



## Going the extra green mile: When others' actions fall short of their responsibility



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### ABSTRACT

The present research examined whether the environmental responsibility and actions attributed to large scale organizations, such as the government, can influence people's environmental efforts. In particular, we examined whether people increase or decrease their willingness to enact energy conservation behaviors (ECB) when there is a shortfall between others' actions and their responsibility. In Studies 1 and 2 we found that willingness to enact ECB was positively correlated with judgements about each of the organizations' eco-responsibility but not their eco-actions. Interestingly, each of the organizations' actions were perceived as falling short of their responsibility and this shortfall was positively associated with willingness to enact ECB. In Study 3, we found that manipulating respondents perceptions of government shortfall increased participants' willingness to enact ECB. Overall our findings provide support for social compensation theory as when others actions fall short of their responsibility people are prepared to "go the extra green mile".

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## 1. Introduction

Environmental campaigns and policy initiatives often attempt to influence people's behaviors (DEFRA, 2008; Owens, 2000). For example, a discussion paper from the UK cabinet office argued that in striving for green behaviors, "the eventual aim is to entrench a habit of personal responsibility" (2004, p.5). However, while the onus appears to be on individuals there are other key actors or agents who also have a role to play in energy conservation such as firms, communities, governments, and international organizations (see Stern, 1992). Yet, to date, this wider social context has typically been overlooked in psychological research. Consequently, it remains to be seen if people's willingness to enact Energy Conservation Behaviors (ECB) is influenced by (a) the responsibility ascribed to others to conserve energy, (b) the actions others are seen to be taking and, (c) incidences in which other agents' responsibility to conserve energy falls short of their perceived eco-actions.

### 1.1. The influence of other organizations on individual environmental efforts

We propose that people's actions are influenced by collective dynamics, such that individuals look to others (including larger organizations) when setting their own behavior standards. We suggest this on the basis that people do not operate in a social and political vacuum; rather they are aware that other organizations and entities have a role to play in energy conservation. Indeed, in several qualitative studies it has emerged that people consider a number of organizations to be responsible for environmental efforts (Barr, Gilg, & Shaw, 2011; Hargreaves, Nye, & Burgess, 2013; Hinchliffe, 1996; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). Interestingly, such findings emerged despite the fact that the majority of these qualitative studies did not seek to examine the role of other agents in environmental behaviors - which suggests that such perceptions may be pervasive. Moreover, it is likely that these perceptions are fostered by the media which frequently provides commentary on the environmental efforts of a variety of agents and institutions. For example, in April 2014 the UK was hit by high levels of air pollution caused by a combination of local emissions, light winds, pollution from the continent, and dust from the Sahara. News articles were quick to acknowledge that such pollution could bring further attention to the, "government's long-term failure to reduce air pollution" (BBC, 2014). As such it is clear that a person's

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environmental action is situated in a broader set of social relations that need to be taken into consideration (see also Catney et al., 2013).

### 1.2. Responsibility

The link between personal responsibility and willingness to enact or support ECB has been established in a multitude of research studies (e.g., Guagnano, Dietz, & Stern, 1994; Hines, Hungerford, & Tomara, 1987; Hunecke, Blobaum, Matthies, & Hoger, 2001; Jansson, Marell, & Nordlund, 2010; Kaiser, Ranney, Hartig, & Bowler, 1999; Kaiser & Shimoda, 1999; Nordlund & Garvill, 2002; Steg, Dreijerink, & Abrahamse, 2005). In contrast, far less is known about the relationship between ascriptions of environmental responsibility to other agents and personal willingness to enact ECB. Yet, it is apparent from both quantitative and qualitative studies, that individuals are aware that other agents, such as their neighbours, the government, corporate bodies (e.g., city council, offices) and multinationals, have a role to play in energy conservation (e.g., Hargreaves, Nye, & Burgess, 2010; Hinchliffe, 1996; Lorenzoni et al., 2007; Stern, Dietz, & Black, 1985). However, it remains to be seen how these perceptions of others' environmental obligations influence people's own environmental efforts. According to the bystander effect, we might expect a diffusion of responsibility to occur and individuals to be less inclined to help by enacting ECB when responsibility is distributed among several others (Darley & Latané, 1968; Latané & Darley, 1970; Latané & Nida, 1981). Yet, on the other hand, if individuals consider both themselves and others responsible for energy conservation this may foster a sense of shared responsibility, such that willingness to enact ECB is positively influenced by ascriptions of responsibility to others.

### 1.3. Action

Past research suggests that social norms play a pervasive role in an individual's willingness to enact ECB (e.g., Barr et al., 2011; Cialdini, Reno, & Kallgren, 1990; Goldstein, Cialdini, & Griskevicius, 2008; McDonald, Fielding, & Louis, 2013; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Typically, marketing campaigns use social norms to try and influence people's behaviors by changing perceptions of what is considered normal (descriptive norms) or socially acceptable (injunctive norms). For instance, researchers found that hotel guests were significantly more likely to re-use their towels when presented with the following normative appeal, "Join your fellow guests in helping to save the environment", than when presented with the message, "Help save the environment" (Goldstein et al., 2008). Social norms can also lead people to act in ways that are detrimental to the environment. For example, people are more likely to litter in littered environments, and this effect is even more pronounced if they have witnessed another person drop litter (Cialdini et al., 1990 Experiment 1). As such, there is substantial support for the idea that people may enact either more or less ECB depending on what others are (or are not) doing. However, typically norms have been examined at the individual level and, to the best of our knowledge; there is currently no research that examines if the norms of larger social organizations (e.g., the government, energy suppliers) influence personal environmental efforts. On the one hand, the environmental actions that an organization takes (or does not take) may set an important precedent (i.e., it may act as a norm), especially given the position of power these organizations may hold. Yet, on the other hand, people may not consider the actions of larger organizations as relevant if

they perceive that they are operating on a substantially different level from themselves.

### 1.4. Considering responsibility and action together

We propose that in order to understand if the wider social context contributes to intentions to enact eco-behaviors it is necessary to consider both perceptions of others' eco-responsibilities, and others' eco-actions. This is because while responsibility and action are distinct and separable from one another they are also clearly related. This relation stems from their definition. Specifically, responsibility is defined as, "the state or fact of having a duty to deal with something ...", while action is defined as, "the fact or process of doing something". In other words, responsibility is about "what we ought to be doing" whereas action is about "what we are actually doing". Thus when people think about responsibility it is likely that they also consider action. Of course, this does not mean that the two inevitably co-occur in an applied setting. Rather, it is possible to be responsible for something but not to take action and vice versa. However, given the operational links between responsibility and action there are two good reasons for considering the dual influence of both factors on intentions to enact ECB. First, considering action without responsibility may render the influence of action irrelevant. If an agent is not considered responsible for conserving energy then their actions or inactions are irrelevant and may have little bearing on our own actions. Second, considering action alongside responsibility provides the basis for moral judgements to be made about whether other agents are meeting their environmental responsibilities. As such, considering both responsibility and action together enables us to address an important and hitherto unanswered research question: to what extent are others' actions seen as matching their responsibility and in cases where others' action are perceived as falling short of their responsibility how does this influence personal willingness to enact ECB? In the present paper we refrain from making specific predictions about whether perceptions of others' shortfall will lead to either an increase or decrease in willingness to enact ECB. We argue that to do so would be inappropriate given that there are psychological mechanisms that can be used to infer support for either possibility. Specifically, when confronted with others' shortfall, the sucker effect and feelings of personal inefficacy may explain why people will decrease their efforts; whereas social compensation theory may explain why people will increase their efforts.

#### 1.4.1. Doing less: running a mile

The 'sucker effect' describes a phenomenon that occurs when individuals experience motivation loss when they suspect that capable others are not contributing (Kerr, 1983). There is some indication from qualitative studies that the sucker effect may occur in response to perceptions that powerful organizations are failing to meet their environmental responsibilities (Barr et al., 2011; Hinchliffe, 1996). For example, one interviewee observed, "But it is discouraging when you hear ... that places like America won't sign up to the Kyoto agreement ... That's just pushing us into thinking, 'well, why should we bother?'" (Barr et al., 2011, p.716), while another interviewee commented, "I am one person and you think, well why am I going to change my lifestyle if all these other people aren't? It's human nature" (Lorenzoni et al., 2007, p.451).

Diminished feelings of personal efficacy or perceived helplessness may also lead individuals to do less when others' actions fall short of their responsibility. Personal efficacy refers to "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations." (Bandura, 1995, p.2). We suggest that individuals' personal efficacy may be undermined in the face of powerful global entities failing to live up to their

environmental responsibilities. Indeed, there is some suggestion of this in qualitative research: “I’m impotent in a way because America didn’t sign up to the Kyoto agreement” (Lorenzoni et al., 2007, p.450) and in quantitative research findings that show perceived behavioral control is a strong predictor of environmental behaviors (e.g., Heath & Gifford, 2002; Kaiser & Gutscher, 2003).

#### 1.4.2. *Doing more: going the extra green mile*

Social compensation theory (SCT) proposes that in a collective setting people may work harder or contribute more effort to group tasks to compensate for others when they expect their co-workers to perform poorly on a meaningful task (Williams & Karau, 1991). As such, if extrapolated from a small group context (where SCT has previously been studied) to a more societal context, SCT provides a theoretical basis for why people may be more likely to increase their own environmental efforts if they perceive a discrepancy between others’ actions and their responsibility. Notably, for social compensation to occur in an environmental setting three conditions need to be met. First, individuals would need to attribute responsibility for energy conservation both to other agents and to oneself to ensure energy conservation is considered an important shared goal. Second, participants would need to perceive that the actions others were taking to conserve energy were minimal or ineffective. Third, as social compensation theory is grounded in the collective effort model (Karau & Williams, 1993), individuals would need to perceive that their environmental efforts could make at least some difference to the goal of energy conservation.

## 2. Current research

In Studies 1 and 2 we utilized a correlational design to examine if willingness to enact ECB were associated with perceptions of others environmental responsibilities, actions, and the discrepancies between others responsibility and actions. In Study 3, we employed an experimental design and manipulated the extent to which the government’s actions were seen as falling short of their responsibility to examine the effects on willingness to enact ECB.

## 3. Correlational studies: studies 1 and 2

In both Studies 1 and 2, we administered a questionnaire measuring participants’ willingness to enact ECB, perceptions of others responsibility, actions, and the discrepancies between others responsibility and actions (i.e., the shortfall). In Study 1, shortfall was calculated by subtracting actions scores from responsibility scores. In Study 2 we aimed to replicate the results obtained in Study 1 and to extend the findings from Study 1, by administering measures of shortfall to ensure that the results we obtained were not the product of measurement biases.

### 3.1. Procedure

In Study 1, participants were presented with a list of six agents displayed in a randomized order and were asked to rate the extent to which each agent was responsible for conserving energy and was taking action to conserve energy. We presented these rating tasks to participants on two different pages because we aimed to avoid highlighting any discrepancies between others’ eco-responsibility and eco-actions (i.e., others’ shortfall) lest this affected ECB ratings. Having completed the rating tasks, participants then indicated their willingness to enact ECB. All measures are detailed below in the order they were presented.

In Study 2, we followed the same procedure. However, this time participants were randomly assigned to complete either (a) measures where shortfall was computed by subtracting action ratings

from responsibility ratings (as per Study 1) or (b) bipolar measures of shortfall (ranging from “action is less than responsibility” to “action is more than responsibility”). Participants then completed the Environmental Government Judgement Scale (EGJS). This is a 15 item scale that we developed to measure perceptions that the governments environmental actions were (i) less than, (ii) in line with, or (iii) exceeding their responsibility. We developed and included this measure to avoid relying on scales comprised of the difference score calculated between two single items. After completing the EGJS, participants then indicated their willingness to enact ECB before providing their responses to a scenario where governments’ environmental actions were described as falling short of their responsibility. We focused on the government, as opposed to other organizations, because, in principle, the government has the most control via legislation. In asking participants explicitly for their responses to the shortfall scenario we were able to see if their self-reported responses to shortfall would be in line with the correlations between shortfall and willingness to enact ECB.

### 3.2. Participants

In Studies 1 and 2 we recruited participants using a convenience sampling method via Amazon’s Mechanical Turk<sup>1</sup> to respond to an online survey entitled, “Social Issues and Your Opinions”. All participants were USA citizens. In Study 1, a total of 197 participants (103 males, 94 females) aged from 18 to 73 ( $M = 33.32$ ,  $SD = 12.99$ ) completed the survey. In Study 2, 212 participants (128 males, 84 females), aged from 19 to 72 ( $M = 34.34$ ,  $SD = 11.98$ ) completed the survey. Of these 212 participants, 108 completed shortfall ratings by providing action and responsibility ratings and 104 completed judgements of the bipolar shortfall measures.

### 3.3. Measures

#### 3.3.1. Responsibility and action judgements

Participants provided their own judgements about the extent to which they agreed/disagreed that each of the six agents were (a) responsible for conserving energy and (b) taking action to conserve energy. All judgements were completed using 7-point scales from 1 (‘Strongly Disagree’) to 7 (‘Strongly Agree’). The agents listed were: myself, other consumers apart from me, the government, the energy suppliers, the big countries that use the most energy (hereafter referred to as industrial countries), and industrial factories. We selected these 6 agents based on the findings from a pilot study in which 10 participants (3 males, 7 females aged between 18 and 60,  $Age = 31$ ,  $SD = 12.27$ ) responded to the open-ended question: ‘In your opinion who does the responsibility lie with to conserve energy?’ We computed a mean score of ‘Other Agents’ Shortfall’ comprised of shortfall ratings of the following agents: the government, the energy suppliers, industrial factories and countries. We excluded “other consumers” from this mean score because we

<sup>1</sup> Past research suggests that the data obtained from M-turk is at least as reliable as the data obtained via traditional methods, and reflect a more diverse sample than either internet or college student samples (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012; Paolacci, Chandler, & Ipeirotis, 2010; Rand, 2012). Moreover researchers have replicated experimental studies previously conducted using both convenience and nationally representative samples and have found that the estimated average treatment effects are similar in the M Turk and in the original samples (Berinsky, Huber, & Lenz, 2012). In the present research, appropriate measures were taken to ensure that the data were of acceptable standard. Specifically, we prevented respondents from taking the questionnaire more than once and attention checks were included where participants were instructed to select a particular option (e.g., please select the middle option to show you are paying attention).

reason that participants will likely perceive “other consumers” as more similar to themselves than to the other agents. In Study 1, we always measured responsibility first and action second. In Study 2, we administered action ratings first and responsibility ratings second. In administering these measures in a different order we aimed to rule out the possibility that our results were influenced by ordering effects<sup>2</sup>

### 3.3.2. Shortfall judgements (subtracting action from responsibility)

Shortfall judgements were calculated by subtracting action ratings from responsibility ratings. Hence, a positive figure indicates a perception that the actions that others are taking to conserve energy fall short of the responsibility that others have to conserve energy.

### 3.3.3. Shortfall judgements (a bipolar scale, Study 2 only)

In Study 2, half of the participants were randomly assigned to complete shortfall judgements using a bipolar scale. Specifically, they were asked to indicate for each agent, ‘if the action they take to conserve energy measures up to the responsibility they have to conserve energy’ using a 13 point bipolar scale ranging from –6 (“action is less than responsibility”) to 6 (“action is more than responsibility”). The midpoint of 0 was labelled “action is equal to responsibility”. We used a 13 point scale to ensure that results were comparable with the shortfall scores that we obtained by subtracting action ratings from responsibility ratings as this previous method allowed scores to range –6 and 6. In subsequent analyses, we reverse scored all responses so that a positive score equated to more shortfall.

### 3.3.4. The Environmental Government Judgement Scale (EGJS, Study 2 only)

In Study 2, we developed our own measure to assess the relationship between perceptions of government’s responsibility to conserve energy and perceptions of the government’s energy conservation actions. Logic dictates that there are only three possible relationships between these two variables. Accordingly, we generated a pool of statements intended to reflect beliefs that the government’s actions (i) fell short of its responsibility, (ii) were in line with its responsibility, and (iii) exceeded its responsibility. In total we generated 15 statements, 5 for each of the possible three relationships. Participants were asked to indicate their agreement/disagreement with each statement using a 7-point scale ranging from 1 (‘Strongly Disagree’) to 7 (‘Strongly Agree’). All items are listed below in the results section in Table 3.

### 3.3.5. Government shortfall scenario (Study 2 only)

We asked participants to report what they would do if the government’s action to conserve energy fell short of its environmental responsibility. Responses were made using a 5-point scale ranging from 1 (‘Decrease my environmental efforts a lot’) to 5 (‘Increase my environmental efforts a lot’). The midpoint of the scale (i.e., 3) represented ‘make no change to my environmental efforts’. Participants were then asked to provide qualitative explanations for the answer they had given.

<sup>2</sup> Specifically, it is possible that our findings in Study 1 may have been swayed by the order in which we measured action and responsibility ratings as we always measured responsibility ratings first and action ratings second. This may have affected shortfall ratings by anchoring them to responsibility ratings meaning that participants’ assessments of shortfall and its relationship to ECB could have been primarily influenced by participants’ perceptions of others responsibility.

### 3.3.6. Willingness to enact ECB

In both Studies 1 and 2, participants indicated the likelihood that they would make a concerted effort to enact each ECB using a 7-point scale ranging from 1 (very unlikely) to 7 (very likely). Six out of eight of these items were adapted from the Student Environmental Behavior Scale (Markowitz, Goldberg, Ashton, & Lee, 2012, p.99). We avoided selecting items that may be dependent on people’s circumstances (e.g., the extent to which they have the opportunities to use public transport, carpool, replace CFL light bulbs, etc.) and instead focused on energy conservation behaviors that in theory most people could enact. Both exploratory and confirmatory factor analysis performed on Studies 1 and 2 revealed a two factor structure (see Supplementary Materials). Factor 1 consisted of items representing effortful ECB: ‘Donate money to research projects designed to reduce carbon emissions’, ‘Start a petition to support environmental protection efforts’ and ‘Tell others about ways in which they can be environmentally friendly’. Factor 2 consisted of items representing easier ECB: ‘Turn my thermostat down by one degree’, ‘Switch off lights in unoccupied rooms’, and, ‘Avoid leaving electronic appliances in stand by modes’. In both Studies 1 and 2 both subscales had good internal reliability (Study 1: Easy:  $\alpha = .74$ , Effortful:  $\alpha = .76$ . Study 2: Easy:  $\alpha = .70$ , Effortful:  $\alpha = .80$ ) and were significantly positively correlated (Study 1:  $r = .44$ ,  $p < .01$ , Study 2:  $r = .62$ ,  $p < .01$ ).

## 3.4. Results

### 3.4.1. Responsibility and action and shortfall judgements

Means, standard deviations, and standard errors indicating respondents’ perceptions of each agent’s responsibility to conserve energy and the actions each agent is perceived to be taking to conserve energy are shown in Table 1.

### 3.4.2. Responsibility ratings

In both Studies 1 and 2, respondents’ responsibility ratings indicate that each of the agents is perceived to be at least somewhat responsible for conserving energy (means ranged from 5 to 6). Overall, participants tended to rate their own responsibility to

**Table 1**

Studies 1 and 2: Means, standard deviations (SD), and standard error (SE) of responsibility ratings, Action ratings, and shortfall (responsibility minus Action).

	Responsibility			Action			Shortfall (responsibility minus action)		
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE
<i>Study 1:</i>									
Me	5.45	1.28	.09	5.21	1.35	.09	.24	1.32	.09
Other consumers	5.32	1.25	.09	4.47	1.36	.10	.86	1.70	.12
Other Agents	5.74	1.07	.07	3.85	1.47	.10	1.89	1.81	.13
Government	5.72	1.30	.09	4.09	1.60	.11	1.63	1.94	.14
Countries	5.85	1.27	.09	3.72	1.73	.12	2.13	2.14	.15
Suppliers	5.71	1.27	.09	3.94	1.66	.12	1.77	1.99	.14
Factories	5.85	1.24	.09	3.65	1.74	.12	2.20	2.15	.15
<i>Study 2:</i>									
Me	5.61	1.31	.13	5.17	1.39	.13	.43	1.23	.12
Other consumers	5.52	1.38	.13	4.65	1.17	.11	.87	1.59	.15
Other Agents	5.69	1.16	.11	3.90	1.15	.11	2.01	1.73	.17
Government	5.72	1.38	.13	4.07	1.50	.14	1.65	1.73	.17
Countries	5.89	1.37	.13	3.50	1.69	.16	2.39	2.24	.21
Suppliers	5.70	1.37	.13	3.98	1.68	.16	1.72	1.95	.19
Factories	5.64	1.56	.15	3.34	1.58	.15	2.30	2.06	.20

Note. The ‘other agents’ score is comprised of the mean of the ratings given for government, industrial countries, the energy suppliers and industrial factories. In Study 1,  $N = 212$ . In Study 2:  $N = 108$ . In Study 1 we always measured responsibility ratings first and action ratings second. In Study 2, we did the reverse (i.e., always measured action ratings first and responsibility ratings second).

conserve energy as less than the other agents' responsibility. To examine if these differences were statistically significant, we conducted a series of pairwise comparisons where the significance level adopted for the results was adjusted to .01 to control for the Familywise error rate.

In Study 1, the results showed that participants rated their own responsibility for conserving energy as significantly less than other agents' responsibility, although the effect sizes obtained were small (the government:  $t(196) = -2.77, p < .01, 95\% CI = -.46$  to  $-.08, d = -0.20$ , industrial countries  $t(196) = -4.25, p < .01, CI = -0.58$  to  $-0.21, d = -0.31$ , energy suppliers:  $t(196) = -2.44, p < .01, 95\% CI = -0.47$  to  $-0.05, d = -0.20$ , industrial factories:  $t(196) = -3.87, p < .01, 95\% CI = -0.60$  to  $-0.19, d = -0.32$ , and other individual consumers:  $t(196) = 1.90, NS, 95\% CI = 0.02$  to  $0.39, d = 0.11$ )<sup>3</sup> In Study 2, participants again tended to rate their own responsibility as slightly less than other agents' responsibility, although these differences were not large enough to reach significance and the effect sizes were negligible (the government:  $t(107) = -79, NS, 95\% CI = -0.42$  to  $0.18, d = -0.08$ , industrial countries  $t(107) = -1.91, NS, 95\% CI = -0.58$  to  $0.01, d = -0.21$ , energy suppliers:  $t(107) = -0.71, NS, 95\% CI = -0.39$  to  $0.18, d = -0.07$ , industrial factories:  $t(107) = -.24, NS, 95\% CI = -0.34$  to  $0.27, d = -0.02$  and other individual consumers:  $t(107) = 1.31, NS, 95\% CI = -.04$  to  $0.21, d = 0.07$ ).

Perceptions of other agents' responsibility did not appear to diminish participants judgements of their own responsibility, in fact the more participants felt other agents were responsible the more they also felt they too were responsible (Study 1:  $r = .57$  and Study 2:  $r = .55$ , both  $ps < .01$ ).

#### 3.4.3. Action ratings

In both Studies 1 and 2, the data show that participants were less inclined to agree that other agents are taking action to conserve energy with mean ratings for each agent typically falling between 3 and 4. This was with the exception of respondents own actions for which the mean score was higher at 5.21 in Study 1, and 5.17 in Study 2.

This suggests that participants believe they are taking at least some action to conserve energy and that the action they are taking is more than that of both other individual consumers and other agents (Study 1: other individual consumers:  $t(196) = 7.84, p < .01, 95\% CI = 0.56$  to  $0.94, d = .54, d = 0.75$ , the government:  $t(196) = 8.37, p < .01, 95\% CI = 0.86$  to  $1.38, d = 0.75$ , industrial countries:  $t(196) = 10.75, p < .01, 95\% CI = 1.23$  to  $1.77, d = 0.96$ , energy suppliers:  $t(196) = 8.84, p < .01, 95\% CI = 0.99$  to  $1.55, d = 0.84$ , and industrial factories:  $t(196) = 11.09, p < .01, 95\% CI = 1.28$  to  $1.84, d = 1.00$ ). Study 2: other individual consumers:  $t(107) = 3.72, p < .01, 95\% CI = 0.24$  to  $.79, d = 0.41$ , the government:  $t(107) = 5.43, p < .01, 95\% CI = 0.69$  to  $1.49, d = 0.76$ , industrial countries:  $t(107) = 7.95, p < .01, 95\% CI = 1.25$  to  $2.08, d = 1.08$ , energy suppliers:  $t(107) = 5.99, p < .01, 95\% CI = 0.79$  to  $1.57, d = 0.77$  and, industrial factories:  $t(107) = 9.27, p < .01, 95\% CI = 1.43$  to  $2.21, d = 1.23$ )).

#### 3.4.4. Shortfall ratings: responsibility minus action

There were significant differences between each of the agents' eco responsibility ratings and their corresponding eco-actions, such that others' eco-actions fell short of their responsibility (other individual consumers:  $t(196) = 7.07, p < .01, 95\% CI = .62$  to  $.110, d = .65$ , the government:  $t(196) = 11.80, p < .01, 95\% CI = 1.35$  to  $1.90, d = 0.65$ , industrial countries:  $t(196) = 13.96, p < .01, 95\%$

$CI = 1.83$  to  $2.43, d = 1.40$ , energy suppliers:  $t(196) = 12.47, p < .01, 95\% CI = 1.48$  to  $2.05, d = 1.19$ , and industrial factories:  $t(196) = 14.35, p < .01, 95\% CI = 1.90$  to  $2.50, d = 1.45$ ). Study 2: other individual consumers:  $t(107) = 5.67, p < .01, 95\% CI = 0.56$  to  $.118, d = 0.68$ , the government:  $t(107) = 9.89, p < .01, 95\% CI = 1.32$  to  $1.98, d = 1.12$ , industrial countries:  $t(107) = 11.07, p < .01, 95\% CI = 1.97$  to  $2.82, d = 1.55$ , energy suppliers:  $t(107) = 9.17, p < .01, 95\% CI = 1.35$  to  $2.09, d = 1.12$ , and industrial factories:  $t(107) = 11.55, p < .01, 95\% CI = 1.91$  to  $2.69, d = 1.46$ )).

Interestingly, participants perceived even their own eco-actions as falling short of their eco-responsibility (Study 1:  $t(196) = 2.54, p < .01, 95\% CI = 0.05$  to  $0.42, d = 0.18$ , Study 2:  $t(107) = 3.67, p < .01, 95\% CI = 0.20$  to  $0.67, d = 0.32$ )). Nonetheless, participants own shortfall was still seen to be significantly smaller than others' shortfall (Study 1: other individual consumers:  $t(196) = -5.96, p < .01, 95\% CI = -0.82$  to  $-0.42, d = -0.41$ , the government:  $t(196) = -10.05, p < .01, 95\% CI = -1.66$  to  $-1.11, d = -0.84$ , industrial countries:  $t(196) = -12.65, p < .01, 95\% CI = -2.19$  to  $-1.59, d = -1.06$ , energy suppliers:  $t(196) = -10.41, p < .01, 95\% CI = -1.82$  to  $-1.23, d = -0.91$ , and industrial factories:  $t(196) = -12.70, p < .01, 95\% CI = -2.26$  to  $-1.65, d = -1.10$ ). Study 2: other individual consumers:  $t(107) = -3.09, p < .01, 95\% CI = -.72$  to  $-0.16, d = -0.31$ , the government:  $t(107) = -5.91, p < .01, 95\% CI = -1.61$  to  $-.81, d = -0.81$ , industrial countries:  $t(107) = -8.48, p < .01, 95\% CI = -2.41$  to  $-1.49, d = -1.08$ , energy suppliers:  $t(107) = -6.04, p < .01, 95\% CI = -1.71$  to  $-.87, d = -0.89$ , and industrial factories:  $t(107) = -9.01, p < .01, 95\% CI = -2.27$  to  $-.87, d = -1.10$ )).

#### 3.4.5. Shortfall ratings (a bipolar scale, Study 2 only)

The descriptive statistics for the shortfall ratings obtained using the bipolar measure are listed in Table 2 along with the results obtained from the series of one-sample t-tests which we conducted for each agent to examine if their shortfall scores were significantly different from 0.

The findings show that each of the other agents' eco-actions is perceived to fall significantly short of their eco-responsibility (apart from Government that did not reach the Familywise corrected .01 significance level). In contrast, participants tended to report that their own eco-actions were either in line with, or marginally surpassed their eco-responsibility. Respondents own shortfall was rated as significantly smaller than each of the others' shortfall (other consumers:  $t(103) = -3.43, p < .01, 95\% CI = -1.41$  to  $-0.38, d = -0.41$ , government:  $t(103) = -2.50, p < .01, 95\% CI = -1.83$  to  $-0.21, d = -0.35$ , industrial countries:  $t(103) = -3.95, p < .01, 95\% CI = -2.45$  to  $-0.81, d = -0.54$ , energy suppliers:  $t(103) = -3.53, p < .01, 95\% CI = -1.97$  to  $-0.55, d = -0.46$ , and industrial factories:  $t(103) = -4.78, p < .01, 95\% CI = -2.65$  to  $-1.10, d = -0.65$ ).

**Table 2**

Study 2: The Means, Standard Deviations (SD), and Standard Error (SE) of the Bipolar Shortfall Measure and findings from the one sample T-test.

	Shortfall			One sample T-test (comparison to 0)
	Mean	SD	SE	
Me	-.24	2.29	.22	$t(103) = -1.07, NS, CI: -.68$ to $.20$ .
Other consumers	.67	2.10	.21	$t(103) = 3.27, p < .01, CI: .26$ to $1.08$ .
Other Agents	1.21	3.00	.29	$t(103) = 4.09, p < .01, CI: .63$ to $1.79$ .
Government	.78	3.42	.34	$t(103) = 2.32, p < .05, CI: .11$ to $1.44$ .
Countries	1.39	3.62	.35	$t(103) = 3.92, p < .01, CI: .69$ to $2.10$ .
Suppliers	1.01	3.11	.31	$t(103) = 3.34, p < .01, CI: .41$ to $1.62$ .
Factories	1.64	3.38	.38	$t(103) = 4.94, p < .01, CI: .98$ to $2.29$ .

Note. The 'other agents' score is comprised of the mean of the ratings given for government, industrial countries, the energy suppliers and industrial factories.  $N = 104$ . The Familywise adjusted level of significance is .01.

<sup>3</sup> Notably, as the dependent variable in question could be viewed as ordinal we also ran the equivalent non parametric tests and obtained comparable results.

**Table 3**

Study 2: Exploratory factor analysis on environmental government judgement items using oblimin rotation.

	Factor loading		Communalities	
	Factor 1	Factor 2	Initial	Extracted
The government is fulfilling its duty to take action to reduce carbon emissions.	<b>.95</b>	.09	.78	.80
The government is doing exactly what it should to conserve energy.	<b>.91</b>	.06	.75	.76
The government's environmental actions are in line with its environmental responsibility.	<b>.88</b>	.08	.67	.70
The government has implemented enough action focused policies to be in line with its responsibility to conserve energy.	<b>.82</b>	-.05	.75	.73
The government is meeting its environmental obligations because it takes enough actions to conserve energy.	<b>.82</b>	-.04	.70	.71
The government is more than fulfilling its duty to take action to reduce carbon emissions.	<b>.79</b>	-.13	.78	.78
The government has implemented several action focused policies to do more than its responsibility to conserve energy.	<b>.78</b>	.05	.57	.56
The government is exceeding its environmental obligations because it takes a multitude of actions to conserve energy.	<b>.66</b>	-.11	.60	.54
The governments' environmental actions exceed its environmental responsibility.	<b>.60</b>	-.30	.71	.68
The government is doing more than it should to conserve energy.	<b>.56</b>	-.32	.71	.65
To meet its environmental obligations the government needs to take more actions to conserve energy.	-.01	<b>.80</b>	.62	.66
The government needs to live up to its responsibility to conserve energy by implementing more action focused policies.	.10	<b>.70</b>	.44	.40
The government's environmental actions fall short of its environmental responsibility.	-.24	<b>.68</b>	.72	.73
The government is doing less than it should to conserve energy.	-.32	<b>.56</b>	.66	.65
The government is not fulfilling its duty to take action to reduce carbon emissions.	-.34	<b>.54</b>	.71	.64

Note. Bold figures indicate which factor items predominantly loaded on.

### 3.4.6. The Environmental Government Judgement Scale (Study 2 only)

To assess the structural integrity of the EGJS we first conducted parallel analysis (PA; Horn, 1965) using the SPSS syntax developed by O'Connor (2000) to determine how many factors to extract.<sup>4</sup> Previous studies have found that PA is one of the most accurate methods for deciding how many factors to retain (e.g., Zwick & Velicer, 1986). Only the first two eigenvalues were greater than the subsequent values, suggesting a two-factor structure solution. Accordingly, we conducted exploratory factor analysis specifying a two-factor solution. Given that we expected our subscales to be negatively correlated we selected an oblimin rotation. Bartlett's test ( $X^2_{(105)} = 2718.04, p < .01$ ) suggested that there was an adequate sample size for this analysis and the Kaiser-Meyer-Olkin (.95) test indicated that the data were suitable for factor analysis. The eigenvalue for the first factor was 9.31 and accounted for 62.07% of the variance. The eigenvalue for the second factor was 1.41 and this accounted for an additional 9.36% of the variance. All items loadings are shown in Table 3.

Factor 1 is comprised of items representing the perception that the government's action either in line with or exceeds its responsibility. Factor 2 is comprised only of items representing perceptions that the government's environmental actions fall short of its responsibility. Both subscales had acceptable reliability (Actions in line with or exceeding responsibility:  $\alpha = .95$ , Shortfall:  $\alpha = .88$ ). As predicted, the two factors were significantly negatively correlated ( $r = -.37, p < .01$ ). Moreover, there was some indication of convergent validity as the government shortfall scale comprised of 5 items was significantly positively correlated with the government shortfall scale that we calculated by subtracting government action from government responsibility ( $r = .49, p < .01$ ). Similarly, the subscale containing items indicating government actions were either in line with or exceeded its responsibility were significantly negatively correlated with the government shortfall scale

comprised by subtracting government action from government responsibility ( $r = -.49, p < .01$ ).

We computed the means for each subscale and found that they were in line with our previous findings. Specifically, the mean score for government shortfall was 5.22 ( $SD = 1.16$ ), indicating that respondents perceive that the government's actions fall short of its responsibility. Conversely, the mean score for the other subscale was 2.89 ( $SD = 1.16$ ) indicating that the majority of participants do not tend to believe that the government's actions are either in line with or exceed its responsibility.

### 3.4.7. Associations of willingness to enact ECB to responsibility, action, and shortfall

The Pearson product-moment correlation coefficients between participants' willingness to enact ECB and eco-responsibility and eco-action ratings are shown in Table 4.

**3.4.7.1. Associations of willingness to enact ECB to responsibility.** In both Studies 1 and 2, willingness to enact both easy and effortful ECB was significantly positively correlated with perceptions of other agents as responsible for conserving energy (Study 1:  $r$ s ranged from .15 to .38, with  $r$ s  $> .20$  being significant at  $p < .01$ . Study 2:  $r$ s ranged from .32 to .47,  $ps < .01$ ).

**3.4.7.2. Associations of willingness to enact ECB to action.** The extent to which others agents were perceived to be taking action to conserve energy was not consistently associated with willingness to enact either easy or effortful ECB. Although, in Study 2, we found that both the ratings of government action and the ratings of industrial factories action were negatively correlated with willingness to enact easy ECB, albeit these findings did not reach statistical significance after applying the Familywise corrected significance level of .01).

**3.4.7.3. Associations of willingness to enact ECB to shortfall (responsibility minus action).** Overall the mean score of other agents' shortfall (i.e., when their responsibility to conserve energy did not measure up to their actions taken to conserve energy) was significantly positively correlated with willingness to enact easy (Study 1:  $r = .26$  and Study 2:  $r = .38$ , both  $ps < .01$ ) but not effortful ECB (Study 1:  $r = .09$  and Study 2:  $r = .16$ , both NS). In both Studies 1 and

<sup>4</sup> PA is based on the Monte Carlo simulation method and entails comparing observed eigenvalues extracted from the correlation matrix to "expected" eigenvalues. "Expected" eigenvalues are computed by simulating random samples/datasets that parallel the observed data in terms of sample size and number.

**Table 4**  
Studies 1 and 2: Pearson product–moment correlation coefficients between each agent's responsibility, action and shortfall and intention to enact easy ECB and effortful ECB.

	Behaviors	Study	Agents						
			Mys	OthC	OthA	Gov	Cou	Sup	Fac
Responsibility	Easy	1	.31**	.31**	.35**	.25**	.38**	.29**	.33**
		2	.52**	.52**	.49**	.47**	.35**	.39**	.32**
	Effortful	1	.30**	.21**	.26**	.25**	.27**	.15*	.15*
		2	.40**	.42**	.24*	.18	.14	.10	.14
Action	Easy	1	.44**	.16*	-.04	-.00	-.01	-.04	-.08
		2	.52**	.14	-.05	.08	-.20*	.05	-.19*
	Effortful	1	.40**	.07	.09	.11	.14	.04	.04
		2	.42**	.22*	-.01	-.04	-.11	.06	-.10
Shortfall (R – A)	Easy	1	-.15*	.10	.26**	.17*	.23**	.22**	.26**
		2	-.03	.35**	.38**	.30**	.37**	.23*	.39**
	Effortful	1	-.12	.09	.08	.07	.05	.06	.06
		2	-.06	.20*	.16	.18	.16	.02	.18
Shortfall (Bipolar)	Easy	2	-.19	.06	.24*	.18	.24**	.14	.27**
	Effortful	2	-.29**	.04	.04	.06	.06	.01	.04

Note: Mys = myself, OthC = other consumers, OthA = other agents (comprised of the mean of the ratings given for government, industrial countries, the energy suppliers and industrial factories), Gov = government, Cou = industrial countries, Sup = energy suppliers, Fac = Industrial Factories. \* $p < .05$ , \*\* $p < .01$ . The Familywise adjusted level of significance is .01.

2, the shortfall ratings for the government, industrial countries, energy suppliers, and factories were positively correlated with willingness to enact easy, but not effortful, ECB. Further analyses revealed positive correlations between each agent's shortfall and willingness to enact easy ECB (Study 1:  $r$ s ranged from .17 to .26, with  $r$ s  $> .20$  being significant at  $p < .01$ , Study 2:  $r$ s ranged from .23 to .39, with  $r$ s  $> .25$  being significant at  $p < .01$ ).

We then conducted further analyses excluding anyone with a score of 0 to see if this would influence the association of shortfall ratings to willingness to enact ECB. Notably, those with a score of 0 believe that the agents' actions are in line with their responsibility (i.e., they are doing what they should be). However, the obtained correlations were comparable to those displayed in Table 4.<sup>5</sup>

**3.4.7.4. Associations of willingness to enact ECB to shortfall (bipolar scale).** The mean score of other agents' shortfall obtained using the bipolar measure administered in Study 2 was also positively correlated with willingness to enact easy, but not effortful, ECB ( $r = .24$ ,  $p = .016$ ). Notably, this correlation was comparable to the correlation we obtained between other agents' shortfall as computed by subtracting action ratings from responsibility (Study 2:  $r = .24$  vs.  $r = .38$ ,  $Z = 1.12$ , NS). Further analyses revealed that the correlations between each of the agents' shortfall and willingness to enact easy ECB were positive ( $r$ s ranged from .14 to .27, albeit only those greater than .25 were significant at the after applying the Familywise corrected significance level of .01).

**3.4.7.5. Associations of willingness to enact ECB to environmental government judgement scale.** The 5-item government shortfall scale was significantly positively correlated with willingness to enact both easy and effortful ECB (respectively,  $r$ s = .43 and .45, both  $p$ s  $< .01$ ). Conversely, the subscale comprised of items indicating that government's actions were either in line with or in excess of its responsibility was significantly negatively correlated with willingness to enact both easy and effortful ECB (respectively,  $r$ s =  $-.30$  and  $-.21$ , both  $p$ s  $< .01$ ). Controlling for personal responsibility did not substantially change the correlations between government shortfall and willingness to enact either easy or effortful behaviors (respectively,  $r(105^b) = .35$  and .31, both  $p$ s  $< .01$ ).

<sup>5</sup> Results available on request from the author.

<sup>6</sup> Notably  $N$  is smaller because only half of the participants provided personal responsibility ratings as they were randomly assigned to complete the shortfall judgements where action ratings were deducted from responsibility ratings.

### 3.4.8. Government shortfall scenario (Study 2 only)

The majority of participants reported that if the government's actions fell short of its responsibility they would make no changes to their environmental efforts ( $N = 75$ , 35.4%), increase their efforts a little ( $N = 98$ , 46.2%) or a lot ( $N = 37$ , 17.5%). Only 2 respondents reported that they would decrease their efforts a little ( $N = 1$ ) or a lot ( $N = 1$ ). Such findings replicate the positive correlations we obtained between government shortfall and willingness to enact ECB.

We used the qualitative responses participants gave for their reactions to the government shortfall scenario to conduct thematic analysis using the five step process outlined by Braun and Clarke (2006) in which analysts (1) familiarize themselves with the data, (2) code it, (3) generate initial themes, (4) review these themes, and (5) define and name them. We employed an inductive approach consistent with an essentialist/realist method whereby the themes identified were strongly linked to the data. Hence, themes were largely identified at the semantic level.

Table 5 shows the themes that emerged from our qualitative analysis for people that indicated they would increase, decrease or make no changes to their environmental efforts. The following themes emerged for participants who said that they would increase their efforts either a little or a lot: compensation, obligation (personal and collective), efficacy (personal and collective), importance of the environment, moral high ground, and setting an example. The following themes emerged for people who said they would make no change: limits to personal environmental contribution, belief that the environmental issues are not important, and disconnection between personal actions and the government. Of the two people who stated they would decrease their environmental efforts, both questioned why they should do more when the government was doing less. In other words, the sucker effect appeared to account for these two people's decreased environmental motivation.

## 3.5. Discussion

### 3.5.1. Perceptions of others' responsibility, actions, and shortfall

Studies 1 and 2 present a first attempt to examine the wider contextual associations of ECB. The results indicate that both individuals and other agents are perceived to be at least somewhat responsible for conserving energy. Yet, other agents are seen to be taking significantly less action to conserve energy than individuals. Both other agents and individuals' eco-actions are seen as falling short of their responsibility to conserve energy and persisted

**Table 5**  
Study 2: Thematic analysis on explanations for responses to the government shortfall scenario.

Theme	Example item
Compensation (+)	ID 49: 'To try and make up the shortfall'. ID 58: "Because I would try to pick up the slack, even if it's just a little'.
Personal Obligation (+)	ID 24: "I have just as much of a personal obligation to be environmentally friendly as the government has". ID 88. "Because while I may not be responsible for the actions and decision of the government, I am responsible for these things in my own life".
Collective Obligation (+)	ID 43: "I think we all need to pitch in regardless of what the government does." ID 61: "It is our collective responsibility to care for the planet ..."
Personal Efficacy (+)	ID 3: "I would increase my environmental efforts because any effort to help the environment helps at least a little bit". ID 59: "Any little bit I can do to contribute can only help".
Collective Efficacy (+)	ID 30: "If everyone changed their efforts a lot it would make up for the short falls of the government" ID 50: "If everyone increased their environmental efforts, it would make a big impact overall."
Importance of environment (+)	ID 16: "I realize the human race is plaguing the Earth with pollution and harming the environment, and if we don't change our ways, we may not have much longer, as a species, to survive on this planet." ID 32. "It is important to remember people will be living after we have gone and we need to leave the planet in a decent state for them."
Moral High Ground (+)	ID 22: "Just because the government proves incapable and incompetent doesn't mean I should as well". ID 31: "I want to do what I can and hope that other people feel the same way. Even if the government is failing the future, I don't want to be a part of that."
Setting an example (+)	ID 97: "Every little bit can help, if I start to be a bit more environmentally friendly that may rub off on other people and so on and so forth". ID 126. "I would try to set a good example for the immediate people around me to try and offset the shortcomings of the government".
Limits of environmental contribution (0)	ID 162: "I'm already doing everything I need to." ID 173: "How could me shivering in a cold house possibly make up for the government failing to pass laws that will do things like ensure every car on the road gets decent mileage?"
Unimportance of environment (0)	ID 197: "I'm just not sure, the environment seems fine to me". ID 202: "I do not believe the dire predictions about the environment, and I do not think it is worth my time to make any effort either way".
Disconnection between personal actions and the government (0)	ID 177: "My actions have very little to do with what the government is doing. If they increased or decreased, my personal actions wouldn't change" ID 203: "What the government does has no effect on how I act individually".
Sucker effect (-)	ID 211: Because why should I do more if they are doing less ID212: Why should I bother reducing my living standards if my government can't make any positive changes?

Note. + Increase in environmental efforts, 0 = no change to environmental efforts, - = decrease in environmental efforts.

irrespective of whether we measured responsibility first (as in Study 1) or action first (as in Study 2). Moreover, we consistently found that regardless of which measures of shortfall are employed there is still a perception that other agents actions are falling short of their responsibility. Notably, this discrepancy between eco-responsibility and eco-actions was significantly larger for other agents than for oneself.

### 3.5.2. Associations of willingness to enact ECB to responsibility, action, and shortfall

Across both Studies 1 and 2 the data show that the responsibility ascribed to others to conserve energy is associated with willingness to enact both easy and effortful ECB. In contrast, perceptions of others' eco-actions were not consistently and significantly related to either willingness to enact easy or effortful ECB. Interestingly, when other agents' actions to conserve energy were seen as falling short of their environmental responsibility, individuals were somewhat more likely to report willingness to enact easy ECB.

### 3.5.3. Shortfall and willingness to enact ECB

Importantly, the positive association between shortfall and willingness to enact ECB emerged consistently, despite our use of several different measures of shortfall which included (i) subtracting action ratings from responsibility ratings, (ii) using a bipolar scale (iii) measuring government shortfall using a 5 item scale, and (iv) asking participants to respond to a government shortfall scenario. As such, it seems that the findings are relatively robust and are not vulnerable to differences in measurement style. Moreover, a thematic analysis of the explanations revealed some

insight into why individuals may increase their efforts when confronted with shortfall. Indeed, the themes that emerged were compatible with the conditions needed to prompt social compensation – i.e., that the goal to be obtained is both important and shared, and that any personal actions they undertake will contribute towards achieving the goal. Specifically, participants appeared to consider "caring for the environment" to be an important goal and one that they had a collective and personal obligation to help fulfill. Moreover, they believed that the environmental actions that they undertook could help make a difference.

As such, the data provide some support for the idea that when others' actions are seen to be falling short of their responsibility people are more likely to be inclined to compensate for the discrepancy by increasing their own willingness to enact ECB. Of course, given that the magnitude of these correlations was generally small and only emerged between others' shortfall and willingness to enact easy (but not effortful) ECB, it seems that respondents may compensate for others' shortfall but only to a certain extent.

## 4. An experimental study: Study 3

In both Studies 1 and 2, we found that participants appear willing to compensate for other agents' shortfall by personally enacting more easy to perform ECB. However, given the correlational design of Studies 1 and 2 we cannot infer causality. Hence in Study 3, we aimed to manipulate shortfall and examine the effect on willingness to enact ECB. We manipulated shortfall by first



asking participants to provide their responsibility ratings, and then randomly assigning them to view either 10 government actions or 10 government inactions. Notably, we deliberately presented the materials in this order in an attempt to manipulate shortfall. Specifically, by presenting participants with the responsibility rating task first and then showing them the actions/inactions we intended to bring responsibility to the forefront of participants' minds. This was done to ensure that those participants who subsequently encountered the 10 government inactions perceived a shortfall to occur between ascribed responsibility to the government and its actions.

We manipulated action on the basis that in Studies 1 and 2 participants typically rated the government as at least somewhat responsible for conserving energy (i.e., mean ratings were always between 5 and 6 out of a maximum of 7). Given the stability of this score we anticipated that it might be difficult to manipulate participants' responsibility perceptions. In contrast, we expected that it might be easier to manipulate participants' perceptions of government's action as we suspect that only those with a specialist interest in the environment would be familiar with environmental policies and legislation. To manipulate actions we randomly assigned participants to view either 10 environmental actions the government has taken or 10 environmental actions the government has not taken. We expected that participants in the inaction condition would score more on the government shortfall measures.

Given the results of Studies 1 and 2 we hypothesized that participants that were induced to perceive high levels of government shortfall (i.e., in the inaction condition) would be significantly more willing to enact ECB than participants that were induced to perceive low levels of government shortfall (i.e., those in the action condition). While we predicted that our experimental procedure would manipulate participants' perceptions of government's shortfall we also considered it likely that in each condition there would be some people that were unaffected by the manipulation. In order to maximize the effect of our manipulation, we removed participants whose scores on our 5-item measure of government shortfall were discordant to the manipulation condition they had been allocated to, namely, (a) those participants who scored highly on government shortfall in the action condition and, (b) those participants who scored low on government shortfall in the inaction condition. Further details on this procedure are presented in the result section.

#### 4.1. Procedure

Participants first rated the extent to which they believed the government is responsible for conserving energy. They were then randomly assigned to view either 10 statements emphasizing the action the government has taken to reduce carbon emissions/greenhouse gases or 10 statements emphasizing issues where the government has not taken action (see [Appendix A](#)). An example of a government action was, 'The environmental actions the government has taken caused carbon pollution to fall to its lowest level in nearly 20 years' and an example of a comparable government inaction was, 'Recent data found that energy related carbon dioxide emissions in 2013 were 2% above the 2012 level, largely because the government has not implemented effective environmental policies.'

Each statement was displayed on a single page and the order in which the pages were presented was randomized. To ensure that participants read the statements we instructed them to 'read this information carefully as you will be asked questions about it later'. To check if our manipulation had worked we asked participants to complete a measure of government action so that we could compute shortfall by subtracting action ratings from responsibility

ratings (as in Studies 1 and 2) as well as our 5-item government shortfall judgement scale (as in Study 2). Finally, participants were asked to indicate how willing they would be to engage in ECB.

#### 4.2. Participants

A total of 125 participants (71 males, 54 females) were recruited via Amazon's Mechanical Turk to complete the online questionnaire. All participants were USA citizens. Their ages ranged from 19 to 81 ( $M = 3.76$ ,  $SD = 13.81$ ). 63 participants were randomly allocated to the high shortfall (government inaction) condition and 62 participants to the low shortfall (government action) condition.

#### 4.3. Measures

##### 4.3.1. Government shortfall

We measured government shortfall using two methods. First, as in Studies 1 and 2, we subtracted action ratings from government ratings and second, as in Study 2, we administered the 5-item measure of government shortfall. The 5-item measure of government shortfall had excellent reliability ( $\alpha = .90$ ).

##### 4.3.2. Willingness to enact ECB

As in Studies 1 and 2 participants completed a measure of their willingness to enact ECB. Each subscale had acceptable reliability (easy:  $\alpha = .68$ , effortful:  $\alpha = .79$ ).

#### 4.4. Results

##### 4.4.1. Manipulation checks

We expected that participants who were exposed to 10 government actions would rate government shortfall as low while participants who were exposed to 10 government inactions would rate government shortfall as high. To examine if this expectation was correct we used a median split to categorize participants' scores on the 5 item government shortfall scale as low (scores of 5 or less) or high (scores of 5.2 or more) to see whether the obtained scores were discordant to the condition participants had been allocated to (i.e. low shortfall scores to participants in the high shortfall condition and high shortfall scores to participants in the low shortfall condition). While this expectation held true for the majority of participants ( $N = 100$ ), it seems that the manipulation did not work as intended for a fifth of our sample. Specifically, in the no-shortfall condition (i.e., where participants were shown 10 government actions) 12 participants still reported perceiving high levels of government shortfall. In the shortfall condition (i.e., where participants were shown 10 government inactions) 13 participants did not report perceiving high levels of shortfall. Hence, following the exclusion of these participants, the mean score of the 5-item government shortfall was 6.14 ( $SD = .55$ ) in the shortfall (or inaction) condition and 3.42 ( $SD = .98$ ) in the non-shortfall (or action) condition<sup>7</sup>.

As an additional test of our manipulation we conducted a one way ANOVA to examine if the conditions had produced significantly different perceptions of government shortfall as assessed by subtracting government action ratings from government responsibility ratings. As intended, there was a significant effect of condition on the Shortfall difference score:  $F(1, 98) = 169.77$ ,  $p < .01$ ,  $\eta^2 = .63$ ) such that participants in the shortfall (or inaction) condition scored higher on government shortfall measures than

<sup>7</sup> We do not report the results of an ANOVA assessing the significance of differences between these two means because of the procedure applied following the median split division of scores.

participants in the non-shortfall (or action) condition ( $M = 3.37$ ,  $SD = 1.73$  vs.  $M = -.92$ ,  $SD = 1.55$ ).

#### 4.4.2. Effect of condition on willingness to enact ECB

Findings from two one-way ANOVAs revealed that there was a significant effect of condition on willingness to enact both easy and effortful ECB (respectively,  $F(1, 98) = 3.98$ ,  $p < .05$ ,  $\eta^2 = .04$  and  $F(1, 98) = 5.29$ ,  $p < .02$ ,  $\eta^2 = .05$ ), such that those in the shortfall (or inaction) condition reported more willingness to enact ECBs than those in the non-shortfall (or action) condition (easy ECB:  $M = 5.97$ ,  $SD = 0.96$  vs.  $M = 5.55$ ,  $SD = 1.15$ , effortful ECB:  $M = 4.44$ ,  $SD = 1.46$  vs.  $M = 3.84$ ,  $SD = 1.11$ ). These findings suggest that participants may be more willing to enact ECB when they are induced to believe that the government's environmental actions fall short of its responsibility.

#### 4.5. Study 3 discussion

The data from Study 3 demonstrate that it is possible to manipulate shortfall by highlighting discrepancies between responsibility and action by first having participants rate an agent's responsibility and then varying the information participants have about an agents actions. Our findings show that participants that are induced to perceive high levels of government shortfall are more willing to enact both easy and effortful ECB than participants that perceive lower levels of government shortfall. Importantly the data show the direction of causality between shortfall and willingness to enact ECB.

### 5. General discussion

The present research presents a first attempt to examine some of the wider contextual variables that surround environmental issues, namely, how perceptions of other agents' responsibility and action contribute to individuals own environmental efforts. Moreover, by considering these variables in relation to one another we were able to make a novel contribution to the literature regarding how people react when others' eco-actions are seen as falling short of their responsibilities.

In summary our findings show that several other agents are seen as responsible for conserving energy but are not perceived as taking action to do so. Respondents' willingness to enact ECB is positively correlated with other agents' responsibility ratings but not perception of their environmental actions. In circumstances where others' actions are seen as falling short of their responsibility people appear prepared to compensate for this shortfall by increasing their willingness to enact ECB.

#### 5.1. Willingness to enact ECB: why eco-responsibility matters

We replicated findings from past research showing that (a) individuals consider themselves to be responsible for conserving energy, and (b) that this responsibility is positively associated with willingness to enact ECB (e.g., Hines et al., 1987; Kaiser & Shimoda, 1999). Our findings also complement existing quantitative and qualitative findings by showing that aside from themselves people attribute responsibility to several other agents (e.g., Lorenzoni et al., 2007; Hargreaves et al., 2010; Hinchliffe, 1996; Stern et al., 1985). Beyond replicating past research, we found that judgements about others eco-responsibilities are positively correlated with willingness to enact ECB. These findings present an important contribution to the literature, as they suggest that, when it comes to environmental issues, responsibility is shared but not diffused, leaving people willing to enact ECB. Indeed, the correlations of .57 and .55 between personal responsibility and others' responsibility

obtained in both Studies 1 and 2 provide some support for the notion of shared environmental responsibility.

#### 5.2. Willingness to enact ECB: why others' eco-actions do not seem to matter

In both Studies 1 and 2 our findings suggest that others are not perceived as taking much action to conserve energy, and that others' eco-actions are not significantly associated with willingness to enact ECB. Therefore, little support was provided for the effects of social norms, at least when considering other agents in the form of high-level institutions or organizations. Such results may be explained by the fact that the average person may have relatively little knowledge of the environmental actions that organizations are taking/not taking. Equally, people may find it difficult to clearly envisage an entire organization's environmental actions rather than a singular person's actions. Indeed, on average participants neither agreed nor disagreed that others were taking action to conserve energy, thus suggesting that they were unsure about their responses. It is possible then that a positive correlation may have been found between willingness to enact ECB and other agents actions if respondents were more inclined to believe these other agents were taking action to conserve energy either because they had knowledge of such actions and/or could envisage them.

It is also possible that we did not find significant correlations between other agents actions and willingness to enact ECBs because the others agents were not considered by participants to be similar to themselves. Indeed, appeals involving social norms appear to be more effective when their content involves a more similar referent group such as guests in *this room* rather than guests in *this hotel* (e.g., Goldstein et al., 2008; Reese, Lowe, & Steffgen, 2013; but see Bohner & Schlüter, 2014; Study 1 for conflicting results).

In summary the null relations between other organizations' actions and willingness to enact ECB could be explained by at least three factors – knowledge of others environmental actions; difficulty of envisaging an organization's environmental actions; and perceived similarity of the organizations to oneself. Future research could independently manipulate these factors to establish if they affect the influence of an organization's actions on individuals own environmental efforts.

#### 5.3. Willingness to enact ECB: when others' actions fall short of their responsibility

In Study 1, we found that other agents' responsibility to conserve energy was seen as falling short of their action and that this shortfall was significantly positively correlated with willingness to enact easy to perform ECB. In Study 2, we replicated these findings using several different measures of shortfall. Moreover, correlations between shortfall and willingness to enact easy to perform ECB were corroborated as almost two thirds of respondents reported that they would increase their environmental efforts should the government's actions fall short of its responsibility. Finally, in Study 3 participants who were manipulated to experience high perceptions of government shortfall were more willing to enact both easy and effortful ECB than participants who were manipulated to experience low perceptions of government shortfall.

We suggest these findings are best explained by social compensation theory. Indeed, the three conditions necessary for compensation to occur were present in our data sets. First, respondents attributed responsibility to everyone including themselves, indicating that energy conservation is seen as a collective or shared goal. Second, respondents appeared unconvinced that other

agents were taking sufficient action as evidenced by their relatively low action ratings. Third, participants appeared to perceive that their own efforts could go some way in compensating for other shortfall. Indeed, in Study 2, the qualitative explanations provided support for the conditions needed for social compensation to occur.

## 6. Conclusions and future directions

Past research has typically identified ways in which individuals can be encouraged to enact ECB. However, it has done so without taking into consideration individuals' perceptions of the "external" world. Our findings show that it is important to consider the broader social context as the extent to which other organizations' actions were seen to fall short of their environmental responsibility increased personal willingness to enact ECB. In our research, we focused on one organization in particular – the government. We consistently found that perceptions of the governments' shortfall were related to increased willingness to enact ECB.

Notably, although significant, in both Studies 1 and 2 many of the correlations we obtained between others' shortfall and ECB were small in magnitude. Similarly, in Study 3, manipulating shortfall did influence ECB but the effect sizes obtained were medium rather than large. This suggests that perceptions of others' shortfall may only explain a small percentage of the variance in willingness to enact ECB. However, this does not mean that our findings are of little importance or interest. Rather, encouraging people to act in environmentally friendly ways constitutes a complex challenge involving a multitude of factors. Thus to identify an additional and previously unconsidered factor still presents an important step towards gaining a more complete understanding of people's willingness to enact ECB.

Nonetheless, although the present research offers an important and novel contribution there is ample scope for future research that could improve upon and extend our findings. First, future correlational research should counterbalance the order in which the measures are presented to participants. While we varied the order in which participants completed responsibility and action judgments, in both Studies 1 and 2 we always measured ECB after participants had completed the responsibility and action judgments. While this enabled us to compare the findings from the correlational studies to Study 3 (in which the experimental design meant that we had no choice but to measure ECB after responsibility and action) it is important to establish whether this ordering had a bearing on our results. Second, to ensure that the results obtained here are not attributable to self-report biases, future research should utilize an objective measure of ECB that captures participants physically enacting a meaningful and personally costly behavior. Given the vague information participants received about each study it is unlikely that they guessed the aim of our research and influenced their answers accordingly. Nonetheless, indicating a willingness to enact ECB is different from actually enacting ECB and establishing a relationship between shortfall and an objective measure of ECB would demonstrate ecological validity. Third, while our results are in line with social compensation theory it is likely that there are additional theories that may also explain the relationship between shortfall and willingness to enact ECB. Indeed, in Study 2 participants mentioned several other reasons for increasing their efforts in response to government shortfall including taking the moral high ground or setting an example to others. Future research could examine the validity of these explanations by operationalizing them and establishing their role as mediator between others shortfall and willingness to enact ECB. Finally, there is ample scope for further research to explore the links between the public goods dilemma and the findings we obtained. Indeed, there are some parallels

between both the public goods dilemma and the perception of others' actions as falling short of their responsibility. Namely, in both scenarios, in the absence of everyone involved working together (i.e., co-operating) it is still in an individual's best interest to contribute even when others do not (i.e., they defect) because the payoff is still greater than doing nothing at all. Considering our findings in this vein may help illuminate other relevant research questions. For instance, participants that initially co-operate in public good games tend to reduce their contribution in subsequent rounds when others repeatedly defect. Are the same findings likely to occur in the shortfall scenario or will people continue to compensate for "repeat offenders" shortfall?

In summary, while as an explanation of the outcome we favor social compensation theory, undoubtedly further research may be required to discount alternative theories. Nevertheless, the present research indicates that perceived shortfall induces a willingness to enact energy conservation behaviors.

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## Appendix A

### *Government actions*

The environmental actions the government has taken caused carbon pollution to fall to its lowest level in nearly 20 years.

The government has recently established the toughest fuel economy standards for passenger vehicles in US history.

The government has reduced oil imports by 10% - the equivalent of 1 million barrels.

The government has finalized fuel economy standards for heavy duty trucks, buses, and vans that will reduce greenhouse gases by 270 million metric tons.

Funds provided through a government initiative known as the Weatherization Assistance Program (WAP) have enabled low-income families to make their homes more energy efficient, saving them \$400 per year.

The government has committed to increase funding for clean energy technology by 30%.

The government has approved enough solar facilities to provide electricity to power 4.4 million homes.

The government has successfully instigated the Better Buildings Initiative which will help commercial and industrial buildings become at least 20% more efficient.

The government has recently implemented a range of incentives for automakers to reduce greenhouse gases using effective design solutions.

The government has committed to expand new and existing international incentives including bilateral initiatives with China, India, and other major emitting countries.

### *Government inactions*

Recent data found that energy related carbon dioxide emissions in 2013 were 2% above the 2012 level, largely because the government has not implemented effective environmental policies.

Without new action by the government, greenhouse gas emissions (GHG) will increase over time and the government will fail to meet its international commitment to reduce GHG emissions by 17% below 2005 levels by 2020.

The government has failed to take action to substantially reduce hydrofluorocarbon (HFC) reductions through implementing

appropriate legislation. Yet eliminating HFC represents one of the biggest opportunities for reducing greenhouse gas emissions.

The government has failed to substantially reduce emissions from deforestation and forest degradation.

The government has neglected to establish carbon emissions standards for both new and existing power plants, yet these are the largest source of emission in the U.S., accounting for roughly 40% of all domestic greenhouse gas pollution.

The government has not yet incentivized household energy efficiency using tax rebates.

The government has not provided substantial support for climate resilient investments by removing policy barriers and modernizing programs.

The government has failed to work more closely with the energy industry to better manage supply and demand.

The government has not comprehensively assessed and addressed existing and long-established energy efficiency barriers.

The government has overlooked energy waste in business and factories by not introducing significant incentives or carefully considered energy reduction programs.

## Appendix B. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jenvp.2015.03.002>.

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