THE PRODUCTION OF CONSUMING LESS: ENERGY EFFICIENCY, CLIMATE CHANGE, AND LIGHT BULBS IN NORTH CAROLINA

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ABSTRACT

Autumn Thoyre: The Production of Consuming Less: Energy Efficiency, Climate Change, and Light Bulbs in North Carolina
(Under the direction of Martin Doyle)

In this research, I have analyzed the production of consuming less electricity through a case study of promotions of compact fluorescent light bulbs (CFLs). I focused on the CFL because it has been heavily promoted by environmentalists and electricity companies as a key tool for solving climate change, yet such promotions appear counter-intuitive. The magnitude of CFL promotions by environmentalists is surprising because CFLs can only impact less than 1% of U.S. greenhouse gas emissions. CFL promotions by electricity providers are surprising given such companies' normal incentives to sell more of their product. I used political ecological and symbolic interactionist theories, qualitative methods of data collection (including interviews, participant-observation, texts, and images), and a grounded theory analysis to understand this case.

My findings suggest that, far from being a self-evident technical entity, "energy efficiency" is produced as an idea, a part of identities, a resource, and a source of value through social, political, and economic processes. These processes include identity formation and subjectification; gender-coded household labor; and corporate appropriation of household value resulting from environmental governance. I show how environmentalists use CFLs to make and claim neoliberal identities, proposing the concept of green neoliberal identity work as a mechanism through which neoliberal ideologies are translated into practices. I analyze how using

this seemingly easy energy efficient technology constitutes labor that is gendered in ways that reflect and reproduce inequalities. I show how electricity companies have used environmental governance to valorize and appropriate home energy efficiency as an accumulation strategy. I conclude by discussing the symbolic power of CFLs, proposing a theory of green obsolescence, and framing the production of energy efficiency as a global production network. I found that promoting energy efficiency involves *consuming less* energy by *consuming more* technologies. This research contributes to understandings of how environmentalists become laboring subjects in an era of neoliberalism and how energy companies are responding to the threat of climate change by turning mitigation into an opportunity for profit.

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LIST OF ABBREVIATIONS

AGO	Attorney General's Office
BLS	Bureau of Labor Statistics
CFL	Compact Fluorescent Light bulb
CHP	Combined Heating and Power
DOE	Department of Energy
DSM	Demand-Side Management
EC	European Commission
EDF	Environmental Defense Fund
EE	Energy Efficiency
EIA	Energy Information Administration
EISA	Energy Independence and Security Act
ENGO	Environmental Non-Governmental Organization
EPA	Environmental Protection Agency
EU	European Union
FPE	Feminist Political Ecology
FTS	Feminist Technology Studies
GE	General Electric
GHG	Greenhouse Gas
GPN	Global Production Network
GS	General Statute
HTS	Harmonized Tariff Schedule
IEA	International Energy Agency

IOU	Investor-Owned Utility
LED	Light-Emitting Diode
MoMA	Museum of Modern Art
NCDENR	North Carolina Department of Environment and Natural Resources
NC EMC	North Carolina Electric Membership Corporation
NCGA	North Carolina General Assembly
NCIPL	North Carolina Interfaith Power & Light
NCLCV	North Carolina League of Conservation Voters
NCPIRG	North Carolina Public Interest Research Group
NC-RETS	North Carolina Renewable Energy Tracking System
NCSEA	North Carolina Sustainable Energy Association
NCUC	North Carolina Utilities Commission
NCWARN	North Carolina Waste Awareness and Reduction Network
ND	No Date
OECD	Organization for Economic Cooperation and Development
RAP	Regulatory Assistance Program
REPS	Renewable Energy and Energy Efficiency Portfolio Standard
RPS	Renewable Portfolio Standard
SACE	Southern Alliance for Clean Energy
SCOT	Social Construction of Technology
SELC	Southern Environmental Law Center
SI	Symbolic Interactionism
SL	Session Law

STS	Science and Technology Studies
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
US	United States
USCAN	United States Climate Action Network

CHAPTER 1: INTRODUCTION

Introduction

This research is about how energy efficiency is produced as an idea, as a part of identities, as a resource, and as a source of value. Energy efficiency is often defined as "physical, long-lasting changes to buildings and equipment that result in decreased energy use while maintaining the same or improved levels of energy services" (La Capra Associates 2006: iii). It is usually framed as something that results from the use of a technology. This research focuses on a case study of a prominent energy efficient technology, the compact fluorescent light bulb (CFL). Such energy efficient technologies can be thought to produce "negawatts,"[1] where a negawatt is a unit of energy efficiency (Lovins 1989).

The CFL has been heavily promoted by environmentalists and electricity companies as a key tool for solving climate change, yet such promotions appear counter-intuitive on the surface. The magnitude of CFL promotions by environmentalists appears at odds with the fact that CFLs can only reduce U.S. greenhouse gas emissions by less than 1% even in the best case scenario. CFL promotions by electricity providers appear at odds with such companies' normal incentives to sell more of their product. This research began with the question, *Given these counter-intuitive promotions, how and why has the CFL become a key tool of climate change mitigation for environmentalists and electricity companies?*

[1] I use the term "negawatts" interchangeably with "energy efficiency," "saved energy," and "using less energy." Following Lovins (1989), one negawatt is equivalent to 1 megawatt of energy efficiency, or 1 megawatt of electricity that one avoided using.

A central theme of this research is that rather than being an already-formed, self-evident technical entity - as it is often treated by environmentalists, energy companies, and policymakers - energy efficiency is produced through social, political, and economic processes. I will show that these processes include identity formation and subjectification; gender-coded household labor; and corporate appropriation of household value resulting from environmental governance. A central finding is that energy efficiency promotions involve *consuming less* energy by *consuming more* technologies. In these ways, this dissertation contributes to understandings of how environmentalists become laboring subjects in an era of neoliberalism and how energy companies are responding to the threat of climate change by turning mitigation into an opportunity for profits.

The dissertation proceeds as follows. In this introductory chapter, I begin by providing background on the case of CFLs, including their political economic and environmental contexts. I discuss my broad theoretical perspectives and research methods. **Chapters 2, 3** and **4** represent the bulk of my findings and analyses, written as separate papers (with their own introductions, theoretical frameworks, methods sections, findings, discussions, and conclusions). In **Chapter 2**, I show how environmentalists use CFLs to make and claim neoliberal identities; I propose the concept of green neoliberal identity work as a mechanism through which neoliberal ideologies are translated into individualistic, consumptive, techno-centric environmentalist practices. In **Chapter 3**, I show how using even the seemingly easiest energy efficient technology, the CFL, constitutes labor that is gendered in ways that can reflect and reproduce inequalities. In **Chapter 4**, I show how electricity companies have used environmental governance to valorize and appropriate home energy efficiency in ways that are an accumulation strategy. In the conclusion (**Chapter 5**), I bring together my findings by drawing out the symbolic power of CFLs,

proposing a theory of green obsolescence, framing the production of energy efficiency more broadly, and discussing directions for possible future research.

CFL Promotions as a Case Study

In spring of 2010, many residents of North Carolina received two mailings that hint at a convergence of views connecting an energy efficient technology, the CFL, with an environmental problem, global climate change. The first mailing was from the Sierra Club, the self-described "largest and most influential grassroots environmental organization in the United States" (Sierra Club 2011); it itemized "Ten things you can do to help curb global warming":

1. Drive Smart!
2. Buy Local and Organic
3. Support clean, renewable energy
4. **Replace incandescent light bulbs with compact fluorescent bulbs**
5. Saving energy at home is good for the environment and for your wallet
6. Become a smart water consumer
7. Buy energy-efficient electronics and appliances
8. Plant a Tree, protect a forest
9. Reduce! Reuse! Recycle!
10. Mount a local campaign against global warming [emphasis mine] (Sierra Club 2010)

The second mailing, from residents' electricity provider, Duke Energy, was a coupon for six free General Electric (GE)-brand CFLs to be collected at Wal-Mart. Text on the outside of this six-pack linked these bulbs to climate change via greenhouse gas (GHG) emissions:

> Did you know if every household used one six pack of GE Energy Smart® CFL's [sic], over the bulbs' lifetime [sic] they would **prevent the emissions equal to 4.6 million cars being on the road**. GE Energy Smart® bulbs save money and resources compared to incandescent bulbs. [emphasis mine]

Here lie strange bedfellows: a large environmental non-governmental organization (ENGO) and a large electricity corporation agreeing that buying CFLs is an important action to prevent climate change. In the rest of this section, I provide background on CFLs as a case study, discussing CFLs promotions from policies, electricity providers, and ENGOs; CFL production and consumption; and CFLs' environmental impacts.

U.S. Policies and Utility-Sponsored Programs to Promote CFLs

CFLs have been promoted through several U.S. federal policies and programs; their promotions have also resulted from state-wide policies in NC. At the federal level, CFLs were incorporated into the U.S. labeling and quality-control program ENERGY STAR in 1999 to address some of the early performance problems people experienced while using them (Sandahl et al. 2006; U.S. DOE 2009). The Energy Independence and Security Act (EISA) of 2007 phased out energy-inefficient light bulbs like incandescents starting in 2012 (U.S. Congress 2007 HR 6/S. 1419), following similar actions by Australia and the EU (Di Maria et al. 2010).

Figure 1.1. EPA's ENERGY STAR "Change a Light, Change the World" Poster. The text reads, "Take the ENERGY STAR Change a Light Pledge and join Americans nationwide in the fight against global warming. Go to energystar.gov to learn more" (ENERGY STAR N.D.(c)).

In October 2007, the Environmental Protection Agency (EPA) launched the "Change a light, change the world" program (ENERGY STAR N.D.(a)). **Figure 1.1** shows an example of their advertising materials, which urge the reader, "Help us change the world, one ENERGY STAR light at a time. Take the ENERGY STAR Change a Light Pledge and join Americans nationwide in the fight against global warming." Taking the

pledge means agreeing to switch one light bulb from an incandescent to a CFL (ENERGY STAR N.D.(a)); as of March 31, 2014, over 3 million people had made this pledge in the U.S. (ENERGY STAR 2014). Their figures show that 69,000 North Carolinians have pledged to install over 480,000 CFLs, which, they calculate, would translate into saving over 500 million pounds of GHGs, $42,000, and 349 million kWh of electricity (ENERGY STAR 2014). As EPA Administrator Stephen L. Johnson explained about the program in January 2008, "More and more Americans are seeing the light – that protecting the environment, while saving money, is as easy as changing a light bulb… Together, we are brightening our country's future, one Energy Star CFL at a time." (Carter-Jenkins 2008)

Also in 2007, NC passed a Renewable Energy and Energy Efficiency Portfolio Standard (REPS). A state law proposed in part to mitigate climate change, REPS requires electricity providers to get a portion of their electricity from renewable energy or energy efficiency (S.L. 2007-397). NC has become a hotbed of energy and climate activism, and its REPS has frequently been touted as the first in the Southeastern U.S. (NC Energy Policy Council 2010). Yet promoting energy efficiency in NC is thought of as particularly challenging because electricity consumption per capita is high, electricity prices are low, and the population is growing (Brown et al. 2012). To meet their requirements under REPS, electricity providers in NC have given tens of millions of CFLs to residential customers (Duke Energy 2011; RAP 2010). This research is focused on the largest of these giveaways, which have been initiated by the Investor-Owned Utility (IOU) Duke Energy. Now the largest electricity company in the nation, Duke Energy is headquartered in Charlotte, NC (NC Energy Policy Council 2013).

Duke Energy's CFL giveaways in NC are some of the latest in a history of utility-sponsored CFL promotions. Into the 1980s, the major choices for residential lighting were

among brands of Edison's incandescent bulbs and most households who used CFLs got them from electric utility promotional programs, thought to have been one of the key drivers of the CFL market (Sandahl et al. 2006). These promotions grew out of Demand Side Management (DSM) programs implemented by state electricity regulators (Hirsch 1999). DSM is a way to "help utilities match energy demand with generating capacity" (Gillingham et al. 2006), mainly by shifting the times (rather than amounts) that electricity is consumed to spread out and dampen peak demand.

CFLs are the public face of Duke Energy's "Save-a-Watt" program, a program to meet the requirements of REPS with energy efficiency (Downey 2010); such a public face can be seen, for example, on the cover of Duke Energy's 2007/2008 corporate Sustainability Report, which shows a full-page drawing of a CFL with people walking along the curves of the bulb, representing corporate sustainability efforts (Duke Energy 2007/2008). Duke Energy's "Save-a-Watt" program has offered discounted and free CFLs since 2009 (Duke Energy 2009). In summer 2009, it gave customers discounts on Sylvania bulbs at Lowe's (Duke Energy 2009). In spring 2010 I received from Duke Energy (my electricity provider) a coupon for six free GE-brand CFLs from Wal-Mart and in fall 2010 Duke Energy mailed me 12 more free Niagara Conservation-brand CFLs in the mail. As detailed more in **Chapter 4**, these programs are paid for via rate increases for customers and Duke Energy is paid for each kWh saved (Duke Energy 2009). Over 200,000 CFLs have been given away in NC via these programs, saving over 40 megawatts of power plant capacity (Downey 2010). Duke Energy has undertaken similar programs in SC, IN, and OH (NCDENR N.D.), giving away millions of CFLs in total (Duke Energy 2011).

CFL Promotions by ENGOs

Many environmental groups promote CFLs prominently as a solution to climate change. In analyzing the websites of the "Big Ten" U.S. ENGOs (see methods section below), I found that nine of these groups portrayed using CFLs as a key action to mitigate climate change. Seven ENGOs listed CFLs as one of top 4-12 things an individual can do to mitigate climate change, and each time it appeared in those lists it was within the first four items. The Sierra Club excerpt at the beginning of this chapter is one illustration of these lists, and also shows that the majority of the other actions being promoted by these groups were consumptive, individual, and private. Showing how much CFLs have come to symbolize energy efficiency, when famous environmentalist Amory Lovins (1989) argued in a prominent forum in favor of negawatts as climate change mitigation, he used CFLs as a key example, urging us to consider them to be tiny power plants:

> Think of such a compact bulb, with 14 watts replacing 75, as a **61 negawatt power plant**. By substituting 14 watts for 75 watts, you are sending 61 unused watts – or negawatts – back to Hydro [a Canadian electricity company], who can sell the electricity saved to someone else without having to make it all over again.

Another example of the widespread use of CFLs as symbols of energy efficiency and climate change mitigation can be seen in an image from the Sierra Club showing Rosie the Riveter holding up a CFL, saying "We can do it!" over the text "Forging a clean energy future" (Sierra Club 2008).

CFL Production and Consumption

The history of CFLs is marked by large corporate interests and partnerships. An employee of GE invented the CFL in 1976 (Sandahl et al. 2006), an invention that some researchers have argued was a response to the 1970s global energy crisis (Ramroth 2008: 5), while others say it was a survival strategy for large light bulb manufacturers in an increasingly competitive light bulb market (Menanteau and Lefebvre 2000). Yet the earliest CFLs often had

short lifetimes, poor lighting quality, and a "flicker" that some researchers think caused many consumers to form negative opinions of the bulbs (Sandahl et al. 2006). Partly as a result, U.S. use of CFLs grew slowly, so that their share of the market for bulbs in their class[2] was still only 1% in 2000 (U.S. DOE 2009).

After 2001, the U.S. market for CFLs changed dramatically, so that by 2007 their market share had risen to 23% (U.S. DOE 2009). That year, the EU placed an anti-dumping tariff on CFLs made in China and other countries (EC 2007), causing a "glut" of inexpensive CFLs to be dumped onto the U.S. market (Sandahl et al. 2006). CFLs were promoted in California in response to the energy crisis and rolling blackouts and in the Pacific Northwest due to droughts that reduced hydropower capacity (Sandahl et al. 2006). The same year, Wal-Mart launched a massive CFL promotion where they sold 162 million CFLs, which was over half the 290 million sold that year in the U.S. (U.S. DOE 2009). **Figure 1.2** shows that nearly all the CFLs sold in the U.S. are imported from China.

[2] "medium, screw-based" bulbs, i.e.: bulbs that fit in a normal household lampshade.

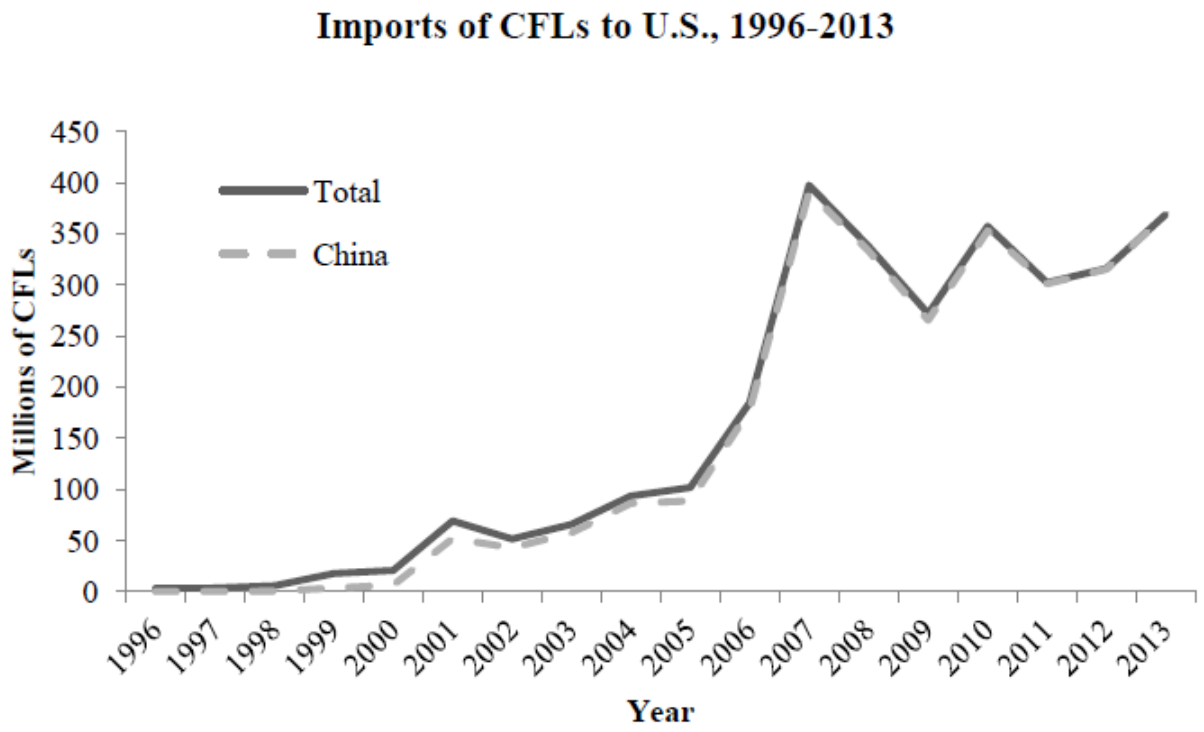

Figure 1.2. Imports of CFLs to U.S. from World and China, 1996-2013. Graph made by author, using data from the U.S. Department of Congress and International Trade Commission (2014); HTS (Harmonized Tariff Schedule) #8539.3100.60, which is the import code for "discharge lamps, other than ultraviolet lamps" which are "fluorescent, hot cathode" and "with a single screw-in base."

At present, the global CFL market is led by three companies, GE, Osram-Sylvania, and Philips (OECD and IEA 2006: 251), which have dominated light bulb manufacturing for roughly a century (Menanteau and Lefebvre 2000). Headquartered in Europe and the U.S., they manufacture bulbs mainly in China (Navigant Consulting Europe 2009: 8); the U.S. buys 29% of the world market (OECD and IEA 2006: 256-7). TCP is another large CFL manufacturer, and one of the few opening factories in the U.S. (Sheeran 2006). Home improvement stores Wal-Mart, Lowe's, and Home Depot have partnered with GE, Osram-Sylvania, and Philips, respectively, to promote CFLs (Sandahl et al. 2006). As a result of the rise of CFLs, light bulb factories have moved from the U.S. to China (Supply Chain Digest 2009) and incandescent sales have been reduced (U.S. DOE 2009). Bulb sales have been predicted to fall by 75% because of

CFLs' longer lifetime (Creyts et al. 2007: 36). While incandescents tend to be bought at grocery stores, CFLs tend to be bought at large home improvement "big box" stores (U.S. DOE 2009).

On the surface, CFLs are a smart bulb choice for consumers. They save users money (Di Maria et al. 2010) and can last eight times longer (Creyts et al. 2007: 35). Yet while some parts of Europe see CFL adoption rates of 50-60%, only 11% of U.S. residential bulbs are CFLs (Sandahl et al. 2006; U.S. DOE 2009). The average number of CFLs per household in the U.S. is 4.4 (North Carolina is 2.5-3) (U.S. DOE 2009). More CFLs are used in parts of the U.S. with prior utility promotional programs such as California and Washington (U.S. DOE 2009). Studies suggest adoption of CFLs is influenced by financial benefits, culture, electricity prices, environmental motivations, and the meanings of lighting in different cultures (Urge-Vortsatz and Hauff 2001; Sandahl et al. 2006; Wall and Crosbie 2009; Wilhite et al. 1996; Bladh and Krantz 2008). Slocum (2004b) has studied how some U.S. ENGOs use CFLs as a way to "bring climate change home," but little is known about how environmentalists in particular think about or use technologies like CFLs.

Environmental Impacts of CFLs

Multiple Life Cycle Analyses have shown that "from cradle to grave," CFLs produce fewer GHG emissions than incandescent bulbs (OSRAM and Siemens 2009; Ramroth 2008; Navigant Consulting Europe 2009; VITO 2009), yet Light-Emitting Diode bulbs (LEDs) are potentially even better (OSRAM and Siemens 2009: 1). Studies have suggested that for the U.S. as a whole and NC in particular, it is better in terms of toxic mercury emissions to switch from incandescents to CFLs because although CFLs contain mercury, there is net more mercury released into the air from burning coal to power incandescents (Eckelman et al. 2008). Lighting is estimated to represent roughly 9% of U.S. residential electricity use (U.S. EIA 2001) and

global electricity demand for lighting is increasing (OECD and IEA 2006: 26). The best CFLs use only one-quarter of the electricity to produce the same amount of light as incandescent bulbs (U.S. EPA 2008).

Although it does not appear, on the surface, to be a complex calculation, no one has publicly calculated the potential impact of CFLs on U.S. GHG emissions in the aggregate. Instead, it is more common for ENGOs to write about the number of imaginary cars that are removed from the road or imaginary houses electrified to equal the energy saved or GHGs avoided from using CFLs. For example, the Environmental Defense Fund writes on their website[3], "If every household replaced just three 60-watt incandescent bulbs with efficient bulbs, the pollution savings would be like taking 3.5 million cars off the road!"

I calculated the maximum percentage of U.S. GHG emissions that can be reduced in the best case scenario if everyone changed all their home light bulbs to CFLs as follows. Note that this figure is an upper limit that cannot be reached in practice because some people have already changed some light bulbs to CFLs and because it is unlikely that every single light bulb will be changed, particularly given the well-publicized stockpiling of incandescents. The calculation was made by multiplying the following figures:

82.7%: The proportion of total U.S. GHG emissions (after changing all gases into equivalent units of CO_2, called "CO_2eq") that was due to CO_2 in 2012 (U.S. EPA 2014: ES-8).

94.2%: The proportion of U.S. CO_2 emissions that was due to fossil fuel combustion in 2012 (U.S. EPA 2014: ES-8).

14.3%: The proportion of U.S. fossil fuel combustion that was due to residential electricity in 2012 (U.S. EPA 2014: ES-11); the figure is a result of the author dividing the CO_2eq emissions from residential electricity (725.8Tg CO_2eq) by the total CO_2eq emissions in the U.S. (5065.7 Tg CO_2eq) within the category of fossil fuel combustion.

[3] Data collected in the present study; see methods below.

8.8%: The proportion of residential electricity use that was consumed in indoor and outdoor lighting in 2001[4] (U.S. EIA 2001).

75%: The average percent less electricity that a CFL uses compared to an incandescent (U.S. EPA 2008).

Multiplying these figures yields:

0.74%: the maximum theoretical proportion of U.S. GHG emissions that could be reduced if every U.S. resident changed every home light bulb to CFLs.

In sum, the CFL is an energy efficient technology that has been highly promoted by U.S. and NC policies and programs, electricity providers, and ENGOs. They are a symbol of energy efficiency and climate change activism for utilities, policymakers, and environmentalists. Their production networks range from factories in China to homes in the U.S. (and beyond in both directions: "backward" along production networks to the extraction of raw materials and "forward" to landfills) and involve multi-national corporate actors. Their consumption has been growing in part due to policies and promotions and in part because they can save consumers energy and money. Yet the magnitude of the environmental savings for CFLs has rarely been calculated in the aggregate and is less than 1% of U.S. GHG emissions even in the best case scenario.

Theoretical Perspectives

I used several broad "sensitizing perspectives" for my research which acted as "points of departure" (Charmaz 2006: 17) for my assumptions, research questions, and methods. Political ecology and symbolic interactionism (SI) are the perspectives most useful in this research, and their emphases on context, power relations, inequalities, and how meanings are constructed shed particular light on my project. For example, political ecologists have pointed me toward understanding neoliberalism as a key political economic and environmental force, while

[4] The most recent date at which this data is available.

symbolic interactionism has sensitized me to the ways that people together make meanings through identity work. Political ecologists see environmental problems as caught up in networks of power, influence, inequality, and dynamic forces. They emphasize analytical questions of who bears the benefits, who bears the costs, and how? SI scholars assume that together people create meanings for themselves, others, and things (Blumer 1969: 2). As an explicitly social constructionist perspective, SI scholars assume "the meaning of anything and everything has to be formed, learned, and transmitted through…a social process," (Blumer 1969: 12). These perspectives are broadly compatible but have different emphases: political ecology has a rich history of work on large political economic forces and subjectivities, while SI provides methods and perspectives emphasizing everyday interactions and practices. In political ecology and/or SI, I drew from theories on environmental subjectivities, identities and labor, technology studies, and critical political economies to build my theories. I will outline the broad contours of these theories here; their applications to the dissertation research are drawn out in more detail especially within **Chapters 2, 3,** and **4**.

Environmentalist Subjectivities

Political ecologists and other critical theorists of environmental subjectivities view multiple possibilities for the environmentalist as a political actor and connect to scholarship on neoliberalism. By environmentalist subjects, I mean people who try to conserve natural resources and "protect the environment" in small and large ways. Many researchers have suggested that new subjects have formed with modernity (Foucault 1995), neoliberalism (Guthman and DuPuis 2006), and the rise of environmentalism (Slocum 2004a; Agrawal 2005; Robbins 2007). These subjects seek to "shop for change" (Johnson and Szabo 2011) and see themselves as consumer-citizens (Guthman and DuPuis 2006). Critics of green neoliberalism (the greening of neoliberal

capitalism and the neoliberaliszation of environmentalisms; see more below) have suggested that "neoliberal notions of citizenship and social capital are [being] discursively repackaged in the image of homo-economicus, the ideal, entrepreneurial, self-made individual," in present discourses (McCarthy and Prudham 2004).

These theorists signal the importance of viewing the environmentalist as a subject of multiple political and economic forces, and produced through multiple processes (Hinchliffe 1996). "Turfgrass subjects" have been produced as caretakers of grass subject to neoliberal logics, in part through community norms of lawn care (Robbins 2007: 130). Much of the research on energy and climate change subjects uses the lens of governmentality to show how governments create green subjects who focus on individualized reductions of GHG emissions (Rutland and Aylett 2008), consumption of energy efficient products (Slocum 2004a), and home energy conservation practices (Hobson 2013).

Identities and Labor

I draw from Symbolic Interactionist scholarship to think about identities. These scholars conceptualize identities as ways people present themselves to claim characteristics that are tied to self-esteem (Schwalbe and Mason-Schrock 1996). *Environmentalist* can be seen as a "moral identity." In such an identity, "our belief in ourselves as good people depends on whether we think our actions and reactions are consistent with that identity," (Kleinman 1996: 5), so the success people have in accomplishing this identity is tied to feelings of self-worth. Identity work is "anything people do, individually or collectively, to give meaning to themselves and others" (Schwalbe and Mason-Schrock 1996). Identity work is accomplished through talk (Snow and Anderson 1987) as well as "gestures, acts, dress, and appearances" (Hunt and Benford 1994).

Both groups and individuals can do identity work, since identities can be collective or personal (Smith 2013; Snow and Anderson 1987; Schwalbe and Mason-Schrock 1996)

I use SI and feminist political ecology perspectives to understand environmental actions as labor. Women are often the targets of environmental campaigns, "expected to be more diligent [than men] in adopting time-consuming green practices like recycling and precycling," (MacGregor 2006: 69). This can increase women's already-larger "care burden," (Buckingham and Kulcur 2009). Many kinds of household labors, from childcare to cooking, have historically been labeled "women's work" and therefore coded as non-work (Giminez 1990: 26). Federici (2009) has traced the assigning of household labor to women and labor outside the home to men to the beginnings of capitalism (53), where "work that women did at home was treated as non-work and worthless" whether it was done "for a family or to make commodities to sell to others," (51). In dual-income households, women in the U.S. do more labor overall because of the "second shift" of housework (Hochschild 2012).

Technology Studies

I draw on two main areas of technology studies: theories of the Social Construction of Technology (SCOT) and Feminist Technology Studies (FTS). SCOT theorists see technologies as inherently social, and that their development is not linear or inevitable. While several traditional histories of light bulbs and CFLs have already been told (Menanteau and Lefebvre 2000; Sandahl et al. 2006; Hong et al. 2005: 22), they have tended to tell an atheoretical tale of the development of the bulb into a seemingly inevitable present form. SCOT developed out of the sociology of scientific knowledge, philosophy of science and technology, histories and sociologies of technologies, and innovation studies (Pinch and Bijker 1987: 18-25). Its theorists argue against technological determinism (Bijker et al. 1987: 2). They follow sociology of

scientific knowledge theorist Bloor in insisting on symmetry: that "successful" technologies be studied in the same way as "unsuccessful" ones (Pinch and Bijker 1987: 18, 28). The idea of symmetry allows me to problematize the "success" of CFLs, so I can assume that "how and why did CFLs arise in this form at this time and place?" is an unresolved question. SCOT theorists also call attention to the "relevant social groups" that form around a technology and how they often have different meanings for the same technology (Pinch and Bijker 1987: 29-34). Bijker (1992) shows this in his history of early (non-compact) fluorescent lights. This concept allows me to assume that CFLs will hold different meanings for different groups of environmentalists, for different companies, and for different policy groups.

FTS scholarship has shown how gender and technology co-produce one another, so that "gender relations can be thought of as materialized in technology, and masculinity and femininity in turn acquire their meaning and character through their enrolment and embeddedness in working machines," (Wajcman 2010). It allows us to expect that the meanings of the CFL as a technology used for climate change mitigation are partly constructed through gender and gender inequalities. Cowan's work (1983, 1999) on the history of domestic technologies shows how as "labor-saving" appliances such as electric irons and washing machines were invented and adopted by housewives in the 1920s U.S., the norms of cleanliness changed (1999: 284), resulting in net "more work for mother" (1983). FTS scholarship also suggests that the gender coding of CFLs is likely to be complex. Cockburn (1997) alerts us to the correspondence of several binaries: technology, public, and masculine vs. (respectively) non-technology, private, and feminine. Faulkner (2001) summarizes how different kinds of home technologies can be gendered differently because of their "association" with men or women in the division of home labor. This suggests that the ways that CFLs are seen by members of the

household matters for their gendering: are they low-tech (or "'soft'" tech, as Faulkner puts it), about cleaning and cooking and routine tasks, or are they high-tech, about home repairs and entertainment?

Critical Political Economies

I use critical political economic theories because they allowed me to assume that there are interests behind political-economic arrangements like discourses, subjectivities, and governance. As Castree (2002) explains, a political economic lens on environmental issues calls attention to "the broad logics of production and the distributive consequences of these logics." I focus on geographers' and others' scholarship on green neoliberalism. Many geographers and others argue that since the 1970s, the capitalist economic system has taken a particular form, neoliberalism, representing a return (at least discursively) to laissez-faire economic ideologies (Heynen et al. 2007: 287) as a response to crises in profitability in multiple industries (Harvey 2005). Neoliberal economies are characterized by movements toward free markets, de-regulation and re-regulation, privatization, and commodification of natural resources (Harvey 2005; Bakker 2010).

Green neoliberalism generally refers to both the "greening" of capitalist institutions like corporations and international trade organizations (Beder 2002: 177; McCarthy and Prudham 2004; McCarthy 2007) and the neoliberalization of environmental groups (Guldbrandsen and Holland 2001; Slocum 2004b). Scholars of green neoliberalism have shown that in a neoliberal era, nature and the environment have been repeatedly appropriated, privatized, and commodified in ways that turn the value of ecosystem goods and services into new realms of profit. Scholars have called attention to the ways corporations and international trade organizations have incorporated environmental tenets into their practices to gain customers and legitimacy in an era

when the appearance of environmentalism can expand markets (Beder 2002: 177; McCarthy and Prudham 2004). Many of these theorists consider neoliberalizations of environmentalism and environmental policy to have had negative impacts on the environment (Heynen et al. 2007: 289; Prudham 2007), but Bakker (2007) offers evidence that in some configurations neoliberalism may protect the environment. Such scholars suggest that the trend is often not toward complete deregulation but is rather a reregulation that results in less transparency and more profits for large corporations (Swyngedouw 2007: 56). These theories highlight the need to understand who is driving economic or political processes and the impacts on various groups (Castree 2007: 283).

Related to this work on political economies of things, in the conclusion (**Chapter 5**) I draw on research on Global Production Networks (GPNs) to suggest some implications of the research as a whole. Scholarship on GPNs "aims to reveal the multi-actor and multi-scalar characteristics of transnational production systems through intersecting notions of power, value and embeddedness" (Coe et al. 2008a). Such analyses began in the work of commodity chain analyses, moved into analyses that included "governance structures in different global industries," and is now focused on global networks of commodities, labor, and governance (Coe et al. 2008a). A "cultural political economy approach" to GPNs can be especially useful for the current case of CFLs and the production of energy efficiency because it such an analysis emphasizes the connections of global systems of production with people's everyday lives and identities (Hudson 2008; Coe et al. 2008b).

Research Methods

This research was inductive, multi-sited, and included qualitative data from interviews, participant-observation, texts, and images. The focus was on the U.S. broadly and on local

dynamics in North Carolina. Multiple methods were used because they are complementary (Bryman 2004: 455) and to triangulate findings (Blee and Taylor 2002: 111). For example, observing how people at these environmentally-oriented events talked about, presented, and promoted CFLs in the context of larger environmental issues allowed me access to meanings that may be more hidden in interviews (Becker and Geer 1957; Emerson et al. 1995: 12). Interviews, on the other hand, are better for understanding personal and organizational histories or for asking about topics people may not talk about regularly (Trow 1957). I concentrated analysis on different types of data for different chapters. Broadly, my analysis for **Chapters 2** and **3** focused on the interviews and participant-observation, supplemented with data from texts and images; my analysis for **Chapter 4** focused on texts, supplemented with data from interviews and participant-observation.

I followed Charmaz's (2006) assumption that methods are technical and perspectival when collecting data. While interviewing people, I assumed that the interviewee and I were constructing meanings together. I assumed I could observe such meaning-constructing, but that it was more difficult to observe the meaning-making processes that had happened in the past and had already become stabilized in interviewees' speech. I did not assume that what people tell me is what they believe all the time. While observing, I assumed that I have a better insight than during interviews into what meanings people might give CFLs, environmentalists, and climate change in their everyday conversations, and how meanings are informally made, passed on, interpreted, and negotiated. I was also able to see patterned absences. For example, despite how much IOU and ENGO texts talk about CFLs in the context of climate change, I rarely observed people connecting these two things verbally during participant-observation (in particular, I was surprised to find that CFL-talk was almost completely absent from the NCUC public hearings).

Given my other findings, I interpreted this patterned absence to be a result of both the common-sense nature of this connection (so common it did not need to be said out loud) and ambivalence about CFLs' significance (see **Chapter 5** for more on this ambivalence).

While collecting and analyzing public documents that IOUs, ENGOs, and policymakers have produced, my approach was slightly different. These texts, unlike my field notes and my interview transcriptions, were extant: I had no hand in making them, and in fact they were made for some other purpose. I assumed that they do not represent the views of everyone at the time or even everyone who made them at the time, since meanings are contested. However, they were useful for understanding how meanings flow, move, encounter one another, are stabilized momentarily, and otherwise change in public spheres. The policy and rulemaking documents were especially important because they codify political economic relations.

Interviews and Participant-Observation

I conducted three kinds of interviews in this research: longer formal semi-structured, in-depth interviews; short informal interviews as part of my participant-observation; and longer semi-structured, in-depth interviews with key informants. All interviewees were given pseudonyms in this dissertation. From November 2011 to January 2013, I formally interviewed 15 environmental activists in NC, all of whom performed multiple energy-related practices in and outside of their homes "for the environment." Six were leaders of environmental organizations or committees and only two were not active within any such group. I gained access to these individuals via participant observation and the "snowball" method (Lofland et al. 2006: 43). My sampling was theoretical rather than representative (Charmaz 2006: 96-7). Questions focused on how the interviewees think climate change should be solved, what sorts of actions they do "for the environment," how they use CFLs, and how they came to buy and use CFLs.

Interviews were semi-structured, recorded, transcribed, and lasted 1-2.5 hours. Interviewees were white, in their 20s-80s in age, and included: 5 men and 10 women; unemployed or retired (9), part-time wage laborers (2), and full-time wage laborers (4); parents (10) and non-parents (5); relatively wealthy (8), middle-class (4), and poor (3) people; from six different towns in central NC; a fuller description of their demographics can be found in **Table 3.1**. Consent of interviewees was obtained.

To complement these interviews (Emerson et al. 1995: 12), I conducted 55 hours of participant observation at public energy and environmental meetings and hearings in NC from February 2011 to November 2012. The events included an Earth Day celebration, an energy efficiency education fair, two climate activist rallies, three public utility commission hearings on state electricity issues like rate increases, and five professional clean energy conferences. I used these events and meetings as both a source of data itself and as the way I found interviewees.

During the participant observation, I briefly interviewed 37 energy and environmentalist employees and volunteers at these events about their personal or their organizations' views on energy efficiency and/or CFLs. About half of these informal interviews were done with men and half with women; all were white but one; and with people in their 20s-60s. They included: nineteen employees or volunteers with ENGOs; three employees of NC IOUs (two representatives of Duke Energy, one of Dominion); seven employees of clean energy businesses; four employees of central NC universities; one city lawyer involved in energy efficiency; one employee of the NC Utilities Commission Public Staff (which represents the electricity "using and consuming public"); and one representative of La Capra Associates (the consulting group that studied the potential for NC's REPS policy). During participant-observation, I also observed lectures, public talks, and presentations from then-CEO of Duke Energy (Jim Rogers), a separate

representative of Duke Energy, a leader of NCSEA (an ENGO in NC), a lawyer for the North Carolina Utility Commission (that governs electricity companies), a representative of DSIRE (a database on green energy policies), and others.

Finally, I formally interviewed four key informants who consented for me to use identifying information (the organization they work at and their names, although I only used the former in this dissertation) in February 2011. I originally intended to interview more such informants, but was constrained by time in the present research. I interviewed the executive director and director of governmental relations of the NC League of Conservation Voters, a lawyer who serves as legal counsel for the ENGO NCWARN, and a senior policy analyst with DSIRE (part of the NC Solar Center). These interviews were recorded and used primarily as supplemental data in **Chapter 4**.

Texts and Images

I collected four broad types of texts and images: I systematically collected (1) U.S. ENGO websites, (2) google search images, and (3) REPS policy- and rule-making texts; I also collected and used (4) a wide variety of miscellaneous texts as supplementary data. For the first source of textual data, I collected websites, letters, and emails from what have been identified as the "Big Ten"[5] mainstream U.S. ENGOs (Center for Media and Democracy 2011) as well as websites from the 35 other members of the U.S. Climate Action Network (US CAN 2010; see **References** for full listing) in summer 2010. Using "screen captures," I began at the homepage of each group, clicked on the "issues" or "programs" tab, then on "global warming" or "climate change"; each group had some variation of this path. I then looked for links that indicated "what you can do" or other calls for the reader/viewer to act. I followed those links until they

[5] These 10 were Defenders of Wildlife, Environmental Defense Fund, Greenpeace USA, National Audubon Society, National Resource Defense Council, National Wildlife Federation, Nature Conservancy, Sierra Club, Wilderness Society, and World Wildlife Fund.

intersected with CFLs or until I found no evidence they talked about CFLs. I looked for patterns among the ways that CFLs and climate change were linked and how the actions for mitigating climate change were framed. I conducted a discourse analysis, looking at the "text in context," analyzing patterns and change in the way lighting technologies and CFLs in particular have been linked to climate change in a qualitative, interpretive, and holistic way (Wodak 2008: 5-6). I focused more effort on the "Big Ten" groups in my analysis, since they represent much of the mainstream, national, public environmental discourses in the U.S. These groups have been faulted as being too corporate and professionalized (e.g., Beder 2002); nonetheless, they influence millions of environmentalists, collect billions of dollars in revenue, and, unlike smaller groups, often have a voice in policy decisions. I used this data mainly in **Chapters 2, 3** and **5**.

To understand the gender coding of CFLs, I collected a second set of textual data using google searches. I analyzed the first ten photos and their accompanying articles when I searched for several strings in Google (while signed out of google accounts like gmail). I searched for ten different terms ("mom," "dad," "mother," "father," "man," "men," "woman," "women," "girl scout," "boy scout"), each paired with "CFL" once and with "compact fluorescent" once (using both CFL and compact fluorescent was necessary because "CFL" is also a common abbreviation for the Canadian Football League). For example, I searched for both "mom and CFL" and "mom and compact fluorescent." These 20 searches resulted in 200 items total that I analyzed mainly in **Chapter 3**.

A third major source of textual data, mainly used in **Chapter 4**, were legislative and rulemaking documents. In particular I examined three groups of data. First, the NC General Assembly commissioned a study of the potential for a Renewable Portfolio Standard in NC (La Capra 2006; GDS 2006); I analyzed that study's report and the responses by IOUs, ENGOs, and

others to the study when it was publicized in 2006[6]. Second, I analyzed the REPS bill itself (REPS of 2007) and its codification as a NC General Statute (G.S. § 62-133.8). Third, I analyzed the docket (E-100, sub 113) through which the initial rules for implementing REPS were hashed out among IOUs, ENGOs, the North Carolina Utilities Commission (NCUC), and others (more details in **Chapter 4**). In this docket, the NCUC first asked stakeholders for their opinions on potential rules for implementing the REPS bill; those stakeholders and others who wanted to participate filed comments officially through lawyers; then groups responded to each other; and finally the NCUC made its initial rules. This docket consisted of 208 separate documents from these different groups; the rulemaking docket goes beyond these 208 documents after the initial rulemaking, but focuses mainly on non-energy efficiency concerns after these first 208. I supplemented this textual data with a few documents that are part of the Save-a-Watt docket (E-7, sub 831), which is the rulemaking proceeding through which Duke Energy's energy efficiency programs (including CFL giveaways) were proposed, debated, and approved. It was beyond the scope of this research to analyze that entire docket (and its 338 separate documents) fully; instead, I used comments from groups like the Attorney General's Office, the City of Durham, Duke Energy's initial Save-a-watt proposal, and the NCUC's ruling on Save-a-Watt to show the directions of energy efficiency rules after the initial rulemaking docket.

My fourth source of textual data was not collected in the same "systematic" way as the prior three sources of data, which is why I called it "miscellaneous" textual data. I collected this data by picking up fliers, pamphlets, posters, etc. at events at which I conducted participant-observation; I also received this type of document from people who knew about my research sending me such texts that they encountered and by coming across such documents online through my research. This miscellaneous data includes data from Duke Energy (its Sustainability

[6] Available: http://www.ncuc.commerce.state.nc.us/reps/reps.htm

Reports and 10-K forms; websites on CFLs, energy efficient lighting, and energy efficiency; Jim Rogers' testimony before Congress promoting energy efficiency in 2007; letters, coupons, and postcards to customers urging them to use CFLs), ENGOs located in NC (pamphlets, fliers, emails from NCSEA, NCPIRG, NCWARN, NCLCV, NCIPL, and others), and others.

Analysis

Because of my focus on meanings and processes and my assumptions about power/inequality, I used a feminist grounded theory approach to both data collection and analysis. By "feminist," I draw on approaches to field work (Kleinman 2007) that stress ever-present power relations and inequality in social settings, and the need to see and analyze these in any fieldwork (because they are already there). Feminist field work approaches have been successful at unpacking "taken-for-granted" meanings, which were helpful in understanding CFLs and energy efficiency. By "grounded theory," I mean approaches to data collection and analysis that are at times inductive and deductive, that are about interpretation, the construction of data and theories, and constant comparison (between data and data, data and theory, theory and theory) (e.g., Charmaz 2006; Becker 1958). Analysis was ongoing, including open coding (Lofland et al. 2006: 200-1) and more holistic interpretation based on patterns among the interviews (Kleinman et al. 1997: 486). Findings are analytically generalizable (Kleinman et al. 1997; Becker 1990) to processes and links between CFLs, cultures of environmentalism, and political-economies.

During data collection, this feminist grounded theory approach meant that I had certain assumptions about myself and my relationship to research participants: my positionality. I assumed that I was not a "blank slate" (Kleinman et al. 1997): my experiences in the world, my previous readings, and my beginning assumptions all shaped the way I approached any field site

or research problem. Rather than trying to adopt a stance of seeing the world as if I had no background or assumptions, I assumed that the best way to reduce my biases was by examining them. While writing field notes, as Emerson et al. (1995) suggest, I assumed that it was impossible for me to transcribe the world exactly as it is. All data is constructed, and inevitably I constructed my data by filtering out certain things, deeming some important enough to jot down and others not important at all, by not even noticing certain things and being sensitive to others. This is inevitable for all researchers (both qualitative and quantitative), and I tried to reduce this bias by writing as complete of field notes as possible for interviews and participant-observation. Because of my own positionality in terms of class, gender, race, etc., I was more sensitive to certain experiences (e.g., gendered experiences) and may not have even noticed or understood others (e.g., racialized experiences). I assumed that only by being aware of my own privileges, disadvantages, and experiences and how they might relate to other participants could I begin to notice some of the power relations in the contexts I was studying. As Kleinman et al. (1997) write, however, my positionality (anyone's positionality) is not an insurmountable bias: it is another source of data. How people reacted to me is how they are likely to react to other young, white, middle class, grad student women.

I treated interviewing, observing, and collecting publications, what we often call "methods," as collections of techniques that are applied together, but can be applied in very different ways based on a researcher's approach. My approach, feminist grounded theory, developed out of my initial research questions and my political ecological and symbolic interactionist perspectives. Together, my data and analyses form the basis for the next three chapters, which constitute the heart of my findings and interpretation for this dissertation.

CHAPTER 2: CONSTRUCTING ENVIRONMENTALIST IDENTITIES THROUGH GREEN NEOLIBERAL IDENTITY WORK

Introduction

The question of how people become environmentalists is important to building more sustainable communities. Much of the research addressing this question has focused on the "determinants" of pro-environmental behaviors (like recycling or voting "green"), including demographics and holding particular values (e.g., Stern 2000; Bamberg and Moser 2007; Thoyre 2011). A separate line of research has focused on environmentalists as subjects within neoliberal economic systems who focus their efforts on green consumptive practices (McCarthy and Prudham 2004; Slocum 2004a; Rutland and Aylett 2008). But the question of *how* neoliberal ideologies become translated into people's everyday environmentalist practices is not yet fully understood (Agrawal 2005: 210; Barnett et al. 2008). In this paper, I use insights from symbolic interactionist (SI) sociology to expand our understanding of the *mechanisms* through which green neoliberal subjects[7] are formed. Using SI theories of identity work, I develop the concept of *green neoliberal identity work*, a process through which groups and individuals construct and claim neoliberal environmentalist identities. Green neoliberal identity work can be seen as a mechanism through which neoliberal ideologies become translated into environmental practices as these subjects *form themselves*.

The paper proceeds as follows. I begin by building the concept of green neoliberal identity work by weaving critical perspectives on neoliberalism and neoliberal subjects with SI

[7] Although green neoliberal subjects are the focus of this paper, it should be noted that these are only one subset of environmentalists.

perspectives on identities and identity work. I explain my empirical research approach to further examining the idea of green neoliberal identity work. Data from interviews, participant observation, and texts about environmentalists' promotions and uses of energy efficient light bulbs revealed five generic patterns of such identity work. I close by discussing two implications of using the concept of green neoliberal identity work to examine how people become environmentalists. First, this concept illuminates the ways that neoliberal environmental subjects *form themselves through talk*, helping scholars better understand the mechanisms of neoliberal subject formation. Second, the concept of green neoliberal identity work opens up new ways of thinking about resistance to neoliberal environmental projects, through micro-processes I call *critical green identity work*.

Conceptualizing Green Neoliberal Identity Work

How do people become neoliberal environmentalists? In other words, how do neoliberal ideologies translate into people's everyday environmentalist practices such as buying energy-efficient light bulbs and other green consumptive acts? I begin to answer this question using critical perspectives on neoliberalism, where scholars have theorized current constructions of neoliberal subjects, showing how they privilege capitalist class interests. Yet this literature has not yet well-theorized "subject formation" (Agrawal 2005: 210), especially glossing over the *mechanisms* through which these subjects are formed. Often the green neoliberal subject is said to be "enrolled," or, following Althusser, they are "interpellated," into the project of neoliberalism without addressing *how* that process happens (c.f. Robbins 2007; Barnett et al. 2008). Identities are assumed to be already-formed and static. I turn to SI perspectives to understand these mechanisms better, as SI theories highlight the processes through which identities are constructed and reconstructed through everyday practices. SI theories provide a

way to understand the question of *agency* within theories of green neoliberalism, illuminating *how* people become neoliberal environmentalists, and how neoliberal ideologies get translated into everyday practices.

In building the concept of green neoliberal identity work, it is important to note the relationship between concepts of *subject* and *identity*. When scholars study neoliberalizations of environmental discourses, people, and practices, they tend to view the environmentalist as a *subject* (Guldbrandsen and Holland 2001; Slocum 2004a; Robbins 2007), whereas when scholars study everyday processes of making environmentalists, they tend to view the environmentalist as an *identity* (Horton 2003; Saunders 2008). Little work has bridged the two, yet they are generally compatible perspectives. Both critical perspectives on neoliberalism and SI theories are social constructionist and, although they do it differently, both are attentive to the interests served by various processes and the ways that particular constructions of subjectivities/identities are influenced by current power relations. SI work can complement that of green neoliberalism scholars who have been conscious of power relations within capitalism. For example, Schwalbe and Mason-Schrock (1996) emphasize that SI research on identity work analyzes "the place where people, through expressive behavior and face-to-face interaction, both reproduce and resist larger social arrangements." They stress that the ways people make and claim identities "are enabled and constrained by the conditions under which people act."

Critical Perspectives on the Green Neoliberal Subject

Scholars of neoliberalism have shown that a range of groups are subject to neoliberal economic ideologies. Neoliberalism is considered the form of the U.S. economic system since the 1970s and a class project that seeks to restore rates of accumulation to elites at a time of declining profitability (Harvey 2005: 19). Neoliberal ideologies prioritize free movement of

capital (Harvey 2005: 11), market forces over state decisions about resource allocation (McCarthy and Prudham 2004), individuals' rights and responsibilities, and private property (Heynen et al. 2007: 10, 287). Much of the work on neoliberal subjectivities has its roots in Foucauldian ideas of power as productive of subjects (2007) who self-discipline (1995), so that even small, private actions like changing one's light bulb are involved in power relations. Broader neoliberal ideologies "of citizenship and social action are discursively repackaged in the image of homo-economicus, the ideal, entrepreneurial, self-made individual," (McCarthy and Prudham 2004). Using Foucault's ideas about power, subjectivity, and governmentality, scholars have shown that neoliberalism has produced subjects who "shop for change" (Johnston and Szabo 2011) and are encouraged to think of themselves as consumers first rather than other kinds of citizens (Guthman and DuPuis 2006).

Green neoliberal subjects are a type of neoliberal subject oriented toward environmental concerns, yet still subject to neoliberal ideologies of marketization, privatization, and consumption-as-social-change. Green neoliberalism generally refers to both the "greening" of capitalist institutions like corporations and international trade organizations (Beder 2002: 177; McCarthy and Prudham 2004; McCarthy 2007) and the neoliberalization of environmentalist organizations (Guldbrandsen and Holland 2001; Slocum 2004b). "Turfgrass subjects" have been produced as caretakers of grass subject to neoliberal logics, in part through community norms of lawn care (Robbins 2007: 130). Much of the research on energy and climate change subjects uses the lens of governmentality to show how governments create green subjects who focus on individualized carbon emissions reductions (Rutland and Aylett 2008), consumption of energy efficiency products (Slocum 2004a), and home energy conservation practices (Hobson 2013). Neoliberalizations often cause environmental degradation (Prudham 2007), but they can also

improve environmental quality (Bakker 2005) or go either way (Bakker 2010). There are hazards in the "co-optation" of environmental movements and subjectivities by neoliberal logics (Gulbrandsen and Holland 2001), as neoliberalized environmentalist subjects may damage democracy (Slocum 2004a), diminish a sense of responsibility among activists (Hinchliffe 1996), and widen inequalities (McCarthy 2007). Dowling (2010), reviewing the literature on climate change activist subjectivities, found that they both help and hurt inequalities.

SI Perspectives on Identity Work

Symbolic interactionism is a field of sociology that grew out of the pragmatist philosophy of George Herbert Mead and is often framed as having the following assumptions, as laid out by one of its founders: (1) "human beings act toward things on the basis of the meanings that the things have for them"; (2) "the meaning of such things is derived from, or arises out of, the social interaction that one has with one's fellows"; and (3) "these meanings are handled in, and modified through, an interpretative process used by the person in dealing with the thing he encounters," (Blumer 1969: 2). Symbolic interactionists build the concept of identity work from the underlying idea that together people create meanings for themselves, others, and things (Blumer 1969: 2). As a social constructionist perspective, SI scholars assume "the meaning of anything and everything has to be formed, learned, and transmitted through…a social process," (Blumer 1969: 12).

An example useful for thinking about environmentalists as subjects can be found in Becker's (1953) work on how people become marijuana users. Becker noted that many of those researching drug behaviors focused on the social psychological determinants of that behavior, similar to how much of current research on environmentalist behaviors has focused on its "determinants." In contrast, Becker's use of an SI perspective meant he assumed,

> that the presence of a given kind of behavior is the result of a sequence of social experiences during which the person *acquires* a conception of the *meaning* of that behavior, and perceptions and judgments of objects and situations, all of which make the activity possible and desirable (emphases mine).

This idea led Becker's research away from a focus on "those 'traits' which 'cause' the behavior" and instead toward "describing the set of changes in the person's conception of the activity and the experience it provides for him." Marijuana users had to *learn* how to use marijuana for pleasure: veteran users taught beginners how to identify the bodily sensations they were experiencing while smoking as pleasurable experiences. In this way, an SI perspective emphasizes the processes through which people build environmentalist identities rather than the traits "causative" of pro-environmental behaviors.

SI scholars conceptualize identity as a way that people present themselves to claim characteristics that are tied to self-esteem; it is "*a sign that evokes meaning*" to others (Schwalbe and Mason-Schrock 1996; emphasis theirs). *Environmentalist* can be seen as a "moral identity." In such an identity, "our belief in ourselves as good people depends on whether we think our actions and reactions are consistent with that identity," (Kleinman 1996: 5), so the success people have in accomplishing this identity is tied to feelings of self-worth. *Identity work* is "anything people do, individually or collectively, to give meaning to themselves and others"; people use the resources available to them to accomplish identities through identity work (Schwalbe and Mason-Schrock 1996). Yet even those with minimal physical or financial resources can create and claim identities, as in Snow and Anderson's (1987) study of homeless people who used *identity talk* to construct identities tied to high self-esteem. In addition to talk, identity work is about "gestures, acts, dress, and appearances, that communicate an identification with a particular worldview," (Hunt and Benford 1994). Calling identity talk and other acts that claim, define, maintain, repair, contest, and police identities *work* calls attention to how the

processes of identity-making can fail and how successful identity-making often requires "care and skill," (Schwalbe and Mason-Schrock 1996). Scholars have further distinguished *subcultural* from *individual* identity work, since identities can be collective (Smith 2013) or personal (Snow and Anderson 1987). Groups do subcultural identity work to construct collective identities, providing the resources in terms of "signs, codes, and rites of affirmation," from which individuals draw to do the individual identity work of constructing personal identities (Schwalbe and Mason-Schrock 1996).

Given these conceptions of green neoliberal subjectivities and identity work, I propose that we view the particular type of identity work through which neoliberal environmentalist subjects are constructed as *green neoliberal identity work*. It is the work of claiming, defining, maintaining, repairing, contesting, and policing green neoliberal identities. Based on what is already known about these subjectivities, I argue that the *consumption of things* within neoliberal logics of free markets, private property, and individualized action are central to this identity construction; this assumption motivates the choice of case study, below.

Research Approach

Case Study

To examine green neoliberal identity work in detail, I use the case study of environmentalists' promotions and use of energy efficient compact fluorescent light bulbs (CFLs). The CFL is an emblematic object of green neoliberal subjectivities focused on the consumption of things. Slocum (2004b) identified CFLs as a "boundary object" that city governments used to "bring climate change home" in discourses creating green neoliberal subjects in her research. She found that energy efficiency objects like CFLs are central to green neoliberal discourses because focusing on energy efficiency places "cost saving as the

gatekeeper of possibility" and individualize responsibility for climate action. I have found that environmental non-governmental organizations (ENGOs) position using CFLs as a key sign of green neoliberal identities, in part by giving the image of the CFL the meaning "energy efficiency action" and "climate change solution." CFLs follow the tradition of incandescent light bulbs in meaning much more than light. The incandescent light bulb, for instance, has long been a symbol of modernity in the home, particularly modern electricity. During the Depression, the U.S. government's Rural Electrification Administration famously used images of incandescent light bulbs to promote electricity through Lester Beall's posters (MoMA 2012). Even today, people call electricity losses "blackouts" (Nye 2010). Even their common use to signify "aha!" moments, inventions, or ideas can be linked to a long history of light bulbs as symbols of novelty, speed, convenience, and modernity. The image of the CFL symbolizes a certain kind of modernity, what Hajer (1995) would call "ecological modernization," characterized by extensive adoption of home green technologies.

Data Collection and Analysis

Data included interviews[8], participant observation, and texts, collected from June 2010 to January 2013. I interviewed 15 environmental activists[9] in North Carolina, chosen because they all told me they performed multiple energy-related practices in and outside of their homes for the environment. I began each interview by asking what the interviewee did in their everyday lives that made them think of the environment, and the interviewees then told me about actions they did that they framed as helping to reduce their impact on the environment. Six were formal leaders of environmental organizations or committees and only two were not active within any

[8] All interviewees have pseudonyms.

[9] 10 women, five men; all white; aged 20s-80s; three at or below 200% of NC poverty line, either upper middle class, four in between.

such group. I gained access to these individuals via participant observation at public hearings at the North Carolina Utilities Commission and through the "snowball" method (Lofland et al. 2006: 43). I contacted people who made public statements to the Commission about the importance of energy efficiency for helping mitigate climate change and other environmental problems; I then asked those interviewees to suggest people they knew who might be interested in being interviewed and who also were doing energy efficient actions in their homes for "environmental reasons," broad construed. Interviews were semi-structured, recorded, transcribed, and lasted 1-2.5h. For these reasons, "environmentalist" was an identity defined by the interviewees rather than imposed on them, but all interviewees did at least a few home energy conservation actions (such as using CFLs, line-drying laundry, walking to work instead of driving, and others) at least in part, they said, "for the environment."

To complement these interviews (Emerson et al. 1995: 12), I conducted 55 hours of participant observation at public energy and environmental public, meetings, and hearings in North Carolina[10]. During the events, I briefly interviewed 37 energy and environmentalist employees and volunteers[11] at these events about their personal or their organizations' views on energy efficiency and/or CFLs. I also collected websites, letters, and emails from the "big ten"[12] mainstream U.S. ENGOs (Center for Media and Democracy 2011). I focused on the "big ten" groups[13] because they represent much of the mainstream, national, public environmental

[10] The events included an Earth Day celebration, an energy efficiency education fair, climate activist rallies, public utility commission hearings on state electricity issues, and professional clean energy conferences.

[11] Roughly half men, half women; all white but one; aged 20s-60s.

[12] Defenders of Wildlife, Environmental Defense Fund, Greenpeace USA, National Audubon Society, National Resource Defense Council, National Wildlife Federation, Nature Conservancy, Sierra Club, Wilderness Society, and World Wildlife Fund.

[13] These groups have been faulted as being too corporate and professionalized (e.g., Beder 2002); nonetheless, they influence millions of environmentalists, collect billions of dollars in revenue, and, unlike smaller groups, often have

discourses in the U.S. I collected "screen captures" (digital computer screen images) of webpages of theses ten ENGOs, focusing on their discourses of climate change and personal actions.

I analyzed the data with grounded theory methods, constructing my theories as they emerged from the data and being "constantly comparative," (Charmaz 2006). Analysis was ongoing, including open coding (Lofland et al. 2006: 200-1) and more holistic interpretation based on patterns among the interviews (Kleinman et al. 1997: 486). Neither the nature of the environmentalist identities themselves nor the concept of identity work were assumed a priori, but instead emerged and grew from the empirical data itself and were subsequently tested against the data and others' research. The findings are analytically generalizable (Kleinman et al. 1997) to processes that are similar to the links between CFLs and environmentalist identities rather than to populations. I developed five patterns of green neoliberal identity work; I call them "generic"[14] to reflect that while they grew from the case of CFLs, similar patterns can be seen in the ways green neoliberal identity work is done with other things and through other kinds of talk. Note, however, that these five patterns are not meant to be exhaustive of all kinds of green neoliberal identity work.

Generic Patterns of Green Neoliberal Identity Work

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a voice in policy decisions.

[14] These generic patterns are similar to Snow and Anderson's (1987) three "generic patterns of identity talk" (distancing, embracement, and fictive storytelling) or Schwalbe and Mason-Schrock's (1996) "four major parts to the process of subcultural identity work" (defining, coding, affirming, policing).

People used CFLs to do the subcultural and individual identity work of constructing green neoliberal identities through: 1) celebrations and 2) renunciations of particular technologies; 3) inclusive-talk; 4) performing moral math; and 5) technological progress-talk.

1. Celebrations of Particular Technologies

Through the identity work of celebrating the CFL as a technology, people constructed CFLs as a badge of environmentalism, signifying that the moral identity "environmentalist" is someone who buys "good" technologies. Groups constructed the environmentalist identity in this way by creating and emphasizing "what you can do" lists and energy audits that teach people how to claim the identity. Nine out of the "big ten" ENGOs promoted the use of CFLs as a key action people should do to fight climate change. All featured at least one list of "what you can do" actions[15] to fight climate change on their websites. I interviewed three past and present leaders of one NC ENGO that sponsors energy audits[16] of public buildings where members of the public are invited to attend. All three agreed that in addition to improving the building itself, one of the main purposes of the audits was education, so that people attending would return to their own homes and apply what they had learned. "What you can do" lists and energy audits are ways that groups teach people what actions "count" toward accomplishing the environmentalist identity and how to enact it, similar to how veteran drug users teach people how to use marijuana (Becker 1953). Like the drug, the CFL acquires a pleasurable meaning for individuals because groups teach them how to celebrate it.

[15] Beyond CFLs, the lists commonly included actions such as planting a tree, buying energy-efficient appliances, and keeping one's car tuned up.

[16] Energy audits are professional assessments of a building's energy use designed to identify ways to use less energy through physically changing the building's design or installing appliances. They usually include replacing incandescent light bulbs with CFLs as one of their recommendations.

Individuals claimed environmentalist identities by following these lists, attending audits, and overwhelmingly by using CFLs. Fourteen of the fifteen environmentalists interviewed described using CFLs; during participant observation, no one I asked about personal use of CFLs denied using them. When I asked people what things they did in their daily lives that make them think of the environment, they listed their actions in ways that strongly emulate the "what you can do" lists, suggesting that such lists are powerful resources for identity-making. More than half (8/15) of those formally interviewed had participated in either a group audit of a public building or an audit of their own home. Those who had their homes audited used the information gained as a personalized "what you can do" list.

CFLs have become one of the most prominent technological signs of environmentalism. Sally, former director of a large NC ENGO, described installing CFLs in a prominent fixture in her home, where she commonly fielded visitors' questions about the importance of CFLs. The installation location invited the questions that allowed Sally to further perform the role of knowing environmentalist (and educator, another moral identity tied to environmentalism, for Sally) to onlookers by celebrating the CFLs. Using a CFL signified that one was committed to everyday environmental actions far beyond light bulbs, similar to how veils have become signs of broader piety for some Turkish women (Gokariksel 2009), while using an incandescent did not. Although some interviewees also spoke lovingly of solar panels, composters, energy-efficient cars, and other "good" technologies they used (or aspired to using), these technologies did not necessarily signify other environmental commitments to the extent that CFLs did. The CFL, more than these other technologies, has become a symbol of energy efficiency and climate change activism more broadly in part because of the symbolic flexibility and power of the light bulb through history (see **Chapter 5**).

2. Renunciations of Particular Technologies

Through the identity work of renouncing certain light bulbs, people constructed CFLs, incandescents, and LEDs as morally-significant technologies that signify different types of environmentalists. Through anti-incandescent talk, the most common way that study participants did the identity work of renouncing technologies, people could signify themselves as committed environmentalists. Anti-incandescent talk gave the incandescent the meaning "hypocritical environmental action"; using incandescents or talking about them in a favorable way, then, signified a person as an uncommitted environmentalist. ENGOs commonly coded incandescent use in this way by referring to them as an "old" technology that belongs in the past. As the Environmental Defense Fund writes, leading up to their CFL promotions:

> In the *1880s*, light bulbs revolutionized the world. Though we call them 'lights,' *traditional* incandescent bulbs are actually small heaters that produce a little light – but waste a lot of energy producing heat. *Today* we can do better (emphases mine).

In this frame, incandescents cannot signify being a good environmentalist. However, some interviewees still used a mix of incandescents and CFLs in their homes. To repair this breach to their identities, they went out of their way to explain that they used their incandescents only for special tasks (such as needlework) or never turned on those particular lamps.

Participants also did identity work in renouncing technologies through anti-CFL talk. Such talk gave the LED light bulb the meaning "radical environmental action" and was a way for the speaker to accomplish a more radical environmentalist identity. At the same time, it made the use of CFLs a sign of being an uncommitted environmentalist. Of the 15 formal interviews, only one person did not use CFLs. Nathan, an active ENGO volunteer, explained that he used LEDs because, as he put it, "Um, I have a social conscience? They're more efficient, you know, better for the planet, less electricity is used. I am slightly less dependent on the grid…" For Nathan, renouncing CFLs in favor of consuming LEDs - and speaking of getting off "the grid" - was a

way to claim a more radical environmentalist identity than what could be accomplished by using the more conventional CFLs. If celebrating CFLs is a key green neoliberal act, rejecting CFLs may appear anti-neoliberal. However, at present these renunciations tend to perpetuate neoliberal subjectivities by continuing to construct the environmentalist as someone who does individualistic, consumptive actions.

Beyond CFLs, many codes of green neoliberal identities are about renouncing particular technological things. As with light bulbs, talk disparaging these technologies is identity work. For example, I had the following exchange with Bill, a home energy efficiency aficionado, in the middle of our outdoor interview:

> **Bill:** I saw you weren't driving a big SUV. [gestures to where I parked the Corolla]
> **Interviewer:** It's actually not even my car.
> **Bill:** Oh, ok.
> **Interviewer:** I borrowed it!
> **Bill:** [lowering voice conspiratorially] What burns me up about this area is that everybody says, [even softer:] 'oh, we're really environmentally sensitive [louder, sarcastic tone:] but we need to drive around [in] a big SUV, because, you know, we may get into an accident!

The SUV, like the incandescent bulb, has been coded as a sign of being a bad environmentalist. Bill has checked to see if I am driving one to see if I follow environmentalist codes. In turn, I was aware, if not consciously (yet), that the rules of environmentalism are that you should minimize driving, so I perform the identity work of renouncing driving by exclaiming that the car is not even mine. The renunciation of particular technological things is pervasive in environmentalist narratives (e.g., "go car-free!" or vilifying coal-fired power plants).

3. Inclusive[17]-Talk

People used CFLs to define the environmentalist identity as one that everyone can and should claim. ENGOs frequently portray switching to CFLs as one of the easiest actions a person

[17] I call this type of talk "inclusive" after Bernstein's (1997) distinction between gay and lesbian social movements that were "inclusive," aiming "to educate and mobilize a constituency or maximize involvement in political campaigns," while "exclusive" groups often "discourage popular participation."

can do for climate change. Four of the big-10 ENGOs especially emphasized the ease of solving climate change through actions like switching to CFLs. Former EPA administrator Stephen L. Johnson rolled out a nationwide CFL promotion by saying, "More and more Americans are seeing the light – that protecting the environment, while saving money, is as easy as changing a light bulb," (Carter-Jenkins 2008). CFLs symbolize this inclusive identity and the message that all actions are important, even small things like changing one's light bulbs. Sarah, director of a NC ENGO, explained her reasoning for focusing on small things:

> If you can get them to make one change, then they'll do another, and they'll story-tell about it... They'll do the easy things, like lighting, and then maybe they'll do something harder like give up their cars, and then maybe they'll run for office...

For individuals, the idea that small things make a big difference was implicit throughout the interviews. Hillary, a leader in her church's environmental committee, made this assumption explicit, telling me what difference CFLs can make:

> it's like, 'if everyone changed 4 bulbs over a period of 3 years, it would be like 800,000 cars removed from-, you know, a million people change, 800,000 cars removed from the streets.' So I mean, collectively it could make a big difference.

The "big difference," for CFLs, was frequently portrayed in terms of these cars off the road or pounds of carbon dioxide reduced.

The idea that claiming the environmentalist identity is easy and only involves small things that make a big difference dovetails neatly into a larger message that everyone has a role to play in solving environmental problems like climate change. In the websites of the big-10 ENGOs, it is common for "you" or "individuals" to be called upon to buy new technologies for our private homes so we produce fewer greenhouse gases (GHGs) in our daily lives. Van, a leader in his church's environmental committee, justified his use of things like CFLs and solar panels by saying,

> I think it's just a matter of us doing our part. You know, you may say, 'it's like a drop in a bucket.' But if enough people do this stuff, a drop can fill up a bucket, the bucket becomes a

stream, enough stream becomes a river, enough river it becomes an ocean, an ocean a change.

If environmentalists construct an identity that is all-inclusive, easy, about small actions, and about everyone doing their part, then using CFLs can come to signify an "ordinary person's" environmentalism. This message of what it means to be an environmentalist went far beyond CFLs, as in Van's explanation that he did things as different as changing light bulbs and buying solar panels, which arguably have very different material impacts, for the same reasons.

4. Performing Moral Math

Through the identity work of "moral math" performances, environmentalists turn the CFL into a morally good technology, signifying that an environmentalist is someone who uses self-education, math, and numbers to make decisions. By "moral math" performances, I mean the public weighing of numerical pros and cons of environmentally-significant decisions using scientific data, so that particular numbers and mathematical calculations take on moral significance. These calculations are part of a "neoliberal logic" that centers information so that consumers "make proper, socially responsible market decisions," (Roff 2007).

CFLs' mercury issue[18] is a clear example where the environmentalist as an identity is constructed so that you can only claim it properly by talking in terms of moral math. While few ENGOs mentioned the mercury in CFLs at all, those that did were quick to reassure the reader that, because of weighing the numerical pros and cons, CFLs are still the best lighting technology. Most of the interviewees who mentioned mercury as an issue in their decision-making process told me that in the end they believed that the CFL was the morally good technology to choose.

[18] CFLs contain a small amount of mercury; incandescents do not. Given how much electricity they save, CFLs release *net* less mercury than incandescents in states with many coal-fired power plants like North Carolina and over the United States as a whole (Eckelman et al. 2008). However, these results were not known by all study participants.

A second area where discussions of moral math predominated was around the question of whether CFLs make a difference. ENGOs nearly uniformly justified the use of CFLs based on numbers that were supposed to hold moral significance, usually accounts of the pounds of carbon dioxide avoided by using them, or the equivalent numbers of imaginary cars that would be kept off the road. Demonstrating knowledge of these numbers and data was a way to claim an environmentalist identity, as when Hillary speaks of the "big difference" it could make, in terms of "800,000 cars removed from the streets" if more people used CFLs (see above). However, the use of these particular CFL calculations to determine if they make a difference is not self-evident. A more straightforward figure than how many cars would be "removed from the streets" is the percent reduction in national GHG emissions CFLs could make. This calculation is a matter of multiplying five numbers: 82.7% (% of U.S. GHG emissions from CO_2[19]); 94.2% (% U.S. CO_2 emissions from burning fossil fuels[20]); 14.3% (% U.S. fossil fuel burning from residential electricity[21]); 8.8% (% U.S. residential electricity used for lighting[22]); and 75% (% less electricity that CFLs use[23]) to get **0.74%**, or the maximum theoretical proportion of U.S. GHG emissions that could be reduced if every U.S. household changed all their bulbs to CFLs. In three years of research, I never found such a figure publicly calculated or discussed by anyone, including ENGOs, scientists, and activists. No one talks about CFL use in percent reduction of national GHG emissions, though that figure offers a clearer indication of the impact

[19] In 2012; after changing all gases into equivalent units of CO_2, called "CO_2eq." (U.S. EPA 2014: ES-8).

[20] In 2012 (U.S. EPA 2014: ES-8).

[21] In 2012 (U.S. EPA 2014: ES-11); the figure is a result of the author dividing the CO_2eq emissions from residential electricity (725.8Tg CO_2eq) by the total CO_2eq emissions in the U.S. (5065.7 Tg CO_2eq) within the category of fossil fuel combustion.

[22] In 2001, the most recent date that such data is available; includes indoor and outdoor lighting in 2001 (U.S. EIA 2001).

[23] Average; compared with incandescents (U.S. EPA 2008).

of CFLs than other measures. This calculation is not too difficult; interviewees and ENGO websites spoke easily of much more complex calculations. The 0.74% figure is a significant patterned absence that strongly suggests that the figures that *are* used by environmentalists to justify the use of CFLs are more about performing moral identities than about what makes change. Likely the 0.74% figure is so low that it would feel dissonant to perform green identities by using CFLs if the figure were widespread knowledge[24].

Talking about CFLs using moral math grounds the environmentalist identity in self-education about numbers and data. Similar dynamics occur in the epic cloth versus disposable diaper or paper vs. plastic bag debates among environmentalists. Brianna, an interviewee without ties to environmental groups, explains her decision about another longstanding debate, over whether it is more environmentally-friendly to hand- or machine-wash your dishes:

> I finally did some reading and found out the dishwasher [versus] by hand, it was kind of a wash, so [we] just use the dishwasher. [sounding defensive:] Um, I pay attention. I try to find out what is the better choice.

An environmentalist is constructed as someone who cares about these minutiae, and scientific data are the guiding light for determining morally right individual actions. But not all data count.

5. Technological Progress-Talk

Environmentalists constructed and claimed identities by talking about their past and future uses of technologies in a frame of technological progress; this talk coded an environmentalist as someone who uses technology progressively. Snow and Anderson (1987) found that identity-talk commonly took the form of "fictive storytelling" by homeless people about their past and future selves. I found similar patterns of talk among environmentalists,

[24] Even academic audiences have resisted this figure. One grant reviewer, for example, wrote that I could not assume the ~1% figure was accurate without first establishing it through peer-reviewed research.

especially the narrative that environmentalists are people who choose better and better technologies based on learning about new scientific data.

Environmentalists talked about their *past* use of CFLs in two main ways, both centering narrations of technological progress and self-education. Some interviewees claimed they had been using CFLs from the moment they first heard of them and spoke of always having been good environmentalists. Others spoke of acting in "bad" ways toward the environment in the past, which they rectified when they learned better. For example, Sandy, an environmental leader in her church, explained with some embarrassment that "before I knew better," she had disposed of CFLs by putting them in the trash, rather than following the extensive EPA guidelines for handling them as a toxic substance.

Talk about using a technology more or in better ways in the *future* was another way that people claimed environmental identities through technological progress-talk. This type of talk was used to repair environmentalist identities. For example, early in my interview with Hillary, she told me she had replaced nearly every bulb in her house with CFLs. Later, while giving me a tour of her home, she expressed surprise as she noticed that she had many fewer CFLs installed than she had thought. Her response was to use talk about future CFL use to repair this identity breach, declaring, "Now that I know this, I can come up today and change it." Similarly, when I asked people about what sorts of environmentally-significant actions they do now, they often responded by telling me about what they *plan* to do once they know or earn more.

Technological progress-talk about choosing and using CFLs progressively better was primarily individual identity work, but it echoes larger environmentalist discourses of progress. The example (see above) from the Environmental Defense Fund's narration of "traditional incandescent bulbs" that were inefficient, but "today we can do better" (with CFLs) was a clear

instance of this with lighting technologies. Communication scholars have shown how the "apocalyptic narrative" has been common in environmentalism for decades. As Killingsworth and Palmer (1996) explain,

> In depicting the end of the world as a result of the overweening desire to control nature, activists have discovered a rhetorical means of contesting their opponents' claims for the idea of progress with its ascendant narrative of human victory over nature.

They argue that in climate change mitigation movements, activists have brought the apocalypse discourse back to the public but without attacking progress wholeheartedly because of environmentalists' generally high education and regard for science. My findings suggest that the emphasis of the technological progress narrative on green technologies improving over time continues in people's identity work with CFLs. This narrative of technological progress is also found in the ways that people talk about the environmental impacts of power plants, as when "old" coal-fired plants are depicted as less environmentally friendly than "new" wind turbines.

The data revealed five generic patterns in the ways that people talk about using things like CFLs to do the identity work of constructing neoliberal environmental subjectivities. Through this green neoliberal identity work, CFLs were given multiple meanings: badge of environmentalism, easy action, big change in a small package, morally good technology, and progressive technology. By giving CFLs these meanings, the environmentalist was constructed as someone who buys good technologies, renounces bad technologies, performs small actions, self-educates, uses math/numbers to make decisions, and uses technology progressively. Even though this sometimes produced a range of "environmentalists," from an uncommitted to a radical to an "ordinary person" environmentalist, these identities can be seen as variations within the green neoliberal identity. Even when the environmentalist was defined as a "radical" through these types of identity work (for example Nathan renouncing CFLs in favor of LEDs), the

identity was still focused on individualistic, consumptive actions: buying green technologies to solve environmental problems.

Discussion and Conclusions

I began by theorizing green neoliberal identity work as a process through which groups and individuals construct and claim neoliberal environmentalist subjectivities. The case study of a quintessential green neoliberal technology, the CFL, brought to the fore five generic processes of green neoliberal identity work. Similar generic processes are likely to be at work in the formation of other kinds of neoliberal subjects, including ethical food consumer-subjects who "shop for change." These processes likely are also at work as green neoliberal subjects use and talk about other things they code as environmentally "good" and "bad" in their everyday lives including bicycles, energy-efficient refrigerators, and hybrid cars on one hand and SUVs, air conditioners, and garbage bins on the other.

I close by discussing why it is useful to frame environmental subject formation in terms of these five generic processes of green neoliberal identity work. Instead of emphasizing the green neoliberal identity as a static, already-formed entity, this framing underscores how such an identity is a *process* where the environmentalist as a subject is continuously being produced and reproduced, accomplished and re-accomplished. The concept of green neoliberal identity work illuminates mechanisms through which neoliberal ideologies get translated into environmentalist practices: neoliberal environmental subjects *form themselves through identity talk*, although the identities available to them and the resources with which to make such identities are constrained by broader power relations. Emphasizing identity work also opens up new ways of thinking about resistance to neoliberal environmental projects through micro-processes I call *critical green identity work*.

Green Neoliberal Subjects Form Themselves through Talk

The concept of green neoliberal identity work illuminates one of the ways neoliberal environmentalists as subjects are made: they *form themselves through talk*. I argue that talk is central to this subject formation because it renders environmental practices visible. From celebrating and renouncing technologies to inclusive-talk, moral math performances, and technological progress-talk, a great deal of the green neoliberal identity work of using CFLs to construct identities was talk. There are at least two reasons to be surprised about this finding. First, the few other studies of environmentalist identity work have emphasized that these identities are all about the consumption and use of *things* (Horton 2003; Slocum 2004b). Beyond studies of environmentalists, much of the research on how people use things to make selves has focused on clothing and appearance (Freitas et al. 1997; Gokariksel 2009). However, instead of the *materiality* of identity performances being primary, my data show that *talking* is at least as important in forming identities. A second reason to be surprised by the finding that talk was central to green neoliberal identity work is because other research on identity work has suggested that such talk is usually central for identity formation when people lack financial or other physical resources, as with homeless peoples' identities (Snow and Anderson 1987). However, we might expect that environmentalists, who on average have access to much greater variety and richness of resources than the average homeless person, would be able to construct their identities in different ways.

How, then, can the finding that environmentalists do so much identity talk to construct green neoliberal identities be explained? It is easy to dismiss the question as a methodological issue: that if I had spent more of my research time watching environmentalists in their private daily lives, rather than talking to them or observing them in public, I would have observed more

material constructions of their identities. To some extent, this is likely true. However, I argue that talk is key to the ways that neoliberal environmentalists form themselves as subjects because it renders environmental practices visible, which is of particular importance to green *neoliberal* identity work. Green neoliberal practices are usually individualistic, private, and consumptive (although not all are: for example, driving a Prius is individualistic and consumptive, but much more public than using a CFL). As such, it can be difficult to make identities with them *except* by talking about them. How is one to perform identity if the marker of that identity is a light bulb in one's closet? How does one claim a more radical environmentalist identity if no one sees you buy the LED? Since identity-construction is a social process, it requires that at least part of the time, the identity-claimant has an audience. This does not mean *all* identity work is done with a live audience or that environmental practices do not become private habits, but only that identity talk can take on new importance for the making and claiming of identities where the identity work is overwhelmingly focused on hidden, private, individualistic, and based on consumption, as it is in the making of green *neoliberal* subjects.

Through this identity talk, neoliberal environmentalists *form themselves* as subjects. The concept of identity work makes the abstract forces of "enrolment" and "interpellation" more concrete by making visible an agent and the mechanisms of subject formation. Some of the important agents in these processes are environmentalists, environmental leaders, and ENGOs themselves, working alone and with others to construct what an environmentalist means and does. The mechanisms include the subcultural and individual identity work of celebrating and renouncing technologies, inclusive-talk, moral math performances, and technological progress-talk. In groups and as individuals, environmentalists make themselves into neoliberal citizens by

claiming, defining, maintaining, repairing, contesting, and policing particular environmentalist identities.

Rather than implying that environmentalists are "dupes," this re-framing of environmentalist actions shows how they become invested in neoliberal identities. Because "environmentalist" is a moral identity, fulfilling the codes and rites of affirmation, making and remaking oneself into this identity has become part of enacting a "good" self (Kleinman 1996: 5). A critical political economy analyst might ask, "What do environmentalists do *for* the neoliberal environmental project by using and promoting CFLs?" and conclude that environmentalists perpetuate capitalism and neoliberal ideologies through their CFL actions (a story for another paper). Yet it is important also to ask, as SI scholars might, "What do environmentalists do *with* the CFL?" I argue that environmentalists use the CFL to claim and construct their identities as green subjects. CFL use and promotions do work for capitalism *and* for people. Environmentalists make these identities, drawing on symbolic and other resources from ENGOs, environmental scientists, politicians, and others who, with the rise of neoliberal environmentalism, are increasingly producing identity-making resources that embody neoliberal ideals. People help produce themselves as particular kinds of subjects through identity work, but the identities available to them and the resources of making those identities are limited by broader power relations.

Toward Critical Green Identity Work

Scholars have called for a remaking of green subjectivities to be more resistant to neoliberalism (e.g., Slocum 2004a). Since identities are continuously made and remade, they can be constructed and performed differently. One way to do them differently is to change the meanings of the things involved in subject formation through different identity talk. Looking at

green neoliberal identity work as a process, rather than green neoliberal identities as static, already-complete entities, opens up new points of resistance through *critical green identity work*. I propose "critical" green identity work as a process of creating identities which resist neoliberal drives toward individualism, privatization, accumulation of capital by a few, and instead emphasizes social justice. This goes beyond calls for a more reflexive consumer-citizen (Slocum 2004a; Johnston and Szabo 2011) and instead moves toward more conscious makings and continuous re-imaginings of environmentalist subjectivities by groups and individuals. It raises questions about whether environmentalism should be about celebrating or rejecting particular technologies, each person making the same changes, easy actions, applying math to small choices between technologies and practices, and technological progress. While I saw glimmers of this type of identity work in the field, often peoples' ideas about social justice did not translate into identity construction. I propose two examples of critical green identity work based on the current study. They are not meant as exhaustive of the possibilities for critical green identity work, but as ways to begin to open up the production of green subjects through the concept of identity work.

First, environmentalists could embrace CFLs' current status as a central badge signifying commitment and re-imagine the CFL as a Trojan horse, re-making its meaning so it better resists neoliberal environmental projects. One way to do this would be to emphasize the question "are CFLs just?" in the constructions of environmentalist identities, rather than "are CFLs better for the environment?" At present, environmental discourses focus on the latter question, so that people do identity work by discussing milligrams of mercury, pounds of carbon dioxide, and life cycle analyses. In contrast, asking "Are CFLs just?" focuses the discussion on what kind of world environmentalists want for the future, begging questions of "just for whom?" and "just

where?" It focuses attention on considering what a just world might look like and *how* environmentalists will go about deciding whether it is just before considering questions of mercury and CO_2. Just as Wolford (2007) showed that a reliance on "moral reasoning" could be an act of resistance to neoliberal logics by the MST, so could questions of the justice of technologies like light bulbs be resistance. It might cause environmentalists to discuss the political economic history of CFLs and whether they can really be considered "progress" if they have more of some kinds of environmental impacts than their predecessors. It might go some small way toward Slocum's (2004b) reworking of Haraway (2000, page 105, cited by Slocum): "climate politics…ought to 'make visible all those things that have been lost in an object,'" which are, in many ways, questions of social justice as well as environmental impacts.

The second example of critical green identity work is to create alternative identity badges for the environmentalist. Other technological badges are the most obvious alternative. One interviewee, Stephanie, who was perhaps the least interested in CFLs of all the interviewees, spoke of wanting to invest in solar panels with her neighborhood. Cooperative purchases like this might be less individualistic performances of identity than CFLs and potentially unravel some of the business-as-usual assumptions in CFLs. But there are clearly problems with many kinds of techno-badges, especially because they tend to be expensive, often laced with prohibitive cultural capital, and, as Feenberg (1991: 65) argues, inventing new and more technologies can help reproduce the capitalist system. It is easy to slip from vilification of one technology to treating another as a savior, when really it is the social relations, in addition to environmental impacts, that matter.

Staying within the light bulb box, what would happen if talk about an *imaginary* lighting technology were constructed as the badge of environmentalism? There is no reason why an

identity badge needs to be material, given the importance of talk to green identity work. Environmentalists might create a new, imaginary light bulb that represents the perfect technology from a sustainability standpoint: it lasts forever, uses no energy, and is made of no toxic or nonrenewable materials. Claiming environmentalist identities might be positioned as something one does by talking in certain ways about this imaginary technology. This sort of thought experiment can raise key questions about what it means to be an environmentalist and what sorts of endgames environmentalists are aiming at. Setting aside physics problems, what might be the economic incentives and disincentives in the capitalist system to inventing such a light bulb? Who would benefit and who would lose from such a commodity? Where and when? Such thought experiments can raise important critiques of the present system by showing the contradictions within hopes for "greening" capitalist systems (O'Connor 1997; Polanyi 2001). And those are the sorts of questions that might begin to unravel the hold neoliberal logics have on environmentalist imaginaries, especially given how rare it is for environmentalists to even say the word "capitalism."

CHAPTER 3: (NOT) "AS EASY AS CHANGING A LIGHT BULB": USING CFLS AS GENDERED LABOR

Introduction

Understanding how different types of environmental solutions affect different groups of people is essential to evaluating which practices and policies can best enable sustainable and equitable communities. I examine this question through a case study of U.S. climate activists who use energy efficient compact fluorescent light bulbs (CFLs) to fight climate change. CFLs are central objects of environmental activism in the home (Thoyre dissertation **Chapter 2**; Slocum 2004a, 2004b). City governments use them to "bring climate change home" in efforts to reduce residential greenhouse gas (GHG) emissions (Slocum 2004). They are a symbol of energy efficiency (Ramroth 2008: 5) and of individual, consumptive, and *easy* climate mitigation actions. They are also promoted by utilities and light bulb manufacturers, but are a key technology in the claiming and performing of environmentalist identities (Thoyre dissertation **Chapter 2**). CFLs are considered superior to incandescent bulbs in energy use and GHGs (Ramroth 2008) and they are positioned as key stepping-stones to further acts of environmentalism, especially for women. For example, CFLs are positioned as such in an article in the women's magazine *Redbook* on women becoming environmentalists and "living green" (Smith 2008).

I show in this paper that we can see CFL use as gendered labor that has important implications for inequities. I begin by using insights from feminist political ecology and feminist technology studies to understand the ways that gender roles and green technologies are mutually

constitutive, how using CFLs might be viewed as labor, and how technologies can be gender-coded beyond individual awareness. I use qualitative data, including in-depth semi-structured interviews, participant-observation, and texts, and the methods of grounded theory for analysis. My findings indicate a contradiction: many environmentalists portray using CFLs as the easiest action to mitigate climate change, yet my data show that using CFLs is more complex and intensive labor than this portrayal suggests, involving five phases of labor. To explain this contradiction, I show how CFL labor is coded as "women's work" and thus not really as work. CFLs are coded as women's work through visual representations of environmentalism, the trope of the "eco-mom," and the ways many parts of labor are the types of labor that has historically been done by women.

I conclude by discussing the implications of coding CFLs and other environmentalist actions as (devalued) women's work, focusing on the "climate gap" whereby groups of people are impacted differentially by climate change and climate change mitigation efforts. Literature on the "climate gap" has shown how the physical impacts of climate change are worse for low-income people, people of color, and women (Grineski et al. 2012; Parry et al. 2007; Shonkoff et al. 2011). Little research has analyzed the climate gap for mitigation efforts, and most of existing research on it has focused on policy solutions (Isla 2009; Pastor et al. 2010; Shonkoff et al. 2009). This paper suggests that a gendered climate gap for non-policy, home-focused mitigation efforts may also exist.

Theoretical Context

There is little existing work on the gendering of climate change mitigation, but feminist political ecology (FPE) and feminist technology studies (FTS) provide valuable theoretical tools for understanding it. FPE scholars have analyzed how gender "structures access to particular

types of knowledge, space, resources, and social-political processes" (Nightingale 2006). Such research has shown how gender and the environment co-produce one another, so that "not only are inequalities between men and women a consequence of environmental issues, gender is a *cause* of environmental change in the sense that gender is inextricably linked to how environments are produced" (Nightingale 2006). FTS scholars have examined the ways that technologies are gendered, understanding "both technology and gender…as socially shaped" (Faulkner 2001). Related to FPE research, FTS scholars have shown how gender and technology co-produce one another, so that "gender relations can be thought of as materialized in technology, and masculinity and femininity in turn acquire their meaning and character through their enrolment and embeddedness in working machines" (Wajcman 2010). Both perspectives tend to view gender as a socially-constructed category (Faulkner 2001), a "process" (Nightingale 2006), and a performance (Wajcman 2010).

These perspectives are useful because they suggest how gender inequality matters for people's interactions with the environment (e.g., Rocheleau et al. 1996) and with technologies (e.g., Cockburn 1997). While FPE scholars have pointed toward the home as a key site of resistance (Elmhirst 2011), they have also noted that this sphere, especially for green scholars, has been little studied (MacGregor 2006: 61). FTS scholars have likewise pointed toward the home as a key site of gendered labor and gender encoding (Cockburn 1997; Doorly 1999; Cowan 1983, 1999; Faulkner 2001), although green technologies have also been understudied. Several insights from FPE and FTS frame the current study, suggesting that environmental activism is shaped by unequal social roles, that such activism can be seen as labor, and that technologies can be gender coded.

FPE scholarship in particular suggests that individuals' environmental activism is often organized around gendered social roles. Women's environmental activism is often connected to their social roles as mothers and caregivers (Rocheleau et al. 1996:16). For example, Bell and Braun (2010) found that Appalachian women were more likely than men to be environmental justice advocates because such activism "corresponded" with their pre-existing identities as mothers. Because of their roles as caregivers, women often experience more negative impacts from environmental degradation than men (Buckingham et al. 2005; Seager 1996: 280). For example, in parts of the Global South experiencing deforestation, women who have to collect firewood for cooking may experience this work become more intensive as logging means they have to walk farther to find wood (Buckingham-Hatfield 2000: 75). Women are also likely to have less opportunity to impact environmental conditions than men because of the "gender division of power to preserve, protect, change, construct, rehabilitate, and restore environments and to regulate the action of others" (Rocheleau et al. 1996: 10). Women's social roles as mothers and household managers can make them targets of consumer-oriented environmentalism (Buckingham-Hatfield 2000: 76) and can mean they experience environmental activism as more difficult than men, as they are often dismissed as "hysterical housewives" (Seager 1996: 279). Research has shown that women hold fewer leadership positions in ENGOs (Buckingham and Kulcur 2009) and have less access to climate change decision-making bodies (Buckingham 2010).

FPE and FTS researchers have contextualized environmental activism (Nightingale 2006; MacGregor 2006) and use of home technologies (Cowan 1983, 1999; Cockburn 1997) as labor. In asserting that environmental activism in the home should be considered labor, MacGregor (2006: 69) argues that environmental scholars have rarely considered social relations the

domestic sphere when imagining sustainable communities (97). Buckingham and Kulcur (2009) suggest that campaigns aimed at increasing rates of recycling and home energy conservation can be framed as increasing women's labor or "'care burden.'" Women are often the targets of environmental campaigns, "expected to be more diligent in adopting time-consuming green practices like recycling and precycling," (MacGregor 2006: 69). Few studies have traced what this might mean empirically (but see Oates and McDonald 2006 for the case of recycling as domestic labor), although there are indications that being the targets of such campaigns may mean more work for women than men (MacGregor 2009).

FTS scholarship suggests that technologies often have gender codes which are in turn linked to their relationships to users' social roles and the labor that goes along with such roles. Cockburn (1997) alerts us to the correspondence of several binaries: technology, public, and masculine vs. (respectively) non-technology, private, and feminine. Technologies associated with work that has traditionally been done more by men or by women have also been shown to be gendered, especially whether they are considered "high-tech" (frequently coded masculine) or "soft-tech" (frequently coded feminine) (Faulkner 2001). Thus the gender coding of CFLs is not clear from this research, because environmentalists sometimes treat CFLs as a somewhat "high-tech" (masculine) "new technology" that is better than old, traditional incandescent light bulbs (Thoyre dissertation **Chapter 2**), yet CFLs might also be seen as used in private to care for the home (like vacuums, which are usually coded feminine). Little research has examined the gender coding of green technologies in particular.

These lines of FPE and FTS scholarship suggest that it is useful to examine the relationship between gendered social roles and the use of environmental technologies, to view such use as labor, and to examine the ways that green technologies can have gender codes.

Research showing that women's environmental activism is often connected to being mothers and caregivers suggests that home climate activism (like using CFLs) may also be connected to these roles. Research framing home environmental activism and technology use as labor suggests it is fruitful to view the use of CFLs for climate change mitigation as labor. According to the work of FTS scholars, the gender coding of CFLs for climate change mitigation is likely to be complex and depend on whether environmentalists consider CFLs as "high-tech" or "soft-tech." These perspectives suggest that gender and the meanings of CFLs should be assumed to be mutually constitutive. This work suggests that gender inequalities are partly reproduced through the use of technologies like CFLs, and that the meanings of the CFL as a technology used for climate change mitigation are (re)constructed through gender and gender inequalities.

Research Methods

This study is qualitative and based on the collection of multiple types of data which are analyzed using feminist grounded theory. A qualitative approach illuminates the meaning-making processes involved in co-producing gender and green technologies. Analysis of in-depth semi-structured interviews, participant-observation, and texts uncovered a wide breadth and variation of CFL labors. For my purposes, it is not necessary to know how many people actually do each of the CFL labor phases discussed below; my research revealed that all are endorsed explicitly or implicitly by environmental leaders, ENGOs, and the U.S. Environmental Protection Agency (EPA) as the "proper" ways to use, install, and dispose of CFLs. In this analysis, "gendered" means more than simply whether more men or women do the labor: it also includes the gendered meanings and other associations of CFLs.

Data come from semi-structured interviews and participant-observation in the southeastern U.S. state of North Carolina, as well as physical and online texts, all collected from

2010-2013. The aim of the data collection was to reach theoretical saturation (Charmaz 2006: 96-7) rather than to form a sample representative of larger populations; I found interviewees through participant observation and the snowball method (Lofland et al. 2006: 43). In addition to being women, the targets of home environmental activism in the U.S. are often white and middle- to upper-class (c.f. Gibson-Wood and Wakefield 2012). Therefore, my interviews were mainly, although not solely, with this group of people. I interviewed 15 self-identified environmentalists whose reason for using CFLs were predominantly guided by a desire to help the environment; **Table 3.1** shows their demographic characteristics. In addition, note that they came from six different cities and towns in central North Carolina; all but one lived in urban areas.

Table 3.1. Characteristics of Formal Interviewees. Grouped first by gender, then by employment status within gender, and by whether they have children within employment status; all were white.

Name[#]	Age	Employment	Has children?	Other current household members
Male Interviewees				
Bill	60s	Retired	Yes	Female partner
Oliver	70s	Retired	Yes	Female partner
Nathan	50s	Retired	No	n/a
Jonathan	20s	Unemployed	No	Female partner
Van	60s	Works full-time outside the home	No	Female partner
Female Interviewees				
Claire	80s	Retired	Yes	n/a
Sally	60s	Retired	Yes	n/a
Jane	50s	Retired	No	n/a
Linda	60s	Retired	Yes	Male partner
Hillary	40s	Stay-at-home-parent	Yes	Male partner, children
Elizabeth	40s	Works part-time outside the home	No	Male partner
Diane	40s	Works part-time outside the home	Yes	Male partner, children
Brianna	40s	Works full-time outside the home	Yes	Male partner, children
Sandy	50s	Works full-time outside the home	Yes	Male partner, children
Stephanie	30s	Works full-time outside the home	Yes	Male partner, children

[#]all interviewee names changed for anonymity.

I complemented interview data with participant-observation and textual analysis. I conducted 55 hours of participant-observation at public energy and environmental events, which included 37 informal interviews with energy and environmental leaders (roughly equal numbers of women and men, all but one of whom were white). I collected websites, letters, and emails

from the "Big Ten"[25] mainstream U.S. ENGOs (Center for Media and Democracy 2011) as well as websites from the 35 other members of the U.S. Climate Action Network (US CAN 2010) in summer 2010. Using "screen captures," I began at the homepage of each group, clicked on the "issues" or "programs" tab, then on "global warming" or "climate change"; each group had some variation of this path. I then looked for links that indicated "what you can do" or other calls for the reader/viewer to act. I followed those links until they intersected with CFLs or until I found no evidence they talked about CFLs. I looked for patterns among the ways that CFLs and climate change were linked and how the actions for mitigation climate change were framed. I conducted a discourse analysis, looking at the "text in context," analyzing patterns and change in the way lighting technologies and CFLs in particular have been linked to climate change in a qualitative, interpretive, and holistic way (Wodak 2008: 5-6). I focused more effort on the "Big Ten" groups in my analysis, since they represent much of the mainstream, national, public environmental discourses in the U.S. I also collected ads, coupons, magazine articles, and fliers from these groups and others, as well as analyzing the EPA's website for additional data. To understand the gender coding of CFLs and their use in particular, I collected the first ten photos and their accompanying articles using Google search (200 items total; searched while signed out of google accounts like gmail): "mom," "dad," "mother," "father," "man," "men," "woman," "women," "girl scout," and "boy scout," plus "CFL" and "compact fluorescent." For example, I searched, "'mom' + 'CFL'" as well as "'mom' + 'compact fluorescent.'"

Analysis followed feminist grounded theory techniques, drawing on approaches to field work that stress power relations and inequality (Kleinman 2007). I used "constant comparison" between data and theories (Charmaz 2006). The idea that using CFLs was labor and that this

[25] These 10 were Defenders of Wildlife, Environmental Defense Fund, Greenpeace USA, National Audubon Society, National Resource Defense Council, National Wildlife Federation, Nature Conservancy, Sierra Club, Wilderness Society, and World Wildlife Fund.

labor was gendered emerged from the data and was explored more pointedly as collection of data progressed. Because of the nature of CFLs as a case study, they are likely to be a particularly good indicator that other types of home climate or other environmentalist actions are gendered labor. As I will show, CFLs are touted as one of the easiest climate/environmental actions, so if using CFLs is complex, an unexpected amount of labor, and gendered, it is likely that more difficult actions, like composting, using solar panels, and participating actively in social movements are also complex, gendered labors. As such, my findings are analytically generalizable to similar *processes* (Becker 1990) rather than to *populations* of environmentalists. Further research, using quantitative methods, could reveal the generalizability to *populations*, or the extent to which the findings apply to groups of environmentalists or climate activists.

As Easy as Changing a Light Bulb?

My data paint a contradictory picture of what is involved in switching from incandescents to CFLs. On one hand, many environmentalists treat using CFLs as the easiest way to mitigate climate change, and they use CFLs to assert that solving climate change is "as easy as changing a light bulb." The message that using CFLs is both easy and involves only popping in a new bulb was pervasive. So I was surprised to find in interviews and through a closer reading of the websites of both ENGOs and the U.S. EPA that switching from incandescents to CFLs could involve more labor than might be expected, especially if, as many environmentalists do, individuals try to use CFLs to the standards of ENGOs and the EPA. In this section, I will show how using CFLs is portrayed as extremely easy, then how using CFLs can involve five phases of labor, and finally I will discuss the conditions under which environmentalists frame using CFLs as labor.

Using CFLs as Easy

Using CFLs is often portrayed by environmentalists as the easiest action an individual can do to help solve climate change. Often CFLs are literally positioned as the poster-child of easy-environmentalism, as when the EPA's then-administrator Stephen L. Johnson promoted a federal campaign to encourage CFL use, "Change a Light, Change the World" by saying, "More and more Americans are seeing the light – that protecting the environment, while saving money, is as easy as changing a light bulb," (Carter-Jenkins 2008). Four of the Big-10 environmental groups' websites underscored the ease of solving climate change through actions like switching to CFLs. For example, the National Wildlife Federation wrote that switching to CFLs was #2 of the five "easiest things to do to conserve energy" for the climate. The Nature Conservancy's message about CFLs extends beyond bulbs to other actions of that kind: "small changes in our everyday lives can make a big difference." The Coalition on the Environment and Jewish Life (COEJL) pushed for CFLs the hardest of the U.S. Climate Action Network ENGOs, writing, "Our message is as easy as changing a light bulb: If you could conserve energy and help stop global warming in one simple step, wouldn't you? "

I encountered the message that using CFLs was the quintessential easy green action in interviews as well as in popular media. Often people spoke of CFLs as the "low-hanging fruit" of climate change mitigation. As director of a large climate activist group in North Carolina, Sally developed climate change programs beginning in the early 2000s where CFLs played a key role precisely because they were easy and concrete, in order to appeal to non-environmentalists:

> …in the how-to part of it we have the little checklist and things like that. You know we had like "what you can do" and "how much greenhouse gases each one of these saves." We had a campaign to get people to reduce their energy use by 10%, their electricity, mainly, 'cause that's the most measurable. And I guess most measurable, most easily…accessed, you know, like compact fluorescent light bulbs.

When he appeared on the Colbert Report TV show, climate scientist Michael Oppenheimer used CFLs as a key example of a "small" change to fight climate change that would not require any big sacrifices (Colbert Report 2007). *Redbook,* a popular women's magazine, ran a story on three women who had become environmentalists, summing it up: "A few dozen new lightbulbs, five recycling bins, and one bamboo floor later, their lives are a little bit greener" (Smith 2008). In these ways, switching to CFLs stands in for many other small actions, symbolic of climate change mitigation more broadly but also symbolic of a kind of environmentalism that is easy and accessible to everyone (see also Thoyre dissertation **Chapter 2**).

Using CFLs as Five Phases of Labor

Given these messages, I was surprised to find in interviews that using CFLs could be more involved than the straightforward image of just "changing a light bulb." This level of involvement was especially true when people tried to reach the standards set by ENGOs and the EPA. My data indicate five phases of CFL labor, each with sub-phases. I have focused on work that is additional to using CFLs, rather than the labor of using light bulbs in general, and I organize them in "phases" in the rough temporal order in which they are likely to occur: *Choosing, Getting, Installing/Turning on, Disposing of,* and *Cleaning up Broken CFLs.*

1. Choosing: CFLs or Incandescents?

Even before acquiring a CFL, people spent time and energy figuring out whether CFLs or incandescents are better for the environment, especially self-educating and deliberating about two issues: mercury and "wasting." Environmentalists consider two main sources of light bulb-related mercury: the mercury in CFL bulbs themselves and the lower mercury emissions from coal-fired power plants that occur when CFLs are substituted for incandescents. In places where much of the electricity comes from burning coal, including North Carolina and the U.S. on

average, CFLs produce net less mercury than incandescents when both mercury sources are included in calculations (Eckelman et al. 2008). Yet many respondents were not aware of this type of research. Some interviewees discussed their decisions to choose CFLs over incandescents as a matter of doing research into the "mercury issue" to determine whether CFLs or incandescents were a better choice. Several interviewees also described being unsure about a second issue: whether to change to CFLs immediately or to wait until their old incandescents burned out first. Hillary, a stay-at-home-mother in her forties, described feeling like she was "wasting something" if she threw out working incandescents, and debated with her husband over the issue.

2. Getting CFLs

Buying CFLs often involves an additional trip to the store that is not required to buy incandescents. Most people in the U.S. have traditionally bought their light bulbs at grocery stores, which tend to carry only one brand of bulbs (Sandahl et al. 2006), reducing the time commitment involved in purchasing them. However, over 75 percent of the CFLs bought in the U.S. are bought at "big box" stores like Lowe's, Costco, Home Depot, and Wal-Mart (U.S. DOE 2009). Out of 13 people who told me where they bought their CFLs, nine cited big box stores or hardware stores, and only three had never bought them in these locations. Only one shopped for CFLs at grocery stores alone. While it is possible that people wait to stock up on CFLs until they go to these big box stores for an unrelated reason, it is likely that sometimes they are making an extra trip, particularly since grocery stores are a more frequent and regular shopping destination.

Once they have gotten to the store, respondents faced a wall of CFL choices and spent time reading the labels on boxes of bulbs and kiosks, looking for particular characteristics. Many seek out ENERGY STAR-labeled CFLs (which are certified energy efficiency by the U.S.

federal government), yet there were 5,695 certified models of CFLs available in the U.S. and Canada in June 2013 (U.S. EPA 2013), a year after the U.S. implemented the Energy Independence and Security Act of 2007 that effectively phased out incandescents in favor of bulbs like CFLs. Given this diversity, the EPA's website recommends a mobile app for picking out the best CFL (U.S. EPA N.D.(b)) as well as a full-page chart directing the reader to pick the bulbs based on socket type, color temperature, quantity of light, and fixture type (U.S. EPA N.D.(a)). It was not enough, for many, simply to read the packages of CFLs at the store, as people said they needed extra knowledge to know what to look for; Hillary called this "knowing how to read a box." As directed by the EPA as well as ENGOs, climate activists teach themselves about how to convert watts to lumens as well as lighting temperature in degrees Kelvin to know how to pick the right CFL when they get to the store. For example, Jane, a retiree in her fifties, held up a box of CFLs during our interview and narrated her thought process for picking it out at the store:

> I just read the back of it, and I thought, "it's ENERGY STAR partner, that sounds good... They're telling me how much I'm going to save here…in lumens, and that seemed a pretty good thing." So, [reading out loud:] "for 13 watts save 250 lumens, replaces 60 watts, 350 lumens." You know, that looked pretty good to me. And [reading:] "10,000 hours, lasts 9 years, now smaller than ever." I thought, "well, that looks like a pretty good deal. And they'll fit into all my light fixtures and they won't stick out." So that's how I bought this one.

Picking up on this extra effort required for CFLs, big box stores have begun to provide kiosks comparing the wide variety of different kinds of CFLs.

3. Installing and Turning on CFLs

On the surface, the question of where people will install CFLs in their homes seems straightforward; wouldn't climate activists want to replace *all* incandescent bulbs to maximize their energy savings? However, both ENGOs and interviewees said that CFLs should not be used everywhere; instead, installing them involves evaluating each location for its suitability. Greenpeace, for example, tells people to use CFLs "in all lamps that are used for 30 minutes a

day or more." Mary, director of an ENGO in her forties, echoed this idea, telling me she thought it was better to use incandescents where lights would be on only briefly, because "CFLs use all their energy up-front" when they are turned on, whereas incandescents use it evenly. Jonathan, an environmental leader in his twenties, said he switched from CFLs back to incandescents in his bathroom after he learned CFLs burn out quickly when frequently turned on and off.

Related to what they had learned about the energy consumption patterns of CFLs, some environmentalists told me about particular CFL-using habits they had developed. Before he switched his bathroom lights back to incandescent bulbs, Jonathan told me he always tried to use the hallway light (an incandescent) when going to the bathroom in the middle of the night, to avoid switching the bathroom CFLs on and off too much. Claire, a retiree in her seventies, described how she purposefully turns on only CFL-lit lamps in her apartment; she remembered which lights were "good" to turn on and only used those, since she had not replaced all her bulbs with CFLs. In these ways, using CFLs can even shape the ways people travel through the spaces of their homes.

4. Disposing of CFLs

After a CFL burns out or breaks, there is the labor of getting it out of people's homes because of the mercury in the bulbs. The Environmental Defense Fund (EDF) explains: "All fluorescent lights contain trace amounts of mercury… When they burn out years down the road, recycle them. Visit Recycleabulb [a link] or Earth911 [a link] to find your closest recycling location." Respondents frequently searched out additional information on how to dispose of CFLs to avoid the mercury they contain. EDF's idea that CFLs can be recycled is misleading because they are not supposed to be placed in curbside recycling bins. Instead, ENGOs and interviewees say CFLs are supposed to be taken either to special disposal receptacles located at

some big box stores or to hazardous waste collection points in landfills. Like the trip to the store to buy the bulbs, it is possible that this does not involve an extra car trip. For example, some interviewees told me they saved up burned-out CFLs along with paint and batteries to take them all at once to the landfill. Jane, for example, told me that because she does not own a car, she saved up spent CFLs and then got a ride with somebody to the dump. When she got there, she found out that they are only open a few days a week during particular hours, so she had to get another ride from someone on a different day. It was most common for interviewees to talk of taking their spent bulbs to the hazardous waste site at the dump rather than to the big box stores' collection receptacles.

5. Cleaning Up Broken CFLs

ENGOs' websites and several interviewees directed me to the EPA's website as their source for knowledge about what to do if a CFL breaks. The EPA's (2012) instructions are a 3-page single-spaced entirely-text document "designed," the EPA writes, "to be useful to the general public." The instructions include detailed suggestions to screw in the bulb in particular ways to avoid breaking it, and steps for cleaning up in the event of a break, including picking up the shards and glass powder from carpeted vs. "hard" surfaces, needing to "air out the room" for several hours after the break, and cleaning those surfaces differently in routine housecleaning even days or weeks after the break. Although no one I interviewed said they did everything the EPA instructed, I observed how involved even an abbreviated clean-up can be when Hillary accidentally dropped a CFL during our interview:

> **Hillary:** Crap! …we're not even supposed to be in here when you break that bulb.
> **Interviewer:** What are we supposed to do?
> **Hillary:** Well, I'm guessing you already know, but let me tell you what I read. We're not supposed to be in the room for the next hour. Particularly if you're pregnant or you're a child. Then you're supposed to put rubber gloves on, put it into a sealed bag, supposed to duct-tape up the pieces, so you don't touch it, put that in the bag, and come back and mop it, put that in the bag, and throw it out, not even in your garbage, you're supposed to take it to-
> **Interviewer:** Do you want to go someplace else?

> **Hillary:** Well, I mean, it's not much of a crisis, I've broke many before and I haven't-, but um, why don't I just clean it up, if you don't mind.

In addition to these steps Hillary performed, the necessity of taking the CFLs to the dump in the first place puts people at risk of having CFLs break during storage. For example, Sally, former director of an ENGO in her sixties, described how she had saved up CFLs and put them in a box in her car, but then a car mechanic accidentally "slid my seat back and smashed all of them." She then had to clean her car, a process not specified by the EPA instruction sheet.

When Using CFLs is Considered Work

What are the conditions under which people treat using CFLs and doing similar home environmentalist actions (including other actions interviewees identified as "environmentalist" such as recycling, composting, buying clothing from a thrift store, etc.) as labor? Although only part of the explanation for this contradiction between CFLs-as-easy and CFLs-as-labor, in a handful of instances people did talk about CFLs as labor. They primarily did this to accomplish particular kinds of identity work. Broadly, identity work refers to efforts to make and claim identities through patterns of talk, dress, appearance, and other acts (Schwalbe and Mason-Schrock 1996; Hunt and Benford 1994; Snow and Anderson 1987). Other research has shown that people use CFLs to do the identity work of making and claiming neoliberal environmentalist identities (Thoyre dissertation **Chapter 2**). Scholars have distinguished *subcultural* from *individual* identity work, since identities can be collective (Smith 2013) or personal (Snow and Anderson 1987).

Talk of the labor of using CFLs could accomplish two kinds of identity work for people that are also contradictory. Some people talked about using CFLs (and other environmentalist actions) as labor when they were distinguishing themselves from non-environmentalists through Othering processes (Schwalbe et al. 2000) that allowed them to claim personal moral identities

(Kleinman 1996: 5). For example, when I labeled her recycling, composting, walking to work, using CFLs, and other environmentalist actions as "work" and "like chores," Brianna appeared uncomfortable, her face looked skeptical:

> I guess, "yes," but it's *not*. If you really had to measure time, the *time* that's spent on that work, it seems like it'd be pretty small. But! I don't even know if it's time that people don't want to do it. I think it's just pure lazy…or that it's just maybe not realizing that there's a real reason to do it, that it makes any difference.

The idea that failing to use CFLs meant one was lazy was a common sentiment among interviewees. Such interviewees also attributed moral attributes to *themselves* when they, at times, expressed guilt when explaining why they were not doing as many environmentalist actions as they said they thought they should. Such individual identity work frames using CFLs as work by positioning environmentalists as good people who are willing to expend the necessary efforts of acting morally.

Environmentalists also did subcultural identity work by framing environmentalism as an identity for everyone in their talk about CFLs as work. Other research (Thoyre dissertation **Chapter 2**) has shown that through such "inclusive-talk," people are able to narrate an environmentalism that is so easy that it is accessible to everyone. Peoples' framing of CFLs as extremely easy to use is part of this inclusive talk. Yet there is also some room for talking about using CFLs as labor within this narrative, but only by minimizing the labor as insignificant when compared with the benefits of such efforts. For example, Oliver, a retiree in his 70s, replied to my remark that many climate change mitigation actions seem like work by saying, "It's work, but it has positive benefits that outweigh negative work parts even for individuals," noting that, for example, people get to know their neighbors better by using public transit. Such minimizing of CFL labor can be seen as a rhetorical strategy for environmentalists, who may worry that if people think it is too hard to be an environmentalist, they will not do any environmentalist

actions. However, this attitude implies that it *is*, in fact, work to do home environmentalism. This minimizing of the labor involved is closely tied to my argument that using CFLs is coded as women's work, and thus as not really work at all, which I turn to next.

Coding CFL Labor as Women's Work

How can we explain the ways that using CFLs can be a complex and involved process yet is treated as simple, as easy as "changing a light bulb"? This contradiction can be explained by understanding how using CFLs is coded as women's work, and therefore as not really labor. Being coded as women's work does not necessarily mean that women are the only ones performing CFL labor or even that they are performing the majority of each CFL labor phase. Instead, my data show how the coding of CFL use as women's labor means that using CFLs (and doing other types of home environmental work) is dismissed as non-work similar to how other types of labor that have historically been coded as women's work are dismissed as unvaluable. Using CFLs has been coded as women's work through visual representations of environmentalism, through the trope of the eco-mom, and through the ways the types of labor involved are the kind of work traditionally associated with women.

Visual Representations and Cultural Tropes

Using CFLs is coded as women's work through visual representations of environmentalism. For example, the Sierra Club (2008) created an image re-envisioning "Rosie the Riveter," icon of feminism and working women, holding up a CFL as a heroic symbol of climate change activism, saying "We can do it" over the text "Forging a clean energy future." In photos of scouts and CFLs, I found more than twice as many images of girl scouts promoting CFLs than boy scouts (14 to 6), suggesting that girls are more commonly socialized into the role of preventing climate change via domestic labor. For example, searching for "girl scout" +

"compact fluorescent," I found an image used by the Northern California chapter of the Girl Scouts featuring a cartoon girl holding up a CFL with a large grin on her face, over the text, "Change a light bulb, change the world" (Ryan 2007). In images of mothers and fathers and CFLs, I found mothers were more commonly invoked as using CFLs to help the environment than fathers (5 to 2). In the articles attached to these photos, mothers were more likely to speak to the reader about the importance of *using* CFLs, whereas "father" was commonly invoked when referencing the male inventor of the CFL.

CFLs are also coded as women's work through the trope of the eco-mom. Other researchers have shown how women's environmentalism is often associated with the trope of the "earth mother" where women are tasked with caring for the environment as part of their mothering duties (MacGregor 2009). In my research, eco-moms were more likely to be described as the *users* of CFLs than environmentally-minded fathers. For example, the national U.S. nonprofit EcoMom Alliance, an "organization nurturing, connecting, and empowering mothers to create a healthy and sustainable world" (EcoMom Alliance 2013) was founded out of a moment of mothers sharing stories about CFLs:

> After Kimberley Danek Pinkson coproduced an event for World Environment Day in 2006, she was touched to hear that it had inspired a friend to switch out her incandescent lightbulbs for fluorescent ones. "We were on a moms picnic, and everyone started sharing planet-saving tips," Pinkson says. "I suddenly realized the power moms have to effect global change." So Pinkson started the EcoMom Alliance. (Palmer 2013)

Similarly, articles in *Redbook* (Smith 2008) and the *New York Times* (Brown 2008) profile mothers who use CFLs as key environmental actions motivated by their children's health and futures, but no such articles exist for "eco-dads."

CFL Labor as the Type of Labor Typically Done by Women

The types of labor embodied by the five phases of CFL work are the types of labor that have traditionally been done by women, with several notable exceptions. Women in the U.S.

spend more time per day cooking, cleaning, grocery shopping, doing laundry, and interior decorating, while men tend to do more outdoor care and interior repairs (UNDP 2007: 342; U.S. BLS 2012; Newport 2008). In general in the U.S., women's extra work compared to men due to having larger housework duties on top of full time jobs has been termed the "second shift" and it was estimated in the 1980s as about an extra month of labor per year (Hochschild 2012: 3-4). Recent analyses have suggested this extra labor persists, although it may have shrunk (Milkie et al. 2009). Recent surveys confirm Hochschild's (2012: 8-9) findings that women's domestic tasks tend to be ongoing and daily (for example, food preparation, shopping, laundry), while men's tend to occur more infrequently and with greater control over timing (for example, lawn care or home repair).

Here I organize the subphases of CFL labor according to the type of work, since some of the types of work (e.g., self-education) happen in several (temporally-organized) phases. In the five phases of CFL labor, there are six general types of labor, which indicate how CFL labor is likely to fit into existing patterns of domestic divisions of labor: three are most likely done by women (*cleaning, ongoing chores, self-education*); one is likely done by men (*shopping*); and two are unclear based on existing divisions of labor (*disposal, installing*).

Cleaning. Women have been shown in the U.S. to do more housecleaning than their male partners (Newport 2008; U.S. BLS 2012) and Hochschild (2012: 9) found that women do "two-thirds more of the *daily* jobs at home, like cooking and cleaning." This suggests that cleaning up from a broken CFL is more likely to be done by women.

Ongoing chores. Women have been shown to do more ongoing household chores than men; Hochschild (2012: 8) argued that the women she studied "felt more *responsible* for the home" and "kept track of doctor's appointments, arranged playdates, and kept up with relatives"

more than their male partners. To the extent that using CFLs involves a similar kind of ongoing tasks, such as deciding which light bulbs to use in which locations, turning on certain lights and not others, and using CFLs for certain lengths of time, these types of labor are most likely done by women. Such "headwork" or "household management," which is more often done by women (U.S. BLS 2012), is often coded as not really labor in ways similar to how CFL tasks are seen as not work. For example, when I suggested that home environmental tasks like changing to CFLs was a lot of effort, Hillary paused a beat, then told me, "I don't know if it takes-. Like, it takes more of an intention than maybe more energy." Similarly, a woman wrote to *Redbook*, "going green isn't difficult – it just requires a change in thinking" (Letters 2008).

Self-Education. Other studies have shown that women are more knowledgeable and worried about climate change than men (McCright 2010), and that women inform others, "propose," and "decide" about recycling tasks more than men (Meneses and Palacio 2005). This suggests that self-education to choose whether to use CFLs, to bone up on information before picking CFLs out at the store, and about CFL disposal is likely to be part of women's domestic division of labor. Women across the globe have been shown to be more involved with environmental issues that impact family health (Seager 1996: 276) and mothers have been shown to do more healthcare work for their families than fathers (HMSO 1996, cited in Buckingham-Hatfield 2000), suggesting that self-education about clean-up of CFLs is likely to be done more by women. To the extent that they do buy CFLs at the store (see below), women are also more likely to spend time reading the light bulb labels at the store, as Furlow and Knott (2009) found that women more commonly "read and use" labels of recycled content and "no CFCs" content more than men at the store.

Shopping. Women more commonly do the household shopping for groceries and other goods (Newport 2008; Buckingham-Hatfield 2000), but more than three-quarters of CFLs bought in the U.S. are bought at big box stores (U.S. DOE 2009), where men are more likely to shop than women (WI Focus on Energy 2009). Another study has suggested that men living alone buy more CFLs than women living alone[26] (Reid 2008). Thus the labor of traveling to a home improvement store, as well as the time spent at the store picking out the right CFL, is more likely to be done by men.

Disposal. It is unclear whether men or women, according to the traditional divisions of home labor, are more likely to dispose of CFLs when they have broken or burned out. Such disposal is likely to involve an extra trip to landfill. Some research suggests that women are more likely than men to take recycling (Oates and McDonald 2006) and e-waste (Saphores et al. 2006) to the landfill. However, other data on trips to the landfill for recycling is more mixed (Meneses and Palacio 2005) and my interviews suggest that men may be more likely to do this labor.

Installing CFLs. According to traditional divisions of labor, it is unclear whether CFL installation is more likely to be done by women or men, because it is unclear whether such installation is viewed more as home decorating, which women do more of (Newport 2008), or home repairs, of which men do more (U.S. BLS 2012).

The gendering of CFL labor is thus complex, with women and men likely doing different parts of each phase, which makes sense given that CFLs are high-tech (more commonly coded masculine) but used in homes as a type of "care-work" (more commonly coded feminine). However, pre-existing patterns in the domestic divisions of labor suggest that women do more CFL labor tasks than men, because cleaning, ongoing chores, and self-education are labor types more commonly done by women and coded as women's work. However, the types of labor more

[26] Data was not available on who buys them in households of more than one person.

commonly done by men, like shopping for CFLs, may be more time-intensive depending on the local infrastructure and geography; for example, the extra trip to the store may be a longer trip for households located in rural areas when compared to those in urban areas, and the majority of this study's participants lived in urban areas.

Women's Work Coded as Not Work

Historically, labor that is associated with women has been less valued and deemed "not work." Many kinds of household labor, from childcare to cooking, have historically been labeled "women's work" (especially when done by middle- and upper-class white women) and therefore coded as non-work (Giminez 1990: 26). Federici (2009) has traced the assigning of household labor to women, and labor outside the home to men, to the beginnings of capitalism (53), where "work that women did at home was treated as non-work and worthless" whether it was done "for a family or to make commodities to sell to others" (51).

Similarly, the limited research done on the gendering of home environmentalist technologies suggests that the labor aspects of using such technologies is left out because such work, typically associated with women, is not seen as labor. Berg (1999: 309) shows that energy-efficient "smart homes" are often designed without conceiving of the labor that goes on in homes at all. By imagining green technologies as "outside" gender relations, environmentalists may implicitly imagine CFL users as men, as have the designers of the smart house. Cockburn (1997) points out that technology is often assumed to be "environmental nemesis or salvation" but usually "anything but housework," so that environmentalism that happens in the home is often devalued in the same ways as other types of housework dismissed as non-technology.

There is also a long history where new home technologies are invented and touted as "labor-saving" and easy to use, but which in practice actually increase women's labor, a

phenomenon an historian of domestic technologies Cowan (1983; 1999) called "more work for mother." Cowan shows how as supposedly labor-saving appliances such as electric irons and washing machines were invented and adopted by 1920s U.S. housewives, the standards for cleanliness were raised at the same time (1999: 284). The result of these labor-saving technologies was an increase in the time women spent cleaning clothes (1983). As another example, the shift from cleaning rugs by hand to using a vacuum cleaner involved less labor done by men and children, but more frequent, solitary labor done by women (1983: 12).

Implications

There are several implications of the ways that CFL labor has been coded as women's work and thus as simple non-work. When environmental movements promote solutions to climate change without examining how these solutions can reproduce gender inequalities, they can reflect and reproduce those inequalities. Work can be fulfilling, a central component to modern identities, and will be part of building more sustainable communities, but there are consequences when a certain kind of work, such as home climate activism, becomes coded as the kind of work done by a particular group of people - women.

A growing body of literature on the "climate gap" examines how the physical impacts of climate change are worse for low-income people, people of color, and women (Grineski et al. 2012; Parry et al. 2007; Shonkoff et al. 2011). The climate gap for mitigation is less well understood, and has focused on policy solutions (Isla 2009; Pastor et al. 2010; Shonkoff et al. 2009). The findings of the current research suggest that a gendered climate gap for non-policy, home-focused mitigation efforts may exist. This can occur through women doing more of the

labor of producing a healthy atmosphere[27], through the particular ways that devalued labor can pose challenges to activists with fewer resources, and through the ways such devalued labor can hide ongoing shifts in who is considered responsible for producing a healthy atmosphere. Although it may seem that using CFLs, even given all five phases of labor, is not likely to constitute an enormous quantity of time and effort by individuals, it is important to remember that CFLs are treated as the lowest of the low-hanging fruit of climate change mitigation. If even such an "easy" action constitutes work for women, the implications are likely to be more substantial for other actions already considered more difficult (such as doing laundry in a more environmentally-friendly way by line-drying clothing).

More Work for Women?

If environmentalist discourses become translated into practices such as CFL labor without simultaneously resisting existing gender inequalities, environmentalists may reproduce those inequalities by producing a "climate gap" whereby women do more of the labor of producing a healthy atmosphere than men. In this way, using CFLs may amount to "more *eco*-work for mother" by extending the scope of the second shift of labor for female heterosexual partners and mothers. As others have shown, in dual-income U.S. households, women already do more labor overall than men because of the "second shift" of housework (Hochschild 2012). Although I do not have the quantitative data to definitively show that women are spending much more time than men in using CFLs, my data suggest that using CFLs is strongly coded as women's work, and include multiple phases of labor that, because they are similar to other types of labor more often done by women, are likely done more by women. This can increase women's

[27] Other types of consumptive labor – beyond home environmental labor - may also be increasing simultaneously, as when the choices of breakfast cereals and the demands to read the labels to follow strict diets (gluten-free or Atkin's, for example) can increase the time spent shopping.

already-larger "care burden" (Buckingham and Kulcur 2009), especially in combination with other, more extensive environmental tasks.

Given that using CFLs is promoted as one of the easiest and most straightforward of environmentalist actions, it is likely that other actions already deemed more difficult will involve more labor than using CFLs and that this labor will also be gendered. For example, women likely will be the ones responsible for line-drying laundry instead of using energy-intensive dryers as well as shopping for local/organic foods, both eco-friendly tasks some environmentalists promote. It is likely that these eco-tasks are more complex than they would appear at first glance, as using CFLs was surprisingly complex. Gardner and Stern (2008) calculated a "short list" of individual actions that can most reduce U.S. GHGs. Applying the lessons of this study to theirs, we might ask, for example, *who* is most likely to be responsible for learning about and then doing the daily, ongoing (i.e., more likely women's) household chore of changing one's thermostat temperature based on the time of day and season? Given that women are more likely to do laundry, their suggestion to wash clothes with certain settings is likely to become women's responsibility. On the other hand, their suggestions for one-time tasks such as weather-stripping and installing insulation are more likely to be done by men, because these are the type of labor more commonly done by men. Further research is needed to understand the gendered implications of these environmental actions, because even the simplest action - changing one's bulbs to CFLs - turns out to have at least five phases of labor.

Supermom Anxiety

Coding CFL labor as easy non-work when it constitutes more complex labor can pose challenges to activists with fewer resources. Other research (Thoyre dissertation **Chapter 2**) has shown that using CFLs can be a crucial "badge" of environmentalism, a way that many people

announce their identities as environmentalists. However, if using CFLs is work, it may not be as easy for everyone to do such identity work. People with less time and money may find it difficult to signal their identities in this way.

Given their already-larger burden of housework and childcare overall than men (and the fact that women are paid less on average than men for the same jobs), women are likely to have greater trouble finding the resources in time, money, and energy to perform CFL labor. I found evidence of this in my research. For example, I separately interviewed two working, married mothers who were friends with each other. The first, Stephanie, is active in local environmental and other politics in addition to doing a wide range of home environmental practices. Stephanie recommended I interview Brianna as another person she knew who did energy-saving practices in her home. When I arrived at Brianna's house, I mentioned that Stephanie had recommended her for the interview. Brianna expressed anxiety, saying almost apologetically, "I don't know if we do energy efficient things, especially compared to Steph. She's much more of an activist kind of person. We're much more like fly-by-the-seat of our pants and do what we can." Brianna then told me about how, for health and environmental reasons, she recycles, composts, gardens, shops local, takes public transit to work, insulated her house, buys bulk, and other actions, in addition to working full-time with two small children. Over the course of the interview, Brianna repeatedly expressed anxiety over how many environmental actions she was unable to do because she was too busy or did not have enough money.

We can see such performances of anxiety in part as identity work, a way that Brianna is making up for what she perceives as a shortfall in her identity as an environmentalist. For an environmentalist stretched to the limits of her time and energy by parenthood, a full-time job, and living at the poverty line, using emotions to perform identity work can be seen as one way

for Brianna to make up for a lack of other resources she could devote to shoring up her environmentalist identity. But Brianna's anxiety-talk, which was not only a performance (as identity work is rarely a "mere" performance) also suggests the toll that not being able to accomplish what she perceives as the appropriate amount of environmentalist labor can take.

Although race and class were not the focus of this study, we might ask what the implications of these findings are for other poor women and for women of color. It was difficult to even find research participants who worked full-time and were primary caregivers, suggesting that being an environmentalist requires available time and may be an accomplishment available only to those with certain class privileges. The eco-mom has come to signify a type of morally good mother and is coded white and upper-middle-class. But if the moral goodness of motherhood is based on ever-expanding duties, it can make it even harder for women already at the margins to properly (according to gendered environmentalist standards) perform motherhood. Already, marginalized women are least able to avoid chores that put them at risk for environmental toxins and degradation (Buckingham-Hatfield: 80).

Narratives of Climate Change Responsibility

Devaluing the labor of using CFLs can also hide ongoing potentially problematic shifts in who is considered responsible for producing a healthy atmosphere. The gendering of CFL labor fits into a larger context of climate change mitigation discourses where private, individualistic, household-scale, consumptive actions are privileged by environmentalists over other kinds of solutions (Rutland and Aylett 2008; Slocum 2004a; Hobson 2013; Maniates 2002). These environmentalist emphases can reproduce misleading narratives of climate change responsibility, re-inscribing sexist ideas about how environmental problems should be solved. It can imply that women and households are to blame for environmental problems like climate change, following

a long history of blaming and subsequently seeking to get women to solve social problems domestically (e.g., Federici 2009). The photos of scouts and CFLs often portrayed girls and women as the workhorses of environmentalism, as the objects that should be moved in the right direction to solve climate change, whereas boys and men are portrayed as the ones who think, decide, and learn about solutions. Similarly, women are often blamed for environmental problems in overpopulation arguments in racialized, classed ways (Brownhill and Turner 2009: 231).

Yet in practice, women and households are not the primary agents of climate change. In the U.S., the residential sector is responsible for 17.6 percent of GHG emissions, while industry is 29.0 percent, transportation 27.6 percent, and the commercial sector 18.0 percent (based on data from U.S. EPA 2011, p. 19[28]). Men are far more likely to be the decision-makers within industries, governments, and other institutions that are more responsible for these sectors than households (Buckingham 2010), and they are thus, at present, more able to make a difference than households (Spitzner 2009).

This research suggests the importance of making the labor of performing home climate activism visible when evaluating the merits of various climate change practices and policies. The gendered labor involved in environmental solutions is not usually a part of these discussions. For example, the designers of the energy-efficient smart house tended to view users of their technology as male by ignoring housework and the gendering of domestic space (Berg 1999: 309). MacGregor (2006: 103) has noted a tendency among environmentalists to focus on "nostalgia for the self-reliant and self-managing community" of the past, a fictive past which we might imagine includes housewives (or servants) for every environmentalist who can do the labor of this self-reliance. Given the growing popularity of do-it-yourself (DIY)

[28] Figures include electricity but not the U.S. territories.

environmentalism, the fact that self-reliance in the form of DIY energy efficiency means more work for women indicates that there are similarly gendered implications for other types of actions. Thus a key step toward revaluing green domestic labor is re-coding these tasks *as labor* and acknowledging this labor is gendered.

Conclusions

In this research, I found that using CFLs to mitigate climate change is often portrayed by environmentalists as "easy as changing a light bulb," yet it can involve multiple types of labor, suggesting that using CFLs is not always as easy as it is portrayed. To understand this apparent contradiction, I looked to the ways such labor is gendered. My data suggest that using CFLs is coded as women's work in visual representations of environmentalism, in tropes of the eco-mom, and in the ways that many CFL tasks are the types of labor that are performed more by women than by men in current domestic divisions of labor. The ways using CFLs is coded as women's work help explain why CFL labor is dismissed as not really labor at all: because women's work has historically been unvalued and not counted as "real" labor. I suggested several implications of this work here, focusing on the ways that such home environmentalist activism may (re)produce a gender "climate gap." Although it may seem that using CFLs, even given all five phases of labor, is not likely to constitute an enormous quantity of time and effort by individuals, it is important to remember that CFLs are treated as the lowest of the low-hanging fruit of climate change mitigation, so if even such an easy action constitutes gendered labor, the implications are likely to be more substantial for other actions that are already considered more difficult.

In NC and other places, two recent political economic changes might appear to affect CFL labor, but are unlikely to have changed the fact that CFLs do involve more labor than just

"changing a light bulb." First, starting in 2012, the U.S. joined Australia and the EU (Di Maria et al. 2010) in passing a federal law, the Energy Independence and Security Act (EISA) (U.S. Congress 2007 HR 6/S. 1419) that effectively phases out energy-inefficient light bulbs like incandescents. While many have perceived this law as a ban on incandescents and a requirement that everyone use CFLs, there are actually a number of models of incandescents that have emerged on the market that meet the standards of EISA, and people also can choose to buy LEDs, halogens, and other non-CFL bulbs. Thus it is not likely that this law has substantially reduced the labor involved in using CFLs, since people are still making choices between CFLs and other bulbs; between the thousands of models of ENERGY STAR-certified CFL models; traveling to big box stores to buy CFLs; and facing the same disposal and clean-up challenges.

A change that is more likely to have altered CFL labor has been the massive giveaways of CFLs that electricity companies in NC have initiated to meet the requirements of a statewide Renewable Energy and Energy Efficiency Portfolio Standard implemented in 2007 (S.L. 2007-397; Duke Energy 2011; RAP 2010). These giveaways have likely reduced the CFL labor involved in traveling to the store to buy CFLs as well as choosing which kind of CFL to use, because electricity companies are doing this labor for customers. However, the labor of CFL disposal, use, and cleanup remains. Thus the remaining labor is the kind of work that is likely done more by women, while the averted labor is the type likely done more by men. This suggests that the parts of CFL work typically done by women remains invisible in these programs, and we might see such programs as another way of valuing labor performed by men but not by women. In addition, several of the interviewees in this study told me they had been offered CFLs from their electricity company, yet they were still traveling to the store to buy their own CFLs, either to supplement the number of CFLs they got from their electric utility or because they had chosen

not to accept the CFLs the utility had given them because they were skeptical of the utility's intentions.

Further research in several directions would be especially fruitful. It would be useful to know the extent to which other home environmentalist actions, from installing insulation to gardening to laundry to dishwashing to turning out one's lights and more are also gendered and in what ways. Surveys could determine this, but would be strongest if they began with a qualitative exploration of the phases of these different actions, given that the CFL study has shown that these phases are likely to be complex and sometimes unexpected. Further research to understand the ways that the climate gap for home mitigation efforts is also racialized and classed are likely to uncover concrete ways that particular environmentalist actions can reproduce, but also perhaps resist, other types of inequalities in addition to gender.

Further research could measure the time it takes to use CFLs (although parts may be very difficult to quantify, given that some of the labor is invisible "headwork") and determine the extent to which different groups do it. In particular, it would be useful to understand differences in the time and effort spent on different parts of CFL labor and how these differences have geographic components. For example, while the majority of CFL labor efforts for people living in cities may be centered on cleaning up after broken bulbs and self-education (labor likely done more by women), in rural areas, where distances traveled to buy and dispose of bulbs may be much longer, CFL labor efforts may be dominated by tasks more commonly done by men. The gendering of even such a simple task as changing a light bulb is more complex than it appears on the surface.

CHAPTER 4: "ENERGY EFFICIENCY AS A RELIABLE, VALUABLE RESOURCE": NEOLIBERALIZING NEGAWATTS IN NORTH CAROLINA

Introduction

Prior to 2007, North Carolina households who used home energy-saving technologies like compact fluorescent light bulbs (CFLs) created value for themselves mainly in the form of lowered electricity bills. Because of the regulatory structure of electricity markets in the U.S., those households' electricity providers largely experienced this creation of value as a temporary loss in sales, which the utility could recover by increasing prices for all customers within a few years. Yet with the passage of NC's Renewable Energy and Energy Efficiency Portfolio Standard (REPS) in 2007, a struggle arose over who benefits from and controls saved energy. By 2009, many North Carolinians began to receive energy-saving technologies like CFLs from their electricity providers and to pay a higher price for all their electricity to compensate those utilities for encouraging such conservation. How did these electricity companies gain control over the value of this energy efficiency? Using the contested implementation of the energy efficiency portions of REPS as a key political arena where this struggle played out, I will show how shareholder-owned electricity companies used environmental governance to redefine and appropriate the value of energy efficiency in a way that expanded their accumulation of profits.

This research focuses on NC's political and economic context for several reasons. NC's REPS policy, like many other renewable portfolio standards across the U.S., was proposed in part to mitigate climate change (S.L. 2007-397). NC has become a hotbed of energy and climate activism in the Southeastern U.S., where its REPS has frequently been touted as the first in the

Southeastern U.S. (NC Energy Policy Council 2010). Yet promoting energy efficiency in NC is thought of as particularly challenging because electricity consumption per capita is high, electricity prices are low, and the population is growing (Brown et al. 2012). I focus in particular on the Investor-Owned Utility (IOU), Duke Energy, which is now the largest electricity company in the nation and headquartered in Charlotte, NC; Duke Energy produces electricity for the majority of NC's residents (NC Energy Policy Council 2013). The implementation of energy efficiency programs by utilities in NC can be seen as test cases for other states[29]. Duke Energy has given away tens of millions of energy-efficient compact fluorescent light bulbs (CFLs) to residential customers (e.g., Duke Energy 2011) as part of these programs (RAP 2010). I use the case of CFLs as an example throughout this paper because they are a symbol of energy efficiency more broadly (Thoyre dissertation **Chapter 2**) and because, in NC, they are likely the way most residents have experienced the energy efficiency programs resulting from REPS because of their widespread dispersal.[30] CFLs can be thought of as a technology that creates the value of energy efficiency for households. I also adopt the language of "negawatts" throughout; a negawatt[31] can be thought of as a unit of energy efficiency (after Lovins 1989).

In focusing my research on the implementation of the 2007 NC REPS policy, I analyzed both the policy itself (Session Law 2007-397, codified as General Statute § 62-133.8) and the

[29] For example, Bill Clinton publicly declared Duke Energy's Save-a-Watt energy efficiency plan (the plan through which Duke Energy is compensated for energy efficiency programs under REPS), "a simple, brilliant idea. It has the capacity to fundamentally change what we do in the United States." (Thompson 2008)

[30] I received 18 CFLs from Duke Energy when I was their customer from 2009-2012: 6 via a rebate program where I could receive free General Electric brand CFLs at Wal-Mart, and 12 Niagara Conservation brand CFLs in the mail with a sticker proclaiming them "compliments of Duke Energy." I encountered residents who had received similar CFL giveaways from Duke Energy throughout my participant-observation.

[31] I use the term "negawatts" interchangeably with "energy efficiency," "saved energy," and "using less energy." Following Lovins (1989), one negawatt is imagined as equivalent to 1 megawatt of energy efficiency, or 1 megawatt of electricity that one avoided using.

rulemaking proceedings[32] overseen by the state regulatory body governing NC's energy providers, the NC Utility Commission (NCUC). Such legal documents are windows into environmental governance (Robertson 2000; McCarthy 2004) where 38 different stakeholders, including electricity companies, their natural gas competitors, consumer advocacy groups, environmental non-governmental organizations (ENGOs), and both industrial and commercial electricity customers proposed and contested different ways to implement the REPS policy. To provide context and deepen the argument, I supplement this research with findings from 54 hours of participant-observation I conducted at public energy and climate change events[33] in central NC from June 2010 to January 2013. Analysis was conducted using grounded theory methods (Charmaz 2006). Following Robertson (2000, 2004) and Prudham (2007), this research emphasizes the "discursive work" that different groups do in struggles over natural resources in environmental governance arenas.

I analyzed how IOUs gained control over the value of negawatts through NC's electricity governance. I will begin by discussing the present study's analytical framework based on scholarship on neoliberal natures and background on electricity's regulated monopoly status. I describe the ways energy efficiency poses a challenge for IOUs under traditional regulation, showing how such conservation is disincentivized from the point of view of energy providers but results in value for customers, showing how the REPS legislation seeks to incentivize energy efficiency. I then turn to three types of struggles in which groups engaged during the REPS rulemaking proceedings that ultimately decided who accrues the value of energy efficiency under

[32] I analyzed 208 separate documents from multiple stakeholders, submitted in the initial rulemaking for REPS from 27 August 2007 to 4 September 2008; they can be found in docket E-100, sub 113 at http://starw1.ncuc.net/NCUC/portal/ncuc/PSC/DocketDetails.aspx?DocketId=d63a7855-50af-4ac4-8e19-cce6aedd2c16.

[33] The events included an Earth Day celebration, an energy efficiency education fair, climate activist rallies, public utility commission hearings on state electricity issues, and professional clean energy conferences.

REPS: struggles to valorize negawatts, struggles to define negawatts' spatiality, and struggles to claim negawatts that have effectively captured home energy efficiency for IOUs. I then discuss the implications of these struggles for how IOUs accumulate wealth within electricity systems, placing the findings within the broader context of neoliberal natures scholarship on accumulation, spatiality, and the neoliberalization of electricity. I conclude by suggesting policy implications and possible future research directions.

Neoliberal Natures

This case shares commonalities with other cases of the neoliberalization of nature. Scholars of green neoliberalism have shown that in a neoliberal era, nature and the environment have been repeatedly appropriated, privatized, and commodified in ways that turn the value of ecosystem goods and services into new realms of profit. The U.S. economic system has been considered neoliberal since the 1970s, characterized by movements toward free markets, de-regulation and re-regulation, privatization, and commodification of natural resources (Harvey 2005; Bakker 2010). Scholarship on green neoliberalism has called attention to the ways corporations and international trade organizations have incorporated environmental tenets into their practices to gain customers and legitimacy in an era when the appearance of environmentalism can expand markets (Beder 2002: 177; McCarthy and Prudham 2004). At the same time, environmental movements have incorporated neoliberal ideologies into their practices and discourses (e.g., Guldbrandsen and Holland 2001; Slocum 2004b), but also in the ways some environmentalists have adopted individualized, consumeristic subjectivities (Robbins 2007; Hobson 2013; Thoyre dissertation **Chapter 2**).

Resource geographers have shown that all natural resources have to be produced, and that this production is "political, economic and cultural work" (Bridge 2010). Nature-as-commodity -

and resource - is constructed, not discovered (Castree 2003, Bridge 2010). The construction of such things as resources frequently happens through political and social processes such as environmental governance, including for things traditionally thought of as resources (e.g., minerals) (Bridge 2007) and more clearly constructed like carbon offsets (Bumpus and Liverman 2008). The formation of nature into something valuable to IOUs and available for capital accumulation through policies, rulemaking, and other forms of environmental governance has been shown for multiple cases. Liverman (2004) has argued that in the neoliberal era, environmental governance brings new actors into the realm of environmental politics, including consumers, social movements, and corporations. Robertson (2004) has shown how wetlands have been commodified through such regulation. McCarthy (2004) has shown how even seemingly non-environmental regulations like NAFTA can be seen as environmental governance in the ways that it results in accumulation of the conditions of production by codifying the rights to pollute. In the realm of climate change, scholars have shown how climate governance has commodified the atmosphere through emissions trading (Bailey 2007) and carbon offsets (Bumpus and Liverman 2008).

Environmental crises like climate change have been shown to be both a threat to and an opportunity for profits for many industries (Bumpus and Liverman 2008; Bridge 2010). Some have argued that because climate change mitigation can involve possibly less centralized and more democratic technologies like solar and wind energy (e.g., Winner 1980), that climate change mitigation may be a threat to traditional electricity companies (but McCarthy [2013] argues against solar/wind energy as resistance to capitalism). In the current case, as I will show in section 2, efforts to mitigate climate change that call for using less energy may be a threat to IOU profits in both the short- and long-term because of the electricity industry's economic

structures and regulations. Yet many (e.g., Bridge 2010) have also argued that climate change can be – and is being – turned into a source of profits, even for the same industries threatened by mitigation efforts. For example, Bumpus and Liverman (2008) have argued that carbon offsets are being used as a new arena of accumulation in an age of concern about climate change. Similar dynamics have been shown to operate for other environmental problems, such as wetland loss (Robertson 2004).

Neoliberalism, Electricity, and Energy Efficiency

Neoliberalism has been characterized as a class project seeking to restore rates of accumulation to elites at a time of declining profitability (Harvey 2005: 11), a narrative that fits the dynamics of the electricity industry beginning in the 1970s. Hirsch (1999: 135-8) has shown that prior to that decade, the electricity industry in the U.S. had seen relatively steady growth, but several influences converged in the 1970s to spark a fundamental shift in that industry. Environmental activists and scholars questioned the mantra of economic growth and turned against nuclear energy (171); the 1973 oil crisis and its resulting increases in the price of electricity made conservation appear more desirable to consumers and energy managers (55; 155); and what had been a steady increase in efficiency and scale of power plant facilities leveled off substantially (55); all threatened the profits and structure of the electricity industry. Yet little work has been done by geographers or others on the resulting shifts in U.S. electricity markets and governance through the lens of neoliberalism; work on neoliberalism and electricity has tended to focus instead on developing countries (e.g., Ahmed 2000) or on the U.S. in broad strokes (e.g., Hess 2011).

Although scholars of green neoliberalism have researched and theorized a myriad of socio-natures, including gold, oil, wetlands, carbon offsets, pets, breast milk, and GMOs (Bakker

2010), scholarship on electricity has tended to remain separate from such scholarship on political ecological understandings of natural resources. Yet electricity is no less a socio-nature than carbon; the kilowatt-hours produced by burning coal can be seen as natural resources in ways that connect to coal as a natural resource. In this work, I place an understanding of electricity as a key socio-natural system into conversation with political ecological understandings of neoliberalism, capital accumulation, and environmental governance. Little critical work[34] has also been done on energy efficiency, despite having become a key arena of climate change mitigation efforts. Research on energy efficiency is important in part because, like work on the carbon economy, it connects everyday life (e.g., energy efficient appliances in the home) with larger political economies (state and federal environmental policies, the production networks of large electricity companies, and the global production networks of energy efficiency technologies). The present study heeds Bakker's (2010) call to research the edges of what is traditionally thought of as "nature."

Bakker (2010) has argued that different socio-natures are neoliberalized differently, so we can expect that just as oceans (Mansfield 2004), drinking water (Bakker 2000), wetlands (Robertson 2000), minerals (Bridge 2007), and other environmental goods and services have been neoliberalized differently, there will also be unique aspects of the neoliberalization of electricity. One difference between some other neoliberalizations of environmental crises where environmental goods and services have been newly valorized, appropriated, privatized, and commodified and the current case is that energy efficiency has long had monetary value. In addition to being valuable to households who use energy efficient technologies to lower their electricity bills, negawatts are also often thought to have value to society by reducing pollution

[34] The majority of critical work on energy efficiency has focused instead on the Jevons paradox or the rebound effect (e.g., Brookes 1990; Herring 2006).

and to electricity systems in their reliability (RAP 2011b: 77). Therefore, the struggle to accumulate off of negawatts is less about the creation of nature as having value per se, although there are components of that process, given the unwieldy nature of negawatts as thing and non-thing, and has focused more about the control of this value. Neoliberalization of electricity in the U.S. is especially important to study given that it is the largest spatial and economic monopoly in the world, with complex histories of deregulation, reregulation, and, increasingly, environmental governance. I turn to the broad contours of electricity as a regulated monopoly in the next section.

Electricity in the U.S. as a Regulated Monopoly System

In the U.S., electricity is a highly regulated monopoly commodity that is both unusually abstractable and aspatial compared with other neoliberalized socio-natures; these unique parts of its socio-nature affect the ways that the value produced by energy efficiency is neoliberalized. Starting in the early 1900s, electricity companies were granted monopoly status and a system for regulating them began to develop (Hirsch 1999: 11), recognizing electricity as an "essential service" that is tied to broader societal interests (RAP 2011b: 3). As monopolies, utilities are protected from competition in the geographical area they cover: the location of a customer's home, business, or industry determines the company from which they buy electricity (Hirsch 1999: 11). As regulated monopolies, utilities are considered responsible for providing electricity to all who can pay for it, at prices that are set by a state regulatory body rather than through competition (RAP 2011b: 4-5). In NC, that regulatory body is the NC Utilities Commission (NCUC).

Similar to water and sewer in its regulated monopoly status, electricity is arguably the largest spatial and economic monopoly in the world. It is highly fungible, interchangeable as the

same commodity across large spaces (along transmission lines, for example). Like water and sewer services, the landscape across which electricity can flow is shaped by infrastructure, yet electricity landscapes tend to be much larger in their extent than more local water and sewer systems. The spatiality of electricity is bound mainly by political economic borders, rather than by biophysical[35] constraints (as we see in some other socio-natures: for example a stream in a particular watershed, carbon in a particular forest, etc.) or localized infrastructure (as with water and sewer). In the U.S., the boundaries of the flow of electricity include areas of interconnected transmission lines, such as the Eastern Interconnection, which includes NC and most of the states east of the Rockies (RAP 2011b: 15). In this eastern space, electrons can in theory flow anywhere, but when they are constrained, this happens mostly because of state boundaries, and this is because electricity providers are regulated at the state level. In states, the electricity landscapes are further divided into service areas, or geographical extents of the companies providing electricity; within those service areas, another division affecting the flows of electricity is across customer classes (residential customers, commercial customers, and industrial customers).

There are generally three types of electricity providers in the U.S., all of whom are regulated by states: 1) Investor-Owned Utilities[36], which are private entities owned by shareholders; 2) publicly-owned municipalities; and 3) electric membership cooperatives. Three-quarters of the U.S. population gets their power from IOUs (RAP 2011b: 9), which are the focus of this paper. At the beginning of this study, there were three IOUs in NC (Duke Energy,

[35] This is not to say that electricity has no biological or physical constraints, or that other socio-natures do not also have political economic borders, but rather that electricity is remarkable in its ability to physically flow across diverse landscapes. There are efficiency (loss or waste) barriers to perfect flow of electricity across landscapes, but they tend to be lower barriers than those existing against other environmental goods or services.

[36] However, IOUs are often called "public utilities" in practice.

Progress Energy, and Dominion); in 2012, Duke Energy merged with Progress to become the largest electricity company in the U.S. New Duke Energy represents 96% of the electricity generated within NC (NC Energy Policy Council 2010) and supplies 68% of NC's total electricity customers (NC Energy Policy Council 2013). **Figure 4.1** shows the service territories of Duke Energy at present, showing which areas used to be Progress Energy.

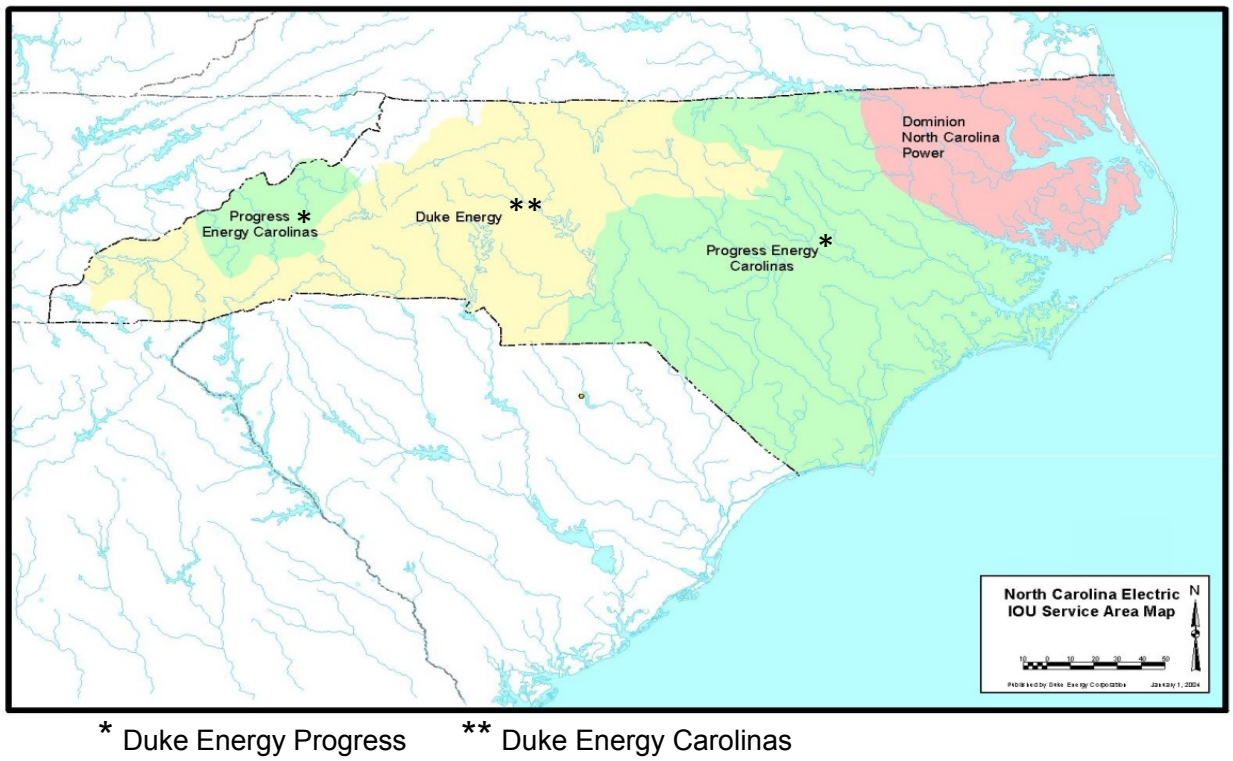


Figure 4.1. Map of Duke Energy's NC Service Territory. Duke Energy's present service area includes areas that, before the merger, were Duke Energy (**) and Progress Energy (*) (Image from NCUC 2013).

Traditionally, electricity rates (prices) in such regulated monopoly systems are set through a process of negotiation overseen and ultimately decided on by the NCUC. This makes electricity an unusual commodity in its pricing. Regulators set the price[37] of an IOU's electricity so that the company meets its revenue requirement, or the projected sum of all their costs (including operational expenses, taxes, and profits) between the time of one rate case (the

[37] Electricity has many prices, including for different classes of customers (residential, industrial, commercial) and at different times of the day and season for some customers. For simplicity, I will generally refer to the "price" of electricity in this paper.

regulatory proceedings through which prices are set) and the next rate case (RAP 2011a: 3). In other words, the NCUC sets the price so that, when multiplied by the projected demand, the amount of incoming revenue matches the projected costs. In a traditional ratemaking system, after prices are set for a given time period during the rate case, they do not change until the next regularly-scheduled rate case. For most utilities, general rate cases happen when the electricity company requests one, usually every two to five years (RAP 2011b: 31); Duke Energy, in recent years, has been having base rate cases every two years (Duke Energy 2011, 2012).

The Challenge of Energy Efficiency under Traditional Regulation

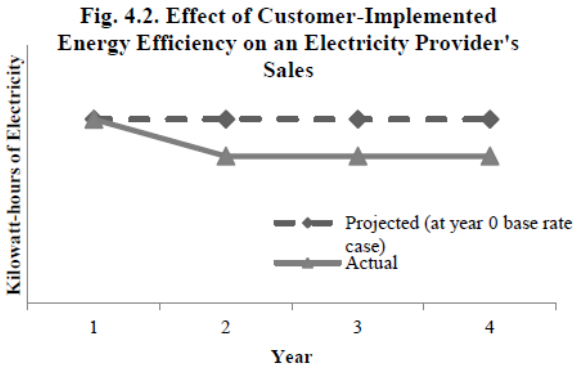
The ways that IOU shareholders earn profits within traditional ratemaking systems are thought to discourage electricity companies from encouraging their customers to conserve energy. Profits for shareholders stem from a rate of return on investments (the rate base), for example in new power plants (Shively and Ferrare 2004: 174-5). This means that in the long term, IOUs experience an incentive to expand this rate base (Shively and Ferrare 2004: 175) by investing in new power plants and other infrastructure to meet perceived or actual increasing demand by customers. This Averch-Johnson Effect can result in long-term disincentives for IOUs to encourage energy conservation among their customers because this lowered demand can make it difficult to justify the investments upon which profits are based (RAP 2011b: 60). In the short term, the disincentive to encourage energy efficiency is called the throughput incentive: once the price of electricity is set in a rate case, any amount of electricity that the utility sells above what it projected during the rate case adds to profits (NCUC 2008: 13)[38]. This means that a utility has a disincentive to encourage energy efficiency among its customers because typically such saved energy means lower sales than those used to calculate the rates.

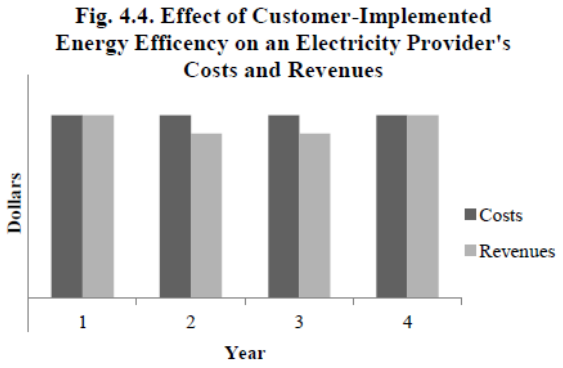
[38] In other words, once prices are set, a utility can only increase profits by either increasing sales or decreasing expenses below what it had projected during the rate case (RAP 2011a: 7).

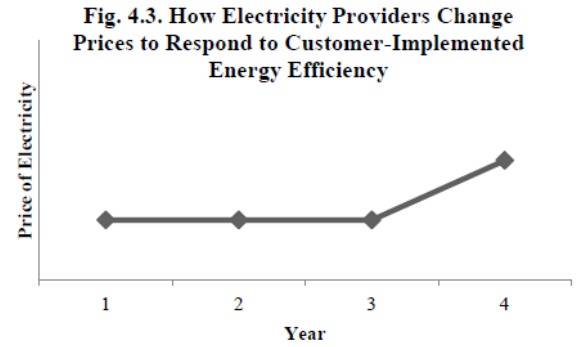
Effects of Energy Efficiency under Traditional Regulation

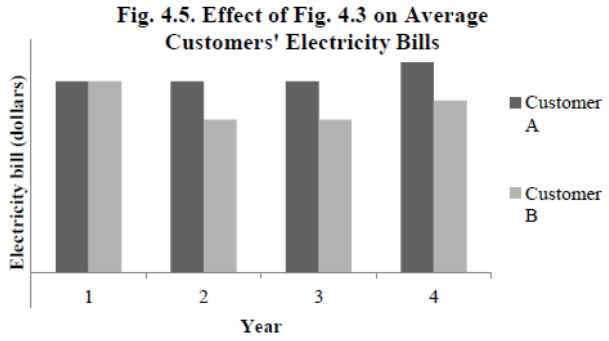
Under this traditional regulation, energy efficiency[39] performed by a group of customers on their own (e.g., installing CFLs in their homes) that was not accounted for in a rate case reduces projected utility revenues. **Figures 4.2-4.5** represent a conceptual model of these relationships. The figures assume a general rate case occurs in year 0 which results in particular electricity prices starting in year 1; the prices set in year 0 were based on the projected sales estimated at the time of the rate case (the dotted line in **Figure 4.2**). In the model, it is assumed that customers implement energy efficiency measures (e.g., install CFLs) in year 2, which has the immediate effect of lowering the actual sales of electricity compared with the projected sales (**Figure 4.2**). As a result, **Figure 4.4** shows that the electricity providers experience a revenue shortfall in years 2 and 3, where their revenue is lower than the costs, because the price of electricity was set assuming a higher level of sales. Under traditional regulation, an IOU would respond to this drop in revenues by filing for a rate case in year 3, which would come into effect as a higher price of electricity in year 4 (**Figure 4.3**). As a result, the IOU would again experience a match between costs and revenues in year 4 (**Figure 4.4**).

[39] Saved energy is not the only factor that cuts into revenues and thus profits: other changes such as unforeseen increases in fuel costs or cooler-than-predicted summer temperatures can also mean that the revenue requirement is not met through sales; however, fuel cost increases can be met through fuel charge riders in NC (NCUC 2008: 13). Likewise, unforeseen decreases in fuel costs or warmer-than-predicted summers are also unforeseen factors that can increase revenues and thus profits between rate cases. The key point is that these changes are unforeseen, and so can mean revenue shortfalls or surpluses until a new price of electricity is set in the next rate case.









Figures 4.2-4.5. Effects of customer-implemented energy efficiency, under traditional (non-REPS) regulation, on electricity sales (Fig. 4.2), price (Fig. 4.3), an electric utility's balance of costs to revenues (Fig. 4.4), and customer electricity bills (Fig. 4.5). Assumes a rate case at year 0 impacts rates in years 1-3, and a rate case in year 3 impacts rates starting in year 4; also assumes customers who implement energy efficiency (by, for example, changing light bulbs from incandescents to CFLs) do so in year 2, leading to decreased sales starting that year. Two types of customers are shown: those who implement energy efficiency measures (Customer "B") and those who do not (Customer "A").

The effect of these changes in price on customers' electricity bills under traditional regulation differs by whether an individual customer implemented energy efficiency or not (**Figure 4.5**). Customers (like "B") who implement energy efficiency in their home have lowered electricity bills in years 2-4, although the magnitude of the lowering of their bills is lower in year 4 due to the higher price of electricity in that year. Customers (like "A") who do not implement energy efficiency experience a rise in overall rates in year 4, with no benefit from energy efficiency.

Figures 4.4 and **4.5** suggest what the struggle over control of negawatts is about. The lowering of customer bills for those who implement energy efficiency themselves (Customer "B"

in **Figure 4.5**) is the direct value that customers produce for themselves by implementing their own energy efficiency. IOUs experience what is valuable to customers as a loss in revenues that they did not predict (**Figure 4.4**). While they are able, in the short-term, to adjust prices to account for this decrease in demand, they are generally not able to recoup losses that resulted in years 2 and 3. Add to this the Averch-Johnson Effect, which pushes IOUs to increase investments in facilities, and the stage is set for IOUs to resist energy efficiency programs and to perceive energy efficiency as a threat to profits. For example, Duke Energy refers to this effect as the risk of "regulatory lag" that energy efficiency can pose to their profits, since under traditional regulation they can only adjust rates to account for lowered demand due to conservation every few years (Duke Energy 2012).

Governance to Encourage Energy Efficiency

Because of these disincentives and the electricity regulatory system, encouraging energy efficiency is a governance challenge that states in the U.S. have met in multiple ways, beginning in the 1970s (Hirsch 1999: 136). Various state policies have encouraged energy efficiency programs administered by state agencies, third parties, or, as in the case of NC[40], the utilities themselves (Hausauer 2009). Fifteen states have adopted electricity decoupling (Morgan 2013), a regulatory approach that allows the price of electricity to be adjusted more frequently than traditional rate cases in order to adapt to, and even incentivize, implementation of energy efficiency[41] programs (RAP 2011a: 9). NC has decoupled some natural gas systems but not electricity (Morgan 2013).

[40] NC has additional energy efficiency-encouraging policies beyond REPS, including energy codes for buildings, a "public benefits fund," tax incentives, rebates, local grants, and loan programs (DSIRE 2014).

[41] In addition to energy efficiency, such decoupling can also apply to other factors such as weather and fuel, depending on the type of decoupling (RAP 2011a).

Although it shares some features with decoupling frameworks (NCUC 2008: 2)[42], NC's lawmakers have sought to deal with the throughput incentive for energy efficiency through an alternative mechanism in its REPS. With NC, 29 states and D.C. have passed Renewable Portfolio Standards, but only seven are like NC in including energy efficiency as part of the RPS[43] (data from DSIRE 2014). RPS laws generally require electricity companies to get a certain percentage of their electricity from renewable energy resources like wind and solar; NC's policy allows IOUs to meet up to a quarter of their requirements through energy efficiency until 2021 when this allowance rises to 40% (REPS of 2007).

Much of the controversy within REPS rulemaking to implement the energy efficiency part of the law has been about how to appropriately compensate IOUs for encouraging their customers to use less energy. The NCUC concluded this debate[44] by determining that between normal rate cases, IOUs can file for riders, or small additions to the base price of electricity, to compensate for energy efficiency programs through two main mechanisms. First, they can increase the price to pay for the implementation of the energy efficiency programs themselves (S.L. 207-397). A high rate of return for shareholders on such energy efficiency investments is said to incentivize them over traditional investments (RAP 2010). In their residential energy efficiency program, called Save-a-Watt, Duke Energy is compensated for energy efficiency in a way that some groups, like the NC Attorney General, have argued results in a rate of return on

[42] According to RAP's typology of decoupling frameworks, NC's REPS rules can be considered a form of "limited decoupling"; however, an NCUC-commissioned study on implementing REPS rejected decoupling as a possible framework, in favor of a "net lost revenue adjustment" (NCUC 2008: 14).

[43] Other than NC, these are: CT, HI, MI, NV, OH, PA, and WA. 20 states have separate energy efficiency portfolio/resource standards (DSIRE 2014).

[44] E-100, sub 113: 2-29-08 (NCUC Order)

energy efficiency investments to as high as 58%[45], compared with a more standard 8-12% return on traditional investments (Duke Energy 2012). By bringing such energy efficiency implementation into the investment fold, IOUs are able to receive a return for shareholders as high or higher than for traditional investments, potentially also reducing the Averch-Johnson incentive toward greater and greater investments in traditional, more polluting electricity facilities.

Second, IOUs can apply for compensation for "net[46] lost revenues," or compensation for sales of electricity that do not occur because the energy is saved instead[47]. While full decoupling separates revenues from sales by adjusting the price of electricity as demand changes due to a number of factors (including energy efficiency but also weather), NC's REPS mechanism is focused on decoupling energy efficiency alone through "lost margin recovery" (RAP 2011b: 86-7). This first mechanism of compensation is said to level the playing field for energy efficiency compared with traditional investments by addressing the way the throughput problem disincentivizes conserving energy (RAP 2010). Thus the two mechanisms of negawatt compensation may be thought to address the two disincentives to energy efficiency: the Averch-Johnson Effect and the throughput incentive.

Struggles over Who Accrues the Value of Energy Efficiency

In this section, I discuss the ways that, in the REPS rulemaking proceedings, the question of who accrues the value of energy efficiency was determined through struggles to valorize

[45] E-7, sub 831: 2-9-10 (NCUC Order); however, the true rate of return on energy efficiency investments is hotly contested in that docket. The AGO was including both the program costs and the net lost revenue compensation in its calculations of this resultant rate of return on energy efficiency investments.

[46] They are called "net" because the REPS rulemaking specifies that utilities are only compensated for revenues "lost" from energy efficiency programs net of revenues "found" through programs that increase customer demand (E-100, sub 113: 2-29-08 (NCUC Order)).

[47] E-100, sub 113: 2-29-08 (NCUC Order)

negawatts, to define their spatiality, and to claim them. The resolution of these struggles through NCUC rules resulted in the creation of negawatts as a valuable resource located in homes for which IOUs are credited with production, allowing IOUs to turn what was a threat to profits into an opportunity for further accumulation.

Struggles to Valorize Negawatts

Is energy efficiency a thing or an absence of a thing? Struggles over negawatt valorization are about defining what energy efficiency *is*. The ability of energy efficiency to take on somewhat paradoxical characteristics as both a material thing and an absence makes it possible for the negawatt to be a source of accumulation in multiple ways[48]. Framing negawatts as both a thing and an absence involves arguing that saving energy is both a source of value and a cause of value loss. By ruling that IOUs could apply for energy efficiency riders to compensate them both for the costs of implementing energy efficiency programs (implying a materiality to energy efficiency) and for net lost revenues (implying energy efficiency is an absence or loss), the NCUC's ultimate rules highlight this dual nature of energy efficiency's valorization processes. The conditions under which groups define energy efficiency as a thing or an absence show that these struggles over definition are about creating a resource that is valuable mainly for IOUs.

Defining Energy Efficiency as a Creator of Value

When they treat energy efficiency as a thing, IOUs and others fashion the negawatt as a loss of value for which IOUs should be compensated. Saving energy already has some value even before REPS, which in traditional regulatory settings can result in a shortfall of revenues

[48] In this paper I do not intend to resolve the question of whether energy efficiency "really is" a thing or an absence, but aim instead to show the struggles to define it in each/both way(s).

for utilities. One part of making negawatts available for accumulation by IOUs, then, involves defining them as a resource similar to other resources that IOUs already control and are paid for.

The framing of energy efficiency as such a resource is often explicit and can be seen in the discourses of IOUs, ENGOs, and others. For example, multiple ENGOs[49] together wrote approvingly of "energy efficiency as a low cost resource" in comments about REPS when it was first proposed. Duke Energy goes further, framing energy efficiency as a "fifth fuel" in their 2007 Energy Efficiency Plan[50]:

> Duke Energy Carolinas…recognizes energy efficiency as a reliable, valuable resource, that is, a "fifth fuel," that should be part of the portfolio available to meet customers' growing need for electricity along with coal, nuclear, natural gas, or renewable energy. The 'fifth fuel' helps customers meet their energy needs with less electricity, less cost and less environmental impact.

Treating energy efficiency as a fuel[51] opens up the possibility that that fuel will "belong" to a group, such as IOUs, who will in turn process and produce it in a similar way to other fuels, and then sell it to customers. Rather than state it outright, ENGOs more commonly imply that using less energy is a fuel when they compare energy efficiency to nuclear or fossil fuels. ENGOs frequently praise energy efficiency for its ability to cause the retirement of coal or nuclear power plants or prevent new construction of such plants[52]. These comparisons, which make it appear

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[49] In official comments on the La Capra's pre-RPS NC study, 19 Jan 2007 (NCSEA, NC Sierra Club, Environmental Defense, Carolinas Clean Air Coalition, NC Cons. Network, NCWARN, et al.).

[50] E-7, sub 831: 5-7-07

[51] This framing is particularly noteworthy because it distinguishes between two fossil fuels (coal and natural gas) that arguably have much more in common economically, politically, and materially than the wide range of renewable energy sources (solar, wind, geothermal, hydropower, biomass, etc.) lumped together in "renewables," while giving energy efficiency its own category. In practice, this valorizes fossil fuels and energy efficiency while devalorizing renewables.

[52] Instead of replacing fossil fuel/nuclear power plants, however, IOUs more commonly talk about the benefits of energy efficiency as a matter of "deferment" of coal/nuclear power plant construction. It was rare for IOUs to talk about energy efficiency resulting in existing power plants being taken offline or canceling future constructions; instead, negawatts are framed as slowing growth enough so that new traditionally-fueled power plants are built later in the future. These differing frames make sense for environmentalists who want energy efficiency to increase, while IOUs want to continue a similar business model based on investment in large power plants into the future.

that energy efficiency is easily interchangeable with coal, nuclear, and other things traditionally thought of as fuels, imply that negawatts are a similar kind of material resource.

IOUs and some environmentalists also both imagine energy efficiency a power plant. For example, Duke Energy[53] writes, "the most environmentally sound, inexpensive and reliable power plant is the one the utility does not have to build because it has implemented cost-effective EE and DSM[54] programs. A type of virtual power plant, EE and DSM are…" The idea that the cheapest power plant is the one we do not build has the dual effect of both implying energy efficiency is distinct from traditional power plants while also marking such efficiency as a kind of power plant, a "virtual power plant." Framing energy efficiency as a power plant is especially striking given the following quote from environmental scientist Amory Lovins (1989) in an famous Keynote Address to a Green Energy Conference:

> …roughly 42 percent of U.S. lighting energy…goes to incandescent bulbs. Those we normally replace with compact fluorescents…that have roughly quadrupled efficiency -- 11 watts replacing 40, 14 [sic] watts replacing 75, and so on… Think of such a compact bulb, with 14 watts replacing 75, as a **61 negawatt power plant**. By substituting 14 watts for 75 watts, you are sending 61 unused watts -- or negawatts – back to Hydro, who can sell the electricity saved to someone else without having to make it all over again. It is much cheaper to save the electricity than to make it…

Here Lovins is asking that we view a CFL, the quintessential energy efficiency technology, as a power plant itself. Similarly, some groups also frame energy efficiency as having a supply and even its own supply curve (GDS Associates 2006), similar to more conventional energy resources. Together, framing energy efficiency as a resource, a fuel, a substitute for coal and nuclear power plants, and a power plant position saving energy as a valuable thing itself, making it available for various groups to claim control of.

[53] E-100, sub 113: 9-24-07

[54] Demand-Side Management, or DSM, refers to programs that shift the peak in electricity demand to another time of the day; in contrast, energy efficiency is about reducing the total amount of electricity consumed.

Defining Energy Efficiency as a Destroyer of Value

While no one in these proceedings explicitly questions the idea that energy efficiency is a source of value similar to other material resources, a struggle is simultaneously occurring in these legal proceedings over the idea that energy efficiency also destroys value, resulting in "lost revenues." Claiming that energy conservation removes value from IOUs allows such companies to claim that they should be compensated for these losses. By calling these revenues "lost," multiple groups imply that the revenues originally *belonged* to IOUs, and that IOUs are entitled to get them back.

In a similar framing, the throughput incentive in these debates is commonly also called the "revenue erosion problem." In the REPS rulemaking, for example, three environmental groups[55] explained the need for compensation for net lost revenues, illustrating how hegemonic the idea that IOUs should be compensated for selling less of their product has become; they argued that some parts of the country,

> …have explicit methods to address the revenue erosion which utilities may experience when their [energy efficiency or demand-side management] [56] successfully reduces their sales below otherwise expected levels… the revenue erosion issue should be addressed through an explicit mechanism, just as program costs are. In most cases, a utility's prices…are set using a sales forecast that does not account for future energy efficiency savings. As a result, when sales are reduced by energy efficiency, the electricity prices are not high enough to recover all the costs incurred by the utility. The utility's variable costs will be reduced along with the lower sales, but the fixed costs will not. Therefore, there is said to be 'lost revenues' created by the energy efficiency programs; these lost revenues are generally said to be equal to the amount of energy saved times the fixed-cost portion of a utility's electricity price.

[55] E-100, sub 113: 9-21-07 (Environmental Defense, Southern Alliance for Clean Energy, and Southern Environmental Law Center)

[56] Note that they say only "demand-side management" in the original quote, but given the rest of the paragraph, it seems clear that they are referring to *both* DSM and energy efficiency.

It has become common sense among ENGOs and IOUs that IOUs should be compensated for these "lost" revenues, but such compensation is not obvious. For example, few ENGOs suggest that oil companies should be paid for lost revenues when people drive hybrid cars[57].

Positioning revenues as "lost" or "eroded" does discursive work. It supports the assumption by multiple parties that IOUs have a right to exist – and benefit - even as demand for their product dwindles, and that they have a right to future sales. Part of the challenge here is that the regulatory compact of electricity monopolies guarantees such companies' survival and continued opportunities for shareholder profits. Instead of questioning whether the structure of electricity monopolies is appropriate in a world of climate change and new decentralized energy technologies, however, the debate becomes centered on the question of how to appropriately compensate IOUs for lost revenues. ENGOs tend to frame this question as a practical issue, assuming that the only way that IOUs would be willing to implement energy efficiency programs would be if they can earn a high enough return on such investments. But framing these revenues as "lost" and "eroded" makes these processes appear natural and without an actor: they are divorced from who loses the revenues, or what political, economic, and social processes lead to their loss or erosion. The debates also become separated from energy governance mandates. For example, NC energy providers are charged, by law (G.S. § 62-2(3a)), with providing energy using "least-cost" resources, which many people believe are usually energy efficiency (e.g., Duke Energy's statement on the cheapest power plant is the one they do not have to build, above). The implication is that if the rate of return is the same for both traditional and energy efficiency resources, IOUs are bound by law to choose energy efficiency, thus negating the need to incentivize such negawatts further.

[57] One reason for this difference is that more competitive market for oil in comparison with electricity.

In the REPS proceedings, only two actors, the NC Attorney General's Office (AGO) and Nucor Steel-Hertford (an industrial electricity customer), seem to question these frames of loss and erosion that position IOUs as having a right to sell electricity. AGO[58] writes:

> Net lost revenues are better characterized as missed sales opportunities associated with DSM and EE programs that may discourage utilities from undertaking ambitious measures to promote energy efficiency and other demand-side management options. By allowing recovery of net lost revenues in conjunction with particular EE programs, the utility would be allowed to take back some of the benefit of energy savings that are brought about by the utility's measures as an incentive to promote wise rather than wasteful use of energy.

By implying that IOUs are "taking back" the value of energy conservation when they are paid for net lost revenues, the AGO is taking the unusual position that the value of negawatts belongs to electricity customers. The AGO also reframes revenue erosion as the "underrecovery of revenues," suggesting that IOUs may not be "entitled" (AGO's term)[59] to recovery of sales underrecovered due to energy efficiency. Yet even though the AGO goes far here in struggling against hegemonic assumptions about who owns the value of save energy, the AGO's position is not that IOUs should be uncompensated for such "lost sales opportunities." Rather, the AGO is arguing that IOUs should have to *ask* for lost revenue recovery, rather than be granted it automatically, but the AGO is *not* outright questioning whether such recovery should happen at all. Likewise, Nucor[60] writes, "from a customer's perspective, these net lost revenues are actually savings brought about by the actions of customers." Nucor makes this argument in order to suggest that recovery of lost revenues should be "on a case by case basis." Ultimately the NCUC ruled with the AGO and Nucor that net lost revenues be considered in each case, but utilities like

[58] E-100, 113: 12-17-07

[59] The AGO also points out that the problem of negawatts for IOUs is a short-term problem (because a later rate case adjusts price to compensate for "lost" revenues), one of the only times this is pointed out in the proceedings. Nucor also questions this "entitlement" (E-100, sub 113: 12-17-07)

[60] E-100, sub 113: 12-17-07

Duke Energy have successfully argued[61] for higher electricity rates to pay for net lost revenues nonetheless. In these ways, the questioning of these frames of loss and erosion is merely procedural in effect, allowing IOUs to continue to position themselves as having experienced a loss of value to which they have a right to seek compensation when energy efficiency is implemented.

Struggles to Define Negawatts' Spatiality

Beyond creating the negawatt as a resource that both creates and destroys value, the creation of energy efficiency as a resource valuable to IOUs involves struggles to define where such valuable negawatts are located. These struggles resulted in an understanding of energy efficiency as a valuable resource located in homes.

Defining Energy Efficiency as a Demand-Side Resource

Where is this valuable resource, saved energy, located? A surprising contradiction in discourses happens here. On one hand, negawatts are treated as if they are a resource, a fuel, and a power plant, which for traditional resources like coal would be considered part of the production or supply-side of electricity. Yet in the REPS discourses, energy efficiency is treated almost entirely as a demand-side resource[62], or part of the consumption side of electricity systems, even though it is far from obvious that energy efficiency is located only in the consumption side of electricity systems. For example, a common model of energy losses or waste, what might be thought of as energy *in*efficiencies, in electrical systems, is often pictured similar to **Figure 4.6**.

[61] E-7, sub 831

[62] Not to be confused with "demand-side management", which is a subset of "demand-side resources."

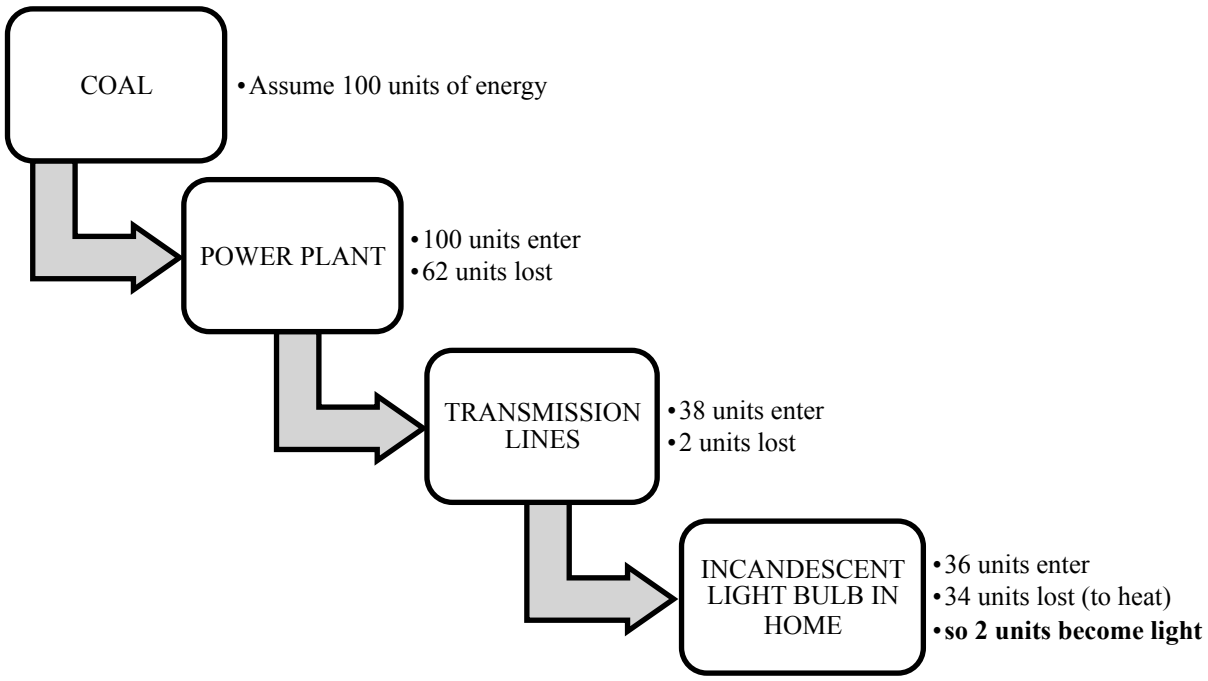

Figure 4.6. Model of Energy Losses in an Electricity System. The figure, made by the author, is adapted from a National Academy of Sciences (2008) article entitled, "What you need to know about energy."

In the article, the figure's caption reads:

> Example of energy lost during conversion and transmission. Imagine that the coal needed to illuminate an incandescent light bulb contains 100 units of energy when it enters the power plant. Only two units of that energy eventually light the bulb. The remaining 98 units are lost along the way, primarily as heat.

Note that the original authors chose lighting as the key example here, which is not surprising given that incandescent lights have become the poster-child, to many, of inefficient technologies, just as CFLs are the symbol of energy efficient technologies (Thoyre dissertation **Chapter 2**). This figure shows how there are substantial losses of energy at the power plant, in the transmission lines, and finally in appliances within homes. These might be thought of as three possible targets of a state energy efficiency policy such as REPS that are all under the purview of electricity companies.

Yet the REPS struggles are mainly about energy efficiency as a "demand-side" resource happening in the course of electricity consumption. The REPS law (2007) defines an "energy efficiency measure" as

> an equipment, physical, or program change implemented after January 1, 2007, that results in less energy used to perform the same function. 'Energy efficiency measure' includes, but is not limited to, energy produced from a combined heat and power system that uses nonrenewable energy resources. 'Energy efficiency measure' does not include demand-side management.

This definition would seem to include, for example, physical changes to power plants to increase their efficiency. However, in the 208 documents about implementing the energy efficiency side of REPS, no one proposes efficiency improvements to power plants, transmission lines, or other supply/production-side changes as changes IOUs could do to meet the requirements of REPS.

Instead, energy efficiency is consistently treated as located on the consumption end of electricity systems. For instance, the environmental groups Environmental Defense, Southern Alliance for Clean Energy, and Southern Environmental Law Center[63] frame "demand-side initiatives (DSM and EE)" as distinct from "generation resources." Even though using less energy itself is being framed as something that is produced, it is not about the *production* of energy. This assumption that energy efficiency is about the consumption side of electricity is common in discourses beyond REPS; for example, the Southern Alliance for Clean Energy's writes on their website[64], "Energy efficiency simply means receiving the same service (light, cooling, heating, for example) out of a device or system without using more energy than necessary – using equipment that performs well."

The second half of the REPS definition of energy efficiency appears to include an important exception to this framing of energy efficiency as a demand-side resource. In it, the legislature includes combined heat and power (CHP)[65] as qualifying energy efficiency. Yet although the definition seems to suggest that IOUs might meet the requirements of REPS by

[63] E-100, sub 113: 11-14-07

[64] http://www.cleanenergy.org/learn/learn-about/learn-about-energy-efficiency/

[65] Seen by many as a type of efficient power plant, often fueled by fossil fuels, where the electricity and heat resulting from the combustion of such fuels are both used.

upgrading their own power plants to CHP facilities, this possibility does not play out in the discourses. Instead, the main way CHP systems enter the REPS conversations is through concerns that IOUs will use the CHP provision in REPS as a way to build more coal-fired power plants. The consumer advocacy group the Public Staff[66] worries that IOUs will use CHP systems to "game" compliance with REPS, concluding, "Obviously, this would be diametrically at variance with the General Assembly's intent [in the REPS law] to promote renewable generation." Yet if groups were thinking of energy efficiency as encompassing both the production of electricity and its consumption, it is not obvious that CHP violates the spirit of REPS. Instead, the Public Staff's argument suggests that many groups view the production of clean energy as something done with renewable energy sources, while the consumption of clean energy is done with energy efficiency. Otherwise, the REPS rulemaking is remarkable for the fact that no one suggests that the power plants or transmission lines should become more energy efficient as a way for IOUs to meet their REPS requirements.

A second exception to the framing of energy efficiency as a demand-side resource illustrates the ways these contested spatialities of energy efficiency are largely struggles over who gets to profit from energy efficiency. Piedmont Natural Gas, a natural gas company in NC, is one of the only groups that treats energy efficiency as applying to the entire length of **Figure 4.6**. Whereas most groups treat energy efficiency as a product of appliances themselves (as a matter of a more or less efficient light bulb, for example), Piedmont argues[67] that energy efficiency programs should be "evaluated on a total fuel efficiency basis (i.e., source-to-site efficiency plus appliance efficiency)." Piedmont's concern likely stems from the ways natural gas companies could lose market share from certain energy efficiency programs if they focus

[66] Representatives of the "using and consuming public," (E-100, sub 113: 11-14-07)

[67] E-100, sub 113: 11-14-07

only on appliances within homes as the sites of energy efficiency[68]. They are concerned that electric companies might, for example, incentivize customers to replace their water heaters with high-efficiency electric models, resulting in some customers who had even more-efficient natural gas-power water heaters replacing those natural gas heaters with less-efficient electric heaters. The result, they say: "what at first glance appeared to be a program to promote lower electric usage and increase energy efficiency, is revealed to be a program that builds electric load and unnecessarily increases greenhouse gas emissions." Whether such fuel-switching is happening and whose equipment is "in actuality" more "efficient"[69] is beyond the scope of this paper; instead, what is important is that the only times that energy efficiency is framed as an issue of the more-than-consumption part of electricity systems is when a natural gas company is concerned that the effects of such exclusions will affect its bottom line[70].

From Demand-Side to Homes

Despite positioning using less energy as a demand-side resource, negawatts are consistently framed in these discourses as mainly about the demand of the residential sector, not all consumers or even all buildings. The REPS law states that IOUs can implement energy efficiency programs for residential, commercial, or industrial customers. Yet there is a special provision of REPS[71] that states that "any industrial customer" and "commercial customers with significant annual usage at a threshold level to be established by the Commission" are allowed to "opt out" of IOU energy efficiency programs. If a customer opts-out, they can avoid paying the

[68] As the NCUC puts it in their final Order: "it is clear that both gas and electric utilities see the new statute as potentially enabling them to build market share." (E-100, sub 113: 2-29-08 (NCUC Order))

[69] Which turns out to be a very complex socio-political question.

[70] Piedmont's line of reasoning was ultimately rejected by the NCUC in light of the fact that general statutes already "[forbid] destructive competition." (E-100, sub 113: 2-29-08 (NCUC Order))

[71] REPS of 2007

higher electricity rates that compensate IOUs for energy efficiency programs, so long as such opting-out customers implements similar programs themselves. A large part of the REPS rulemaking proceedings thus were about the appropriate threshold level for such opt outs[72].

Yet is not clear why residential customers, small businesses, governments, and other customers should not also be allowed to opt-out. If a residential customer buys and installs their own CFLs, they still have to pay higher rates on their electricity to compensate Duke Energy for CFL giveaways to the residential customer class (in other words: they would pay twice for CFLs). Yet if a large-enough commercial customer installs CFLs in its buildings, it can choose to not pay for any IOU programs installing CFLs in the commercial customer class. It is possible that the reason residential and small commercial customers are excluded from opting-out is because it would be logistically difficult to manage many small units. Yet it is unclear why residential customers could not bundle their energy efficiency savings together and opt-out as a larger unit, a solution that commercial customer Wal-Mart proposes[73] for its own buildings to meet the threshold. It is an important patterned absence that no one in the rulemaking procedures even suggests that residential customers should also be able to opt-out[74]. Instead, the entire class of customers who use electricity in their homes are being positioned so that the value of their negawatts is claimable by others, while larger customers, including global capital such as Wal-Mart, are allowed to keep the value that using less energy generates for themselves. It is likely

[72] The main thresholds considered were 1,000,000 kWh (initially favored by Duke Energy's large commercial customers such as Wal-Mart, NCSEA, and Public Staff (E-100, sub 113: 11-14-07), 3,000,000 kWh (initially favored by Dominion (E-100, 113: 11-14-07), and 5,000,000 kWh (initially favored by Progress Energy (E-100, sub 113: 11-14-07) and Duke Energy (E-100, sub 113: 11-14-07). Given the throughput incentive, it makes sense why IOUs would favor threshold levels that exclude as many customers as possible.

[73] E-100, 113: 12-14-07

[74] But note that the City of Durham suggests such a thing in the Save-a-Watt proceedings (a separate rulemaking docket, E-7, sub 831), writing, "If large users want to have the option of implementing their own EE measures and opting out of the surcharge, shouldn't local governments, small businesses and residents have the option of investing in EE on their own and opting out of the surcharge too?" (6-26-08)

that, in part because households are largely underrepresented[75] in the NCUC proceedings compared with other actors and interest groups, energy efficiency in homes is being treated as a the first frontier of energy efficiency appropriation by IOUs.

Struggles to Claim Negawatts

Positioning mainly the energy efficiency that is implemented in homes as counting toward REPS requirements may appear to have the paradoxical effect of placing it out of reach of IOUs' accumulation efforts. IOUs and other groups struggled in the REPS rulemaking proceedings to determine who produces negawatts and how; these struggles resulted in home energy efficiency being framed as produced by energy providers and the exclusion of other possible producers of energy efficiency.

Defining the Processes that Count in Producing Energy Efficiency

Electricity flows into homes, but traditionally the only way that homes produce value for IOUs is by paying for kilowatt hours they use. This is why the discursive and legal appropriation of negawatts includes both the valorization discussed above and processes which position IOUs as the producers of these negawatts. Becoming seen as the *producers* of residential negawatts is an accomplishment in particular because it can be counter-intuitive to think of external corporations producing value in private homes when those homes consume less of their product. IOUs become positioned as the producers of residential negawatts in part through debates about what does and does not constitute the production processes[76] for negawatts. When IOUs

[75] The only representation households have directly is through the Public Staff, who are appointed by the state to represent the using and consuming public. Otherwise customers are represented only in various interest groups (e.g., ENGOs, the AARP, etc.) in normal NCUC proceedings.

[76] The idea that energy efficiency itself has production processes (although not always the language of production) is widespread among IOUs and ENGOs. For example, some groups frame energy efficiency as something that should be mined, captured, or found, as when the ENGO ACEEE (Oct. 2013 white paper, http://www.aceee.org/files/pdf/white-paper/eer-2013.pdf) writes, "That future of mining demand-side energy resources holds rich veins of remaining opportunities, not to mention yet-to-be-discovered efficiency resources." It

implement programs to encourage their customers to use less energy, which actions should these IOUs be compensated for by way of rate increases? The answers to this question by various stakeholders construct what counts as part of negawatt production. This debate in the REPS proceedings centers around which parts of negawatt production are considered "costs" for which IOUs can raise rates as compensation, or which costs should be considered "recoverable."

Many groups in these proceedings converged on the theme that negawatt production involves buying new technologies[77]. This framing is visible in the REPS legal definition of energy efficiency, which emphasizes "equipment, physical, or program change." The "program change" part of the definition leaves some room for energy efficiency to be interpreted outside of or beyond the consumption of new technologies. Yet the vast majority[78] of the energy efficiency programs approved for compensation and implementation by the NCUC thus far have involved technologies. This framing of energy efficiency excludes any saving of energy that results from non-technologies such as behaviors. For example, in the case of lighting, this discourse treats CFL use as producing negawatts, but not turning off the lights. One possible reason for this narrowing of what counts as part of negawatt production is because it can be difficult to measure saved energy that results from behaviors, making it especially hard to abstract it. It may also be

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was common in the REPS proceedings for environmentalists, policymakers, IOUs, and others to speak of the "development" of energy efficiency resources and that energy efficiency must be "made" and "delivered." Note, however, that I am leaving aside the question of what "really are" the production processes of negawatts, in this paper.

[77] I am not using "technology" in the STS frame of "technologies and techniques"; rather, I mean material things that are more commonly thought of in lay language as "technologies." Examples of energy efficiency technologies might include: CFLs, combined heating and power (CHP) plants, hybrid cars, etc.; they require the producer of negawatts to acquire (usually buy) a thing first in order to save energy. Examples of non-technology-centric actions that can result in using less energy are behaviors such as turning off the lights, turning down the thermostat, or walking to work instead of driving; these actions can involve technologies, but do not necessarily require buying new items.

[78] The main exception of which I am aware is a new set of energy-saving programs proposed by Duke Energy in 2013 that have not yet been ruled upon by the NCUC that may ultimately include energy conservation education as a program, and thus educational programs as recoverable costs.

difficult to attribute these actions that reduce energy consumption to actions taken by IOUs, making it harder for IOUs to claim they are the producers of these negawatts.

Most groups in these proceedings seem to agree that negawatt production involves technologies, but some processes are much more contested; in particular, groups disagreed over whether advertising and education about energy efficiency programs and studies of customer energy use should be considered recoverable costs for IOUs. IOUs tend to frame all such costs as part of the production of negawatts. For example, Duke Energy[79] asserts that energy efficiency recoverable costs should include "all capital costs, including cost of capital and depreciation expenses, marketing and advertising costs, implementation costs, incentive payments to program participants, administrative costs, operating costs and measurement and verification costs." Duke Energy is claiming that all of these expenses are part of producing negawatts. In contrast, ENGO NCWARN[80], addressing a similar claim from Progress Energy, argues against the idea that some of these expenditures should be recoverable, saying that accurately counting certain kinds of these activities will be too difficult:

> Measuring the real world impacts of the utility energy efficiency programs will be a difficult undertaking. As an example, Progress Energy has been running newspaper ads with the 'Save the Watts Guy' who [is dressed up as a CFL and] suggests ways to save electricity… Does Progress Energy get credit and cost recovery for every instance that one of its suggestions is actually followed? Who gets the credit if a residential customer buys an energy efficient light bulb on his or her own without paying attention to the ad? Does Progress Energy recover advertising expenses even if the ads might not have any substantive content and just allow Progress Energy to polish its corporate image?

NCWARN is arguing that advertising should not always be considered a recoverable cost, and thus should not be considered part of negawatt production, because it is unclear that advertising results in saved energy.

[79] E-100, sub 113: 9-24-07

[80] E-100, sub 113: 11-7-07

In its Order[81] on these issues, the NCUC ruled that recoverable costs would include costs of investments in infrastructure, administration of energy efficiency programs, incentives to customers to participate, but not advertising or measurement of whether energy efficiency has happened. In other words, for a CFL giveaway, the costs of bulbs, their shipping, any rebates for customers, and labor of Duke Energy workers who administer the program are all part of the production of negawatts, but the marketing of the program to customers and any follow-up studies to see how many people are actually using the bulbs are not. Even with these limitations, IOUs are positioned as the producers of negawatts because multiple actions that IOUs can contribute to are framed as part of the production of using less energy. But household labor of installing, using, cleaning up after, and disposing of CFLs are not considered part of production, even though these actions are necessary to the creation of value that happens when such bulbs are installed (Thoyre dissertation **Chapter 3**).

Excluding Alternative Producers of Energy Efficiency

A second way that IOUs are positioned as the producers of energy efficiency in homes is by excluding alternative producers both legally and discursively. Given other states' electricity policies, IOUs are not the only possible state-endorsed producer of negawatts, because energy efficiency programs have also been administered by state agencies and third parties. In NC, government-administration of energy efficiency programs was proposed as a law called NCSAVE$, which never passed the legislature. In interviews, ENGO representatives told me this was because Duke Energy did not want it to pass. In Oregon and Vermont, Energy Trusts were created independently of IOUs to implement energy efficiency programs (RAP 2011b: 78). In practice, such third party production could include a third party contractor installing CFLs in

[81] E-100, sub 113: 2-29-08 (NCUC Order)

homes, which generates an energy efficiency credit ("white tag") equal to the number of kilowatt-hours saved; an IOU could then purchase this credit to meet their REPS requirement.

NC law allows such third parties to produce negawatts that IOUs could then purchase to meet the requirements of REPS, but neither a market for white tags nor a platform through which IOUs could buy such credits from third parties has materialized. This is surprising because many other natural resources have been fully commodified (e.g., carbon offsets and wetlands). The REPS law specifically creates such a platform for registering (although not trading; however, the registration is supposed to facilitate trading by abstracting the energy) renewable energy credits and states that "one megawatt hour of electricity…reduced by implementation of an energy efficiency measure" can count as such a renewable energy credit (REPS of 2007). Yet in the rulemaking for REPS, the platform for registering such credits is only established for renewable energy projects; in my observations and interviews, I found that many stakeholders seemed unaware[82] that energy efficiency could legally be included. To date, no energy efficiency credits have been registered on the NC green tag trading platform[83]. In the rulemaking, the NCUC ruled that such white tags were a legal means for IOUs to fulfill their REPS requirements, but noted that the REPS law does not "provide for the purchase of RECs associated with the implementation of EE."[84] The lack of a platform for registering energy efficiency excludes alternative producers of energy efficiency from participating in the implementation of REPS,

[82] Even experts on energy policy in NC are not always aware that energy efficiency can be included in the green tag platform established for IOUs to buy green tags from third parties. For example, I interviewed a representative of DSIRE, a database for renewable and energy efficiency policies nationwide; the representative is considered an expert in NC green energy policies in the electricity sector. In the interview, I asked him why energy efficiency is not traded as part of REPS. He responded that such an action was legally excluded by the NC REPS law. However, during the course of the interview, he looked up the NC REPS law on his computer and then, sounding surprised, he corrected himself, reading the pertinent part of the law out loud to me and saying that he had just found out that REPS does include energy efficiency as part of the green tag platform.

[83] As of 28 March 2014; platform available: http://www.ncrets.org/

[84] E-100, sub 113: 2-29-08 (NCUC Order)

including third party contractors as well as households, who might otherwise buy CFLs themselves and sell the saved energy to their utility (which might be accomplished, in theory, similarly to net metering for renewable energy).

Finally, the exclusion of non-IOUs as producers of negawatts is also accomplished through language that normalizes IOUs as implementers of energy efficiency and frames other producers as *exceptions*. In these proceedings, "energy efficiency" usually refers to negawatts implemented through IOU-administered programs. When customers (industrial, commercial, or residential) implement their own energy efficiency without IOU influence, many stakeholders in these proceedings referred to this as self-initiated,"[85] "self-implemented"[86], or "self-directed"[87] energy efficiency. These framings of energy efficiency are about giving large corporations (IOUs and other big capital[88]) the opportunity to claim the value of energy efficiency for itself, by framing "normal" negawatts as belonging first and foremost to them.

Through these struggles over what energy efficiency is, where it is located, how it is produced and by whom, the negawatt is created as a valuable resource for IOUs to control in order to accumulate wealth. By creating the negawatt as a valuable thing that they produce, but also as an absence that leads to corporate lost revenues, IOUs position themselves as the proper recipients of value and of compensation for lost value. By limiting valuable energy efficiency to that which happens in homes, while normalizing IOUs as the producers of negawatts, IOUs

[85] E-100, sub 113: 9-24-07 (Progress Energy)

[86] E-100, sub 113: 2-29-08 (NCUC Order)

[87] E-100, sub 113: 12-17-07 (Nucor)

[88] E.g., Wal-Mart and other commercial/industrial opt-outs.

effectively appropriate the low-hanging negawatt fruit that previously had been causing them short-term revenue shortfalls compared to their predictions.

Discussion

Two aspects of the struggles over the valuation, spatiality, and control of negawatts are unusual compared with neoliberalizations of other socio-natures. First, negawatts already create monetary value for households, so their appropriation does not involve traditional discourses of valuation that have to first posit nature as valuable; instead, the struggle is to define the value in certain ways. Second, negawatts are appropriated in the context of a large regulated monopoly system. Given these unique qualities, these struggles over negawatts in the REPS proceedings have particular implications.

Appropriating Negawatts

Out of these struggles over the valuation, spatiality, and control of negawatts, IOUs have effectively gained control over some of the energy efficiency occurring in homes in NC. The value of energy efficiency that used to accrue primarily to households when they installed energy-saving technologies for themselves instead has been positioned as the private property of IOUs. The processes through which negawatts are valorized and abstracted separate the value of using less from the traditional producers of that value, who are people in households performing the labor of using less. Previous research has shown that what is widely considered the easiest energy efficiency action, using CFLs, can be labor for residents, particularly when those households try to use the CFLs to the environmental and health standards set by ENGOs and the EPA (Thoyre dissertation **Chapter 3**). If even using CFLs can entail five different actions (including self-education, altered habits of lighting use, transportation to buy the bulbs, extensive clean-up from breakage, and disposal of a hazardous substance), it is not a stretch to imagine that

many actions to use less electricity involve household labor. Yet this labor is completely absent from struggles in the REPS proceedings over what should be considered to count (and be compensated for) in the production of using less. The question of whether households might be part or full "owners" of the negawatts they help to produce with their labor (and money) is also neglected.

The case of negawatt appropriation shares features with the privatization and commodification of other socio-natures. Scholars have distinguished different phases of commodification of nature. Castree (2003), for example, argues that commodification includes privatization, alienation, individuation, valuation, and displacement. Bumpus (2011) shows how commodification of carbon offsets involves privatization, individuation/abstraction, monitoring/verification, and displacement/exchange and Robertson (2000) argues the moments of wetland commodification include abstraction, monetary valuation, spatial abstraction, and exchange. The literature on the commodification of nature suggests what the appropriation of negawatts can accomplish for IOUs: a specific kind of saved energy (that in homes) is valorized and abstracted in ways that make it available to spatially-removed capital, IOUs, to use for accumulation.

The neoliberalization of negawatts involves sub-processes often thought of as part of commodification: valuation and abstraction. In the REPS rulemaking, valorization struggles have resulted in a paradoxical definition of energy efficiency as something that both creates and destroys value for IOUs. Unlike minerals, using less energy can be more difficult to envision as a traditional resource because of its lack of materiality, which is perhaps one of the reasons that so much effort is expended in establishing the negawatt as a resource, fuel, and power plant; framing energy efficiency as a resource – as a thing that exists - is an accomplishment that could

fail and thus requires effort to maintain. Constructing a valuable resource as located in homes poses a particular challenge for IOUs: how can they accrue the value of this resource if it is located in a sphere traditionally thought of as private and outside the influence of outside energy providers? Thus the value of household energy efficiency must be abstracted so that it can circulate and accrue to actors outside of homes. Valorizing using less energy and then narrowing it to only a portion of the potential saved energy resource sets only some energy efficiency free for circulation, and the subset that is abstracted in this way is mainly different from the rest of negawatts in not being controlled by large corporations. The result is that the value from using less energy comes to be seen as a thing separatable from its traditional producers (people in households), able to circulate beyond them, and hence as claimable by others: it becomes appropriable. Thus valorization and abstraction processes are here key conditions for the corporate accumulation happening through appropriation of negawatts.

A key comparison with negawatts is the case of carbon offsets, an ecosystem service-like commodity with some similarities to negawatts. Bumpus and Liverman (2008) show that abstracting carbon is a key process in what they call the "accumulation by decarbonization" through which "carbon is materially created [in] sinks or destroyed in reductions, but eventually becomes a virtual commodity that is abstracted and transferred across space as a tonne of reduced carbon to be 'consumed' by an organization that wants to compensate for emissions of equal value…" Similarly, reductions in energy use, measured in kilowatt-hours saved, are abstracted across a variety of energy efficiency technologies, across different types of homes across landscapes, and separated from the social contexts (Robertson 2000) – including labor processes - in which they are saved, so that they come to be treated as one thing, a kilowatt-hour

less. These processes of abstraction separate saved energy from its context so that it can be framed as produced, controlled, and owned by IOUs.

Yet there are important differences between these other cases of neoliberalization of nature and the appropriation of negawatts. Energy efficiency has commonly already been a private good, unlike many other socio-natures which have been held collectively, so the process occurring here is appropriation, not privatization. Because of the absence of any market or ability to exchange negawatts, energy efficiency has also not been fully commodified in NC. While other neoliberalized natures have been fully commodified, in this case appropriation via regulation may more fully allow capital to control the value of energy efficiency, especially in an already-regulated monopoly system.

Neoliberalizing Negawatts as Accumulation Strategy

The neoliberalization of household negawatts can be seen as a transfer of wealth from households to IOUs because value that is produced in part through household labor is claimed by and becomes a source of profits for IOUs. In the case of CFL giveaways and other utility-implemented energy efficiency programs, utilities and households are clearly both involved in the production of negawatts. Yet in the REPS proceedings, only corporate value-making is recognized. Part of the way the erasure of the household in producing the value of negawatts is facilitated by the ways that the labor of using CFLs and other home green technologies is often coded as "women's work" and thus as not work (Thoyre dissertation **Chapter 3**). The appropriation of negawatts can be seen as part of the larger class project of neoliberalism that represents multiple ways to transfer wealth to capitalists (Harvey 2005). As Bridge (2010) writes, "resource making" can be seen as "theft."

How much wealth is being transferred? This question is surprisingly complex, a complexity that both highlights the paradoxical processes occurring and hides the transfer of wealth. Given that the NCUC has granted utilities the ability to raise rates for creating/destroying value through energy efficiency, it is surprising that the amount of money households and utilities benefit and/or lose is not easy to find in public records. In **Appendix 1**, I create a conceptual model of the relationships within utility-sponsored energy efficiency programs under REPS regulation between: electricity prices; utility costs, revenues, and profits; and customer electricity bills. I conclude that the neoliberalization of negawatts in this case is a transfer of wealth to IOUs because utilities see higher profits and customers see higher electricity bills. Before REPS, the relationship was the opposite, because people in households paid lower electricity bills when they used energy efficient technologies (**Figures 4.2-4.5**). This transfer of wealth is especially true for those customers who do not take part in the utility programs; for example, not all Duke Energy residential customers receive free CFLs, but all receive higher prices of electricity to pay for such programs. These conceptual relationships are based upon my back-of-the envelope calculations, but are not surprising given the near-universal agreement among stakeholders in these proceedings that utilities should receive rates of return on money invested in energy efficiency programs higher than those they receive from traditional investments in order to provide incentives to energy efficiency programs.

I used a back-of-the-envelope calculation (also in **Appendix 1**) to estimate the scale of the wealth transfer over four years, the length of the first Duke Energy household energy efficiency programs. Buying CFLs themselves in the absence of the REPS legislation, households would save an average of $130; in the presence of REPS, customers installing the CFLs would pay net $30 to Duke Energy, so the implementation of REPS results in a transfer for

value of $160 from CFL-using households to the IOU. Customers who did not use the CFLs given away by Duke Energy under the presence of REPS would pay $60 in higher electricity bills over the same period, another layer in the transfer of wealth.

The neoliberalization of negawatts through REPS can be seen as a way that IOUs, largely with the backing of policymakers, the NCUC, and, perhaps most surprisingly, ENGOs, use environmental governance and the threat of environmental crisis to secure markets into the future. McCarthy's (2004) case of NAFTA as primitive accumulation of the conditions of production sheds particular light for the case of negawatts. He found that NAFTA resulted in guarantees of corporate profits by positioning environmental regulations as "takings" for which these corporations should be compensated. Similarly, I have shown that energy efficiency imposed on IOUs through the REPS law is framed as resulting in "revenue erosion" and "lost revenues" for which IOUs as considered to be entitled compensation. In a related docket, the City of Durham[89] in fact argues that Duke Energy is trying to impose a normalization of compensation for such "takings" through their implementation of REPS.

Neoliberalization of negawatts can be seen as an accumulation strategy in the short- and long-term for electricity companies in an era of threats to profits from environmentalism and climate change mitigation. In a world where people use less and less electricity in order to mitigate climate change, IOUs are likely to experience decreasing sales of kilowatt hours but increasing prices of electricity, which can result in both short- and long-term declines in profits. Appropriating household negawatts allows utilities to resolve both the throughput incentive problem and the Averch-Johnson Effect, providing incentives for IOUs to promote energy efficiency in the short- and long-term but also turning negawatts into profits in both time scales. In addition, like carbon offsets (Bumpus 2011), negawatts requires its "opposite" (kilowatt

[89] E-7, sub 831: 6-26-08

hours) to continue to be consumed in order to exist. We can see this for negawatts by asking "how many negawatts are there?", a question implying that there are exactly as many negawatts potentially consumable as electricity that is being consumed (or produced) in a given moment. The emphasis on using less energy via negawatt appropriation perpetuates long-term consumption of IOU products, be they electricity or the absence of electricity.

In these ways, it is possible to take the following statement by Duke Energy in its 2007 Energy Efficiency Plan[90] seriously:

> The Company's new role is to manage energy efficiency as a reliable 'fifth fuel' and provide customers with universal access to energy efficiency services and new technology. Duke Energy Carolinas has the expertise, infrastructure and customer relationships to produce energy efficiency and make it a significant part of its resource mix.

IOU moves to appropriate household negawatts are both a short-term and long-term business strategy that provides utilities with profits even in the face of climate change mitigation and its potential high rates of energy conservation. They normalize the idea that IOUs have a right to certain levels of sales and that IOUs are the rightful owners of this residential negawatts resource. Other forms of energy efficiency – those produced by businesses, governments, industries, along other parts of electricity production networks, as well as behaviors, *in addition to* technologies - have not been appropriated by IOUs. They may well represent new frontiers for the mining of energy values.

Negawatt Spatiality

The struggles to define energy efficiency under REPS law in NC have resulted in the valorization and abstraction of a spatially-specific form of negawatts: those in homes. However, electrical negawatts might be thought to occur throughout human-built landscapes: in the realms of other electricity customers (businesses, governments, industries) but also along other parts of

[90] E-7, sub 831: 5-7-07

electricity networks (in the mining of coal, in power plants, along transmission lines and within transformers). It is also possible to imagine saved energy as about behaviors instead of technologies, further expanding the possibilities for electrical energy efficiency landscapes.

How can using less energy, which is often thought of as an absence, have a spatiality? In part this spatiality is an imaginary landscape of disappearing currently-consumed electricity. In that way, the landscape of negawatts is closely tied to the spatiality of electricity. While electricity is generally treated as a universal service available to everyone who can pay, its spatiality is determined by the current infrastructure of the electricity grid and by the political boundaries drawn by regulatory bodies. NC falls under the Eastern Interconnection, a set of linked transmission lines spanning the Eastern U.S. from the Rocky Mountains (excluding Texas, which has a separate grid) (RAP 2011b: 15). In theory, then, it is possible to imagine negawatts "flowing" along this grid, and thus circulatable among energy providers throughout it. Yet state boundaries delimit negawatt realms because of the ways electricity is regulated on a state, not federal, basis. Thus, the NCUC has determined that negawatts only count for IOUs if they are produced in that IOU's territory in the state of NC; an alternative arrangement that has not been implemented might be to say that IOUs could buy negawatts from neighboring states, just as they do for electricity. Even if negawatts were fully commodified, they would still be limited by the regulatory landscape of white tag trading markets; for example, at present the regulatory landscape of renewable energy certificates (which NC white tags can, in theory, join) is limited to trading in NC and the North American Renewables Registry, encompassing parts of the Southeastern and Midwestern U.S. and roughly half the provinces of Canada (NC-RETS 2012).

Carbon offsets again provide an important comparison. Energy efficient technologies like CFLs have been used in other countries to produce carbon offsets, but the spatiality of NC's negawatts and global carbon offsets is fundamentally different, posing particular challenges for those attempting to accumulate by claiming its value. As Bumpus and Liverman (2008) show, carbon offsets link Global North with Global South countries because they are less expensive to obtain in developing countries. In contrast, the REPS law limits the extent of the similar geographical reach of negawatts because energy efficiency projects to fulfill it must occur in the state of NC and, at least in practice (because a white tag market has not developed) has been limited to the territory of each IOU. Yet the neoliberalization of negawatts still results in a power imbalance, as corporations outside of homes claim a "resource" within homes for the purposes of resolving challenges of accumulation. Because they occur in homes, the accumulation of negawatts is also different from carbon offsets because it is tied to social reproduction, including gender inequalities (Thoyre dissertation **Chapter 3**) and identities (Thoyre dissertation **Chapter 2**).

Conclusions

In this paper, I have shown how IOUs gained control over the value of household negawatts in NC by appropriating them in legal and discursive struggles over the implementation of a state Renewable Energy and Energy Efficiency Portfolio Standard. Because traditional regulatory structures of electricity monopolies in the U.S. have disincentivized energy efficiency from the point of view of electricity providers, the state of NC attempted to encourage such energy efficiency through mechanisms of compensation through which IOUs are paid for both the value created and destroyed by negawatts. In struggles over the spatiality of negawatts, the energy efficiency that counts according to REPS law became codified as that which occurs in

homes. Yet IOUs gained control of such energy efficiency by defining what counts in the production of energy efficiency and by excluding alternative possible producers of energy efficiency. The resulting appropriation of energy efficiency via environmental governance represents an accumulation strategy for IOUs that has allowed them to turn climate change from threat to opportunity for profit in both the short- and long-term.

This research suggests several future directions. It is still unknown how much wealth is being transferred and how much greenhouse gas emissions are effected by this kind of energy efficiency policy. Would a more competitive market for energy efficiency or government-run energy efficiency programs, help or hinder equity and sustainability goals embodied by energy efficiency policies? Since the neoliberalization of other systems has often involved appropriation (often via privatization) as a first step toward commodification, will negawatts ultimately be commodified as well, or does the unique history and geography of electricity systems mean that appropriation is the more lucrative accumulation strategy?

The energy efficiency portion of REPS applies to three different kinds of electricity utilities in NC, investor-owned utilities, municipalities, and cooperatives[91], but I have focused my research on IOUs. A test of whether this appropriation of negawatts is driven primarily by the profit motive could compare the effects of REPS on IOU-, municipality-, and cooperative-run energy efficiency programs. Such a comparison is not possible in the present research because of data limitations. Even though REPS applies to IOUs and munis/coops, munis and coops only participated in the energy efficiency rulemaking in a limited way. Of the 208 documents that made up the energy efficiency rulemaking, only six represented participation by

[91] The magnitude of the portfolio standard is larger for IOUs vs. munis/coops, but no cap is put on the percent that can be met through energy efficiency (REPS of 2007).

munis or coops. Of these, one[92] was a petition to intervene by an electric coop that was denied for not meeting regulations by the NCUC; two[93] were comments by a group of municipalities who expressed opinions on the guidelines for opting out (since munis are consumers of IOU-produced electricity); and otherwise these groups mainly commented on issues unrelated to the present analysis[94] or expressed broad agreement[95] with the stance taken by Progress Energy. It is possible that such groups did not participate in the rulemaking as much as IOUs, ENGOs, and other groups because they have fewer resources and because their incentive structure is different when it comes to energy efficiency because they are not shareholder-owned private companies. A test of the profit-motive explanation would be possible by comparing the energy efficiency programs of different kinds of electricity providers and tracing where the value of energy efficiency is flowing, and would be an area ripe for further research beyond the scope of the present study.

Such a comparison between IOUs and munis/coops could be especially useful for understanding questions of equity and sustainability embodied by energy efficiency programs. For example, munis and government-run utilities like the TVA were some of the first utilities in the nation to implement energy-saving utility programs in the 1970s and 1980s, spurring state regulators to require energy efficiency of IOUs (Hirsch 199: 157-169). What kinds of political economic structures for commodities such as electricity can best attain the sustainability goals of reducing energy consumption in a neoliberal era is an area of research that should be further examined.

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[92] E-100, sub 113: 9-21-07 (EnergyUnited)

[93] E-100, sub 113: 11-14-07 (ElectriCities) and 12-14-07 (ElectriCities and NC EMC)

[94] E-100, sub 113: 9-24-07 (ElectriCities) and 11-14-07 (NC EMC)

[95] E-100, sub 113: 9-27-07 (NC EMC)

Finally, this research has several implications for thinking through climate change and energy policies. How might we make such policies more equitable? As they exist now, the REPS and other energy efficiency policies have the effect of transferring wealth from residential customers to energy companies. This framing of energy efficiency, which is not the only one possible, requires that electricity consumption continue into the future, as Bumpus (2011) shows is also true for carbon offsets: the value that derives from this socio-nature only accrues to IOUs if people continue to consume electricity. However, it is not clear if equitable energy efficiency portfolio standards are possible in a monopoly system where electricity companies are guaranteed survival.

How might energy efficiency portfolio standards (or energy efficiency parts of RPSs) be crafted to avoid the transfer of wealth from customers to IOUs within monopoly systems? In some ways, a fuller commodification of negawatts may be more equitable in that it might allow for a less uneven distribution of the value of such saved energy than the one currently in effect in NC. For example, broadening what counts as energy efficiency to include behaviors, commercial and industrial buildings, and especially the supply-side (power plants), while also allowing residential customers to opt-out and to sell their energy efficiency to the grid (like net metering) could minimize the magnitude of the transfer of wealth accompanying such policies. Indeed, as Hess (2011) and Bakker (2005) have shown, not all neoliberalizations of nature result in worse social or environmental outcomes than what came before. However, the history of neoliberalizations, including that of more "full" commodifications of resources, suggests that such a move is likely to exacerbate existing inequalities (e.g., McCarthy 2007). Because of the ways that using less energy is valuable and the large potential for low-income households to benefit from such value (given their low levels of energy efficiency adoption and high levels of

energy poverty), there is also a great potential for energy efficiency programs to help build resources for low-incomes households and communities, particularly if they are structured to do so.

A key starting point may be to alter the ways that environmentalists, policymakers, and consumer advocates frame energy efficiency in such policy discourses to more fully reflect the range of production processes of energy efficiency and to question the assumption that electricity companies should always be paid for selling less of their product. Opening up this hegemonic discourse has the potential to center perhaps more equitable energy efficiency producers, from state and local governments, to individuals, but also social movements.

Finally, it is important to question whether REPS legislation is, in fact, resulting in the material environmental sustainability that its proponents claim. Legislating energy efficiency, similar to legislating "no net loss" of wetlands (Robertson 2000), may not always increase energy efficiency or decrease greenhouse gas emissions (for example in the ways Piedmont Natural Gas argued that they may not, above). Such considerations should be a part of any negawatt-promoting policies. It is not clear that REPS has resulted in people using less energy in the aggregate, but more importantly, it is not clear that the benefits that lay behind desires for energy efficiency are being impacted. It is not energy efficiency per se that is desired, but the values it produces in lowered electricity bills, lower pollution, and lower environmental impacts from coal and uranium mining.

CHAPTER 5: CONCLUSIONS

I have used political ecological and symbolic interactionist theories, mixed qualitative methods of data collection and analysis, and the case of CFL promotions to analyze processes in the production of consuming less electricity. My findings suggest that, far from being a self-evident technical entity, "energy efficiency" is produced as an idea, a part of identities, a resource, and a source of value through social, political, and economic processes. In **Chapter 2**, I showed how environmentalists use CFLs to make and claim neoliberal identities, proposing the concept of green neoliberal identity work as a mechanism through which neoliberal ideologies are translated into individualistic, consumptive, techno-centric environmentalist practices. In **Chapter 3**, I showed how using even this seemingly easiest energy efficient technology constitutes labor that is gendered in ways that reflect and reproduce inequalities. In **Chapter 4**, I showed how electricity companies have used environmental governance to valorize and appropriate home energy efficiency in ways that represent an accumulation strategy. In these ways, my research tells us about how environmentalists become laboring subjects in an era of neoliberalism and how energy companies are responding to the threat of climate change by turning mitigation into an opportunity for profits.

My research hinges on the ways that energy efficiency promotions by environmentalists and electricity companies call for *consuming less* energy by *consuming more* technologies, a relationship I examine more explicitly in this chapter. This conclusion represents a drawing together of the work done so far and a pointing toward further research possibilities. I will begin by examining how my findings explain ENGO and IOU promotions of CFLs that appear

counter-intuitive, by drawing out the symbolic flexibility and power of CFLs. I then propose a theory of green obsolescence as a way to better understand why energy efficiency in particular has become such a focus of environmentalism and energy providers. Building off this theory, I begin to frame the production of energy efficiency as a global production network which weaves together different commodities, laborers, and governance networks. I conclude with suggestions for future research directions that further develop the findings of each chapter as well as the ideas of green obsolescence, energy efficiency production networks, and energy efficiency as a relationship.

Explaining Apparently Counter-Intuitive CFL Promotions

I began my research interested in understanding how and why environmentalists and electricity companies have promoted the use of CFLs as a key solution to climate change, given the contradictions in these positions. For environmentalists, the magnitude of these CFL promotions seemed surprising given how small an impact (<1%) they can make on U.S. GHG emissions. For electricity companies, the CFL promotions were surprising because it is unusual for companies to encourage their customers to buy less of their product. These two strange bedfellows have converged on the promotion of a technology that is supposed to use less energy. This dissertation, especially **Chapters 2** and **4,** helps explain these counter-intuitive CFL promotions by showing what CFLs *do for* environmentalists and IOUs as well as what environmentalists and IOUs *do with* CFLs.

Explaining IOU promotions of CFLs and energy efficiency in NC is more clear-cut than explaining environmentalist promotions. In **Chapter 4**, I showed how the struggles to implement NC's REPS policy resulted in the valorization and appropriation of residential negawatts in ways that help IOUs accumulate profits in the short- and long-term. IOUs have used such

environmental governance to turn the threat of widespread climate change mitigation into an opportunity for profits. It is also likely that CFLs in particular are an attractive vehicle for IOU energy efficiency programs because they involve a usually seamless transition from traditional incandescent technologies (same rough size, shape, light quality and quality) and they have a clear maximum limit on the amount of energy that could be saved, maintaining the hegemonic power of electricity as a system. Although an important part of the story, my analysis of the ways environmentalists use CFLs to do green neoliberal identity work in **Chapter 2** does not fully explain how environmentalists come to promote such an insignificant technology for such a large environmental problem. Here I want to discuss the ways that the CFL's symbolic flexibility and power take the explanation further; these understandings also help explain why IOUs have fixated on CFLs in particular to carry their energy efficiency programs. In the section following this, I will broaden to another part of the story, proposing a theory of green obsolescence.

The CFL as a Flexible Symbol

CFLs are a particularly flexible symbol for carrying the disparate desires and needs of both environmentalists and electricity providers. In **Chapter 2**, I showed how people could use CFLs to claim a range of neoliberal identities. This reflects a particular ambivalence about CFLs on the part of environmentalists that I encountered throughout my research. In many ways, ENGOs portray CFLs in very different ways depending on who and where their audience is, showing CFLs' symbolic flexibility. I found that ENGOs publicly and nationally portrayed CFLs as an unproblematic key climate change activist action, while locally and privately the messages and identity work are more complex and ambivalent.

On the national and public stages, environmentalists have tended to portray using CFLs as an unproblematic yet key action people should do to solve climate change. All the "Big 10"

ENGOs I examined linked CFLs to climate change via personal actions except for the Wilderness Society, and many portrayed CFLs as a key action individuals can and should do to mitigate climate change. About half the ENGOs featured CFLs prominently in general lists of things "you" or "individuals" can do to mitigate global warming. EDF listed CFLs #2 out of four; Defenders of Wildlife #4 of seven; and TNC #3 of nine. The Sierra Club's "Ten things you can do to help curb global warming" (see list in the **Chapter 1**) listed CFLs as #4. The Audubon Society said CFLs or natural lighting are #2 out of the "most important" of eleven "ways we can all make a difference."

When I analyzed websites for the other 35 ENGOs included in USCAN, 15 said CFLs were an important action to help stop climate change; 12 of these strongly suggest CFLs as a key way to solve climate change, while four said it is important to use CFLs but they are not enough (one group did both). Of these 35, the Coalition on the Environment and Jewish Life (COEJL) pushed for CFLs the hardest, writing, "Our message is as easy as changing a light bulb: If you could conserve energy and help stop global warming in one simple step, wouldn't you? CFLs use up to 75% less energy than incandescent light bulbs, while lasting approximately *eight* times longer…" [emphasis theirs]. In contrast, 350.org provided a list of ten things to do to solve climate change, where CFLs are fourth, but they caution that these ten things are just "a few places to start," because "if we all were just to focus on individual changes in our lifestyles, we might never reach 350 ppm." The split between the "Big 10" ENGOs and the other 35 less mainstream, regional, or smaller ENGOs suggests that not all ENGOs with an online, more-than-local presence agree that CFLs are a key action. However, all 25 groups that talk about CFLs suggest that their use is largely unproblematic: they make a difference and are an important start.

In contrast with these national discourses, I found that privately and more locally, environmentalists exhibited more ambivalence about the connection between CFLs and climate change. I encountered this ambivalence in many of the formal and informal interviews with local environmentalists in one-on-one settings. Nearly everyone I spoke with told me enthusiastically that "of course, all earth advocates use them" (as one interviewee put it), yet when I asked them what difference the bulbs make, or how climate change will be solved, they said things like, "everyone knows it's like spitting in the ocean" (as a different interviewee put it) to use CFLs. As an illustration, here are two excerpts from the same interview with Hillary, a stay-at-home-parent who uses CFLs in her home and has been talking about how she promoted CFLs at her church:

> **Interviewer:** So what was the purpose of having CFLs? What was that program-
> **Hillary:** Mostly to educate people and to get CFLs into their hands.
> **Interviewee:** For what purpose?
> **Hillary:** For energy savings? [Her tone sounds confused] I mean, for the obvious reasons you might want to use a CFL.
> **Interviewee:** And what are those obvious reasons?
> **Hillary:** Energy savings, mostly. Decrease electricity use.
> **Interviewee:** To save money mostly?
> **Hillary:** For me, it's to save energy. I think for many people it's to save money.
> **Interviewee:** And when you say, "to save energy," why do you want to do that? What do you kind of envision as kind of the end goal of that?
> **Hillary** [Her tone sounds somewhat annoyed]: Because we're destroying the earth. [She laughs bitterly] There's an elephant in the room which is that there's an urgency and enormity of climate change that is not being addressed.

Notice how she does not seem to understand what I am asking when I ask why one should use or promote CFLs. Her tone, repetitions that she is using CFLs "to save energy," and her final ironic laughter signify how common-sense it is to her that you would use CFLs for the climate. Yet, later in the interview, when I asked her, "how do you think that climate change will be solved?" she responded,

> I don't know what you mean by climate change *solved*. But, I think it's going to be multifaceted and little bits of everything that can be done. [She discusses the possibility of Carbon Capture and Storage]… Particularly in Europe, they're doing some novel technology that we don't have here yet but you know, [articles about the technologies in Europe] talk about all sorts of solutions that I had never heard of, that I think are gonna be part of the final, kind of, way this thing hopefully works itself out. *I don't think it's*

gonna be changing my bulbs. [emphasis mine]

On the one hand, Hillary promotes CFLs because of the enormity of climate change: she has taken care to use CFLs throughout her own home and spread the gospel about them. On the other hand, she clearly says she does not think changing her own bulbs really matters to solving climate change. This contradiction was common in the interviews.

Research on the Social Construction of Technology (SCOT) has shown that many technologies take on multiple meanings that are inherently social. These scholars call attention to the "relevant social groups" that form around a technology and how they often have different meanings for the same technology (Pinch and Bijker 1987: 29-34). SCOT theorists follow sociology of scientific knowledge theorist Bloor in insisting on symmetry: that "successful" technologies be studied in the same way as "unsuccessful" ones (Pinch and Bijker 1987: 18, 28). Bijker (1992) showed this in his history of early (non-compact) fluorescent lights. CFLs can thus hold different meanings for different groups of environmentalists, and even in different contexts for the same person. "Interpretive flexibility" means that these groups may see different symbolic meanings in the CFLs as well as have different ideas about what makes a light bulb "successful" (MacKenzie and Wajcman 1999: 21). The CFLs' symbolic flexibility allows several contradictory views about the future of climate change mitigation to co-exist, at least momentarily, within the same movements, organizations, and even individuals.

The CFL as a Powerful Symbol of Ecological Modernity

Although CFLs are a flexible symbol, they are likely most often used as a symbol of ecological modernity, following a long tradition of light bulbs symbolizing more than light. The incandescent light bulb ushered in the era of electricity as the first wide-spread technological use of electric power in homes (Schewe 2007: 70) after its invention in the 1870s (RAP 2011b: 1). It became a symbol of modernity in homes, particularly symbolizing modern electricity. During the

Depression, the U.S. government's Rural Electrification Administration famously used images of incandescents to promote electricity through Lester Beall's posters (MoMA 2012). Even today, people invoke the symbolism of lighting representing electricity when they call electricity losses "blackouts" (Nye 2010). Even the image of light bulbs (and phrases like, "a light bulb went off in my head") to signify "aha!" moments, inventions, or ideas can be linked to a long history of light bulbs symbolizing novelty, speed, convenience, and modernity.

CFLs can be seen as the latest incarnation of this tradition of light bulbs symbolizing progress, modernity, and innovation. My research shows that the image and idea of the CFL symbolizes a certain kind of modernity, what Hajer (1995) would call "ecological modernization," characterized by extensive adoption of home green technologies. Throughout my research, I have observed the image of the CFL being used to represent energy efficiency and climate change mitigation-oriented environmental activism. For example, it was common for a squiggly-shaped CFL to be the image used by environmental groups, electricity providers, and governmental agencies at the local, state, and federal levels to represent energy efficiency.

The following moment in the *Colbert Report* TV show (2007) illustrates the larger environmentalist discourses at stake when talking about CFLs and climate change mitigation:

> It's February 12, 2007, and satirical pundit Stephen Colbert is interviewing scientist Michael Oppenheimer about climate change. Colbert says, "Now let me guess. We're all doomed, right? We're gonna be lucky to make it through this interview. We're gonna die." After a short back-and-forth, Oppenheimer responds, "No, this is a problem that can still be solved… The future remains soundly in our hands." Colbert demands, "How do we solve it without me making any sacrifices?" Oppenheimer admits, "You're gonna probably have to make some sacrifices," but Colbert interrupts him to dismiss this possibility: "You've got the wrong guy!" Oppenheimer quickly says, "Oh no, they're small… Even you will be able to do it." He suggests Colbert should drive a "high fuel economy" car. Then he says, "Do you have light bulbs in your house?" Colbert reluctantly admits he does. Oppenheimer says, "Use the compact fluorescent ones. They use a quarter less energy." Colbert refuses because CFLs "make you turn green, you look like a skull-faced creature." Oppenheimer assures Colbert the "new" bulbs are improved. He then suggests other actions to solve climate change - planting a tree and buying an EnergyStar dishwasher - before Colbert changes the subject.

Here, Colbert plays the role of the doubting public reluctant to be an environmentalist because he's sure this will involve gloom-and-doom and sacrifice. Oppenheimer plays the

environmentalist, insisting that climate change is easily solvable by doing things like buying fuel-efficient vehicles and switching to CFLs. In this brief exchange, we can see the conflict between two distinct environmentalist discourses: "ecological modernization" (Hajer 1995) environmentalism, which falls under a neoliberal ideology, and "apocalypse" (Killingsworth and Palmer 1996) environmentalism. In the former, environmentalists use CFLs to align themselves with modernity, progress, high technology, and efficiency. The latter, which Colbert expects Oppenheimer to take, and which Oppenheimer is strategically guarding against, also uses CFLs, but in a less clear way, to signal a vision of the future based in part in a simpler past. These two discourses have been some of the most powerful visions of future worlds taken up by environmentalists over the past half century. Over the past two decades they have increasingly been taken up and contested in the name of climate change mitigation. These two discourses are co-constitutive: they depend on the other for their meaning, particularly when talking about the enormously challenging environmental problem of climate change. Environmentalists use CFLs to do identity work in part because CFLs allow them to claim a more ecological modernizationist perspective.

From the ecological modernization perspective, environmental problems are caused by the structure of political, economic, and social institutions, and can be solved by reforming these institutions to make them more environmentally friendly (Hajer 1995: 25). Environmental problems are caused by "modernization and industrialization" and will be solved by more modernization and superindustrialization (Buttel 2000). This is because further economic development "will lead industry to become more *ecologically* rational, that is, to weigh the costs and benefits of ecological disruption and take steps to minimize externalities, just as modernization also drives industry to be more economically rational," (York et al. 2003).

Capitalism is considered fundamentally compatible with environmental protection so long as it is appropriately "greened," (Hajer 1995: 26). Some of the driving forces behind the greening of capitalism are seen as technological innovation (York et al. 2003; Murphy 2000; Hajer 1995: 32, 35); market forces (York et al. 2003); and the power of consumption (Buttel 2000). Solving environmental problems is fundamentally beneficial for both industries and the environment, allowing environmentalism to serve neoliberal interests. Ecological modernization is often seen as a rather automatic path to environmental protection (Murphy 2000; Mol 2000) that is driven by environmental groups (York et al. 2003) and the need for environmental protection.

Environmentalists can use CFLs to invoke this discourse of ecological modernization to make their environmentalist discourse more palatable to skeptics. CFLs easily fit into this discourse because of the way that ecological modernizationists envision the natural progress of technological change, using the CFL to perform the subcultural identity work of expanding the identity of "environmentalist" to everyone, as I showed in **Chapter 2.** Many climate change scientists have adopted ecological modernizationist assumptions, suggesting that the key to mitigating climate change is large-scale implementation of particular technologies. For example, Pacala and Socolow's (2004) popular "stabilization wedges" paper argued that we can solve climate change by simply scaling up technologies that already exist. NRDC writes that "technological innovations" are a key part of what's "critical to any successful effort to curb greenhouse gas pollution and avoid the worst impacts of climate change." The Sierra Club declares, "choosing modern technology can reduce our use of fossil fuels to help protect the planet" and that "for nearly all the thousands of ways we use energy, we have the technology to use less – reducing pollution and lower our energy bills."

It is CFLs' symbolic flexibility and power as a symbol of ecological modernity in particular that makes them such a useful technology for environmentalists *and* IOUs. Their flexibility allows a range of neoliberal environmentalists to claim CFLs as a technology that serves their identity, even when they say that CFLs make a big difference and that they cannot make a big difference. As a symbol of ecological modernity, this makes sense, because in that vision of social change, it is the impact of many small technological changes that help to mitigate climate change rather than large-scale restructuring of the economy or society, so that using CFLs is part of doing one's part, a sentiment I heard frequently in interviews.

Toward a Theory of Green Obsolescence

If the long tradition of light bulbs as flexible and powerful symbols helps to explain the emphasis on CFLs, how might we understand ENGO and IOU emphases on home energy efficient technologies more broadly? There are a broad range of other possible solutions to climate change, including home behaviors rather than technologies, such as turning out the lights; other individual actions that could potentially impact more GHG emissions, such as limiting airplane travel or eating vegan food; changes to the ways homes are built, such as using daylighting or building smaller homes; focusing on reducing energy use by other electricity consumers beyond homes, such as commercial and industrial customers; and focusing on parts of the electricity system other than consumption, such as the production side. While ENGOs and IOUs do promote some of these changes, these alternatives to energy efficiency technologies are arguably not promoted as prominently.

I propose that the emphasis on energy efficiency by ENGOs, IOUs, and others is prominent because of the ways that promoting energy efficiency means promoting the consumption of *more* technologies to consume *less* energy. This calculus that consuming less

means consuming more has the potential to expand markets for large corporations in ways that I am grouping together as the beginnings of a theory I call "green obsolescence." Slade (2007: 3-5) distinguishes several types of obsolescence: "technological," or "obsolescence due to technological innovation," as when a new, better model of a technology is invented and then bought by people; "psychological," or "changing product style as a way to manipulate consumers into repetitive buying," as when people upgrade still-functional cell phones to new phones to stay trendy; and "planned," or "the assortment of techniques used to artificially limit the durability of a manufactured good in order to stimulate repetitive consumption," as when products are designed to break. "Green" obsolescence, I propose, is the specifically environmental crisis-oriented types of these obsolescences. I focus here on a combination of technological and psychological obsolescence which I call "cultural green obsolescence," or when people buy newly-invented "greener" versions of products in order to protect the environment, especially when they make these upgrades before their old product versions have expired. I also propose another category of obsolescence, what I call "regulatory" obsolescence: the buying of new technologies as encouraged or required by laws, rules, and other governance. "Regulatory green obsolescence," then, is the buying of new technologies in order to meet new environmental governance.

Cultural Green Obsolescence

> **Interviewer:** What do you think that people will be doing for lighting in the future?
> **Hillary:** …I mean what you read is, CFLs and then it's gonna be LEDs and there's another bulb which I can't think of the name of that's better than LEDs that's very close by, so I think that I don't *know* what they'll be doing. It'll be something that I don't know about yet… And my kids will look at an incandescent and go, "What's that? I remember when we used to use those!"… It's just like the CD, the CD versus the LP. My son said, "An LP. What's a record?" Maybe it will be the same. *Hopefully* it will be the same.

Hillary, a stay-at-home mother of two I interviewed, is here putting clearly an idea I encountered in many interviews, observations, and texts. Cultural green obsolescence includes a narrative of how green technologies like light bulbs, dishwashers, cars, and power plants all

become more and more environmentally sustainable over time. Part of making and claiming environmentalist identities, then, involves constantly upgrading to the new, better technology, even when this involves more consumption. I found similar narratives of a natural technological progression for green technologies in analyzing the websites of national ENGOs. For example, the Environmental Defense Fund, on a page called "What you can do about climate change," promotes CFLs by writing,

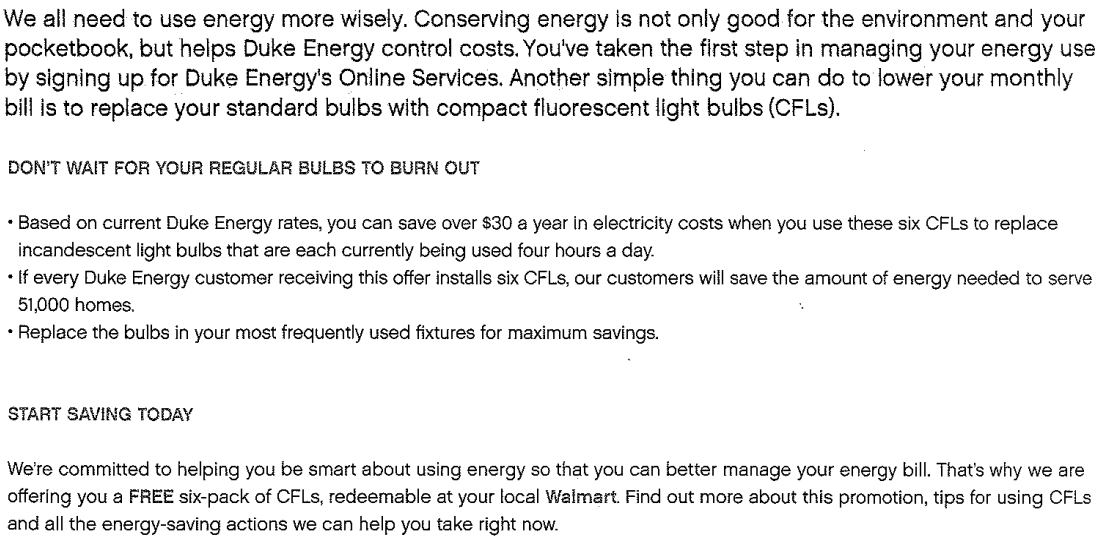
> In the *1880s*, light bulbs revolutionized the world. Though we call them 'lights,' *traditional* incandescent bulbs are actually small heaters that produce a little light – but waste a lot of energy producing heat. *Today* we can do better (emphases mine).

This portrayal of technology assumes that it is inevitably getting better and better, and it implies that CFLs will revolutionize our world.

The narratives of progress and waste I discussed in **Chapter 2** are related to purchasing behaviors in ways that I have not yet fully examined, but which pose an important future area of research. From my research so far on CFLs, we can see that there are consumptive consequences of such cultural green obsolescent assumptions. For example, later in my conversation with Hillary, the following exchange occurred:

> **Hillary:** …There's, you know there's, the train of [thought that] "Let the bulb die before you replace it." And then there's the train of thought that "You're gonna save more money if you just throw out a good bulb and replace it." And then-. Well, my husband says "Just throw them all out now and replace it," and I think I tend to want to let it burn out, [pauses] for no reason. I mean it just logically doesn't make sense, but then I feel like I'm wasting something.
> **Interviewer:** Say a little more about that. What do you feel like you're wasting?
> **Hillary:** The manufacturing, the energy that went into making that bulb. At some level, [it] costs some energy, so I feel like, just to take it and toss it-. But I don't know the actual kilowatts that it costs to make that bulb and the materials, to mine the materials, and to put it all together, and the labor. There's a cost in that bulb beyond just its energy use. So. [pauses] But I don't know the magic formula. I'm sure somebody's researched it.

Others interviewed expressed similar ideas about not knowing if they should change their bulbs now or wait for the incandescents to burn out first. Further research could determine the extent to which people are waiting vs. switching immediately and the consequences.



We all need to use energy more wisely. Conserving energy is not only good for the environment and your pocketbook, but helps Duke Energy control costs. You've taken the first step in managing your energy use by signing up for Duke Energy's Online Services. Another simple thing you can do to lower your monthly bill is to replace your standard bulbs with compact fluorescent light bulbs (CFLs).

DON'T WAIT FOR YOUR REGULAR BULBS TO BURN OUT

- Based on current Duke Energy rates, you can save over $30 a year in electricity costs when you use these six CFLs to replace incandescent light bulbs that are each currently being used four hours a day.
- If every Duke Energy customer receiving this offer installs six CFLs, our customers will save the amount of energy needed to serve 51,000 homes.
- Replace the bulbs in your most frequently used fixtures for maximum savings.

START SAVING TODAY

We're committed to helping you be smart about using energy so that you can better manage your energy bill. That's why we are offering you a FREE six-pack of CFLs, redeemable at your local Walmart. Find out more about this promotion, tips for using CFLs and all the energy-saving actions we can help you take right now.

Figure 5.1. Letter from Duke Energy Encouraging Household to Use CFLs. Received and photographed by author in NC in 2012.

There are similar themes of obsolescence in **Figure 5.1,** an excerpt from a letter my household received from Duke Energy that accompanied our coupon for free GE-brand CFLs from Wal-Mart, giveaways through which the IOU met the requirements of the REPS law. Duke Energy writes in it, "DON'T WAIT FOR YOUR REGULAR BULBS TO BURN OUT," encouraging customers to make a change Hillary and her husband debated. The assumption that people will change their bulbs to CFLs before their incandescents burn out is implied by Duke Energy's giveaways, which sent 6-18 CFLs to households, an amount of bulbs highly unlikely to all be burned out at once when the household receives their giveaway. Although many people told me they were storing their CFLs in a closet while they wait for old bulbs to burn out, this is still a program that encourages them to replace working light bulbs with new bulbs, for which customers are paying higher electricity rates.

In recent years, a number of other laws, rules, and programs have made similar moves to encourage people to progress to new, better green technologies. In 2007, the U.S. Congress

passed the 2007 Energy Independence and Security Act (EISA), which notoriously phased out energy-inefficient light bulbs starting in 2012, effectively promoting CFLs (as well as other bulbs that meet efficiency requirements). Although EISA is the most recent federal requirement for bulbs, effective national standards for fluorescent bulbs have been set as far back as 1988 (Gillingham et al. 2006). The U.S. EPA's "Change a light, change the world" campaign to promote CFLs started in 2007, but as of 2014, the EPA's ENERGY STAR lighting website now promotes LEDs through the "ENERGY STAR LED bulb challenge," with the goal of "20 million by Earth Day 2014" (ENERGY STAR N.D.(b)). Also note that the "Change a light, change a world" does not encourage people to wait until their incandescents burn out before changing to CFLs.

I argue that these regulations (REPS, EISA, federal appliance standards) and governance-prompted programs (like Duke Energy's CFL giveaways and the EPA's "Change a light" program) can be seen as "regulatory green obsolescence" that acts as a spatial-temporal fix for economies and companies. Such a ramping up of energy efficiency standards along with a narrative of changing from incandescents to CFLs to LEDs strongly reflects the environmentalist narratives of neutral, progressive changes in green technology that I have called cultural green obsolescence. Thus cultural and regulatory green obsolescence seem to share much in common and may go hand in hand.

Green Obsolescence

The cultural narratives and regulatory changes falling under the idea of green obsolescence help explain how both environmentalist identities and environmental governance are being used to expand profits for several different kinds of corporations in the face of the possible threat of a consuming-less environmentalism. For CFLs, cultural green obsolescence

can translate into expanded markets for large multinational light bulb manufacturers like GE, Philips, and Osram-Sylvania and for light bulb distributors like Wal-Mart, Home Depot, and Lowe's. Regulatory green obsolescence can expand markets for the same companies as well as for the IOUs (**Chapter 4**) who are profiting from negawatts, a supply of which is similarly assumed to be constantly growing. Under the banner of environmental concern, people are being encouraged through identity-making practices and environmental governance to repetitively buy new, better energy efficient technologies as the old technologies are coded as obsolete. Although it shares some elements of greenwashing (c.f. Cox 2009: 345; Beder 2002: 29), green obsolescence is broader, more clearly tied to assumptions about the nature of technological change that are deeply rooted in narratives of progress (including in both capitalist and Marxist ideologies), and more deeply imbricated in governance and environmentalist identity-making processes. Such a theory can be thought of as contributing to the literature on green neoliberalism by looking specifically at how environmentalists can end up promoting the consumption of more products even when they appear to be promoting using less, in ways that echo drives for higher consumption in non-environmentalist arenas of the economy.

What are the consequences of these practices, narratives, regulations, and programs to promote CFLs, then LEDs, and then "something that I don't know about yet"? A green obsolescent assumption that environmental problems like climate change will be solved by a ramping up of better and better technologies turns consumption into a political act, and keeps the identity work of environmentalism focused on the private sphere and individuals rather than on production systems. Green obsolescence expands markets and profits for electricity, light bulb manufacturer, and light bulb distributor corporations in at least two ways. In a highly-competitive light bulb market dominated by just a few large multinational companies (**Chapter**

1), it potentially creates new demand for light bulbs by encouraging customers to buy more bulbs than they otherwise would have. This new market could be only a short-term expansion in profits because CFLs generally last longer than incandescents (although this is tempered by the higher cost of CFLs); however, if customers can, in a few years and before their CFLs burn out, be convinced to switch to LEDs, then the market for light bulbs can expand again. Second, green obsolescence can help create a new market for energy efficiency, which creates profits for IOUs (**Chapter 4**) and potentially also for the manufacturers and distributors of energy efficient technologies promoted by IOUs.

Feenberg's (1991) theories of the relationship between capitalism and technologies can be useful for thinking through green obsolescence. Feenberg (v) insists on the interests embodied in the design and production of technologies as a key arena of technological politics. His approach complements and expands Marx's (1976) theory of technological innovation where technological change is a key process in capitalism because of the coercive laws of firm competition. These theories also highlight technology's ties to social change: technology is a scene of struggle (Feenberg 1991: 14). He is interested in how modern societies become focused on technical things, including technologies (artifacts, things) and techniques, because those things are crucial ways that the hegemony of capitalist classes is reproduced (65). Feenberg draws on Marcuse to argue that society has become dominated by a particular form of rationality, which Marcuse called "technological rationality" (69). Feenberg (80) explains that capitalist classes use a "technical code," or cultural and other rules about how technical choices will be made; under capitalism, such codes tend to signify "efficiency" as a primary end goal and efficiency comes to be seen as a value-free standard, making it hard to question. In the current case, we can see that technologies deemed "energy efficient" can take on a similar veneer of

neutrality that makes them difficult to question, so that green obsolescence comes to be seen as natural and even progressive, even when installing a new energy efficient technology can mean higher GHG emissions (as Piedmont Natural Gas claims it can in **Chapter 4**). In expanding the theory of green obsolescence, Feenberg's theories may be useful in thinking through efficiency as a green variant of larger hegemonic capitalist technical codes privileging economic efficiency.

Implications: Toward Viewing the Production of Energy Efficiency as a Global Production Network

As a way to further understand these trends toward normalization of green obsolescence, I propose that the materiality of CFLs themselves and their production can be better understood as constituting part of energy efficiency's Global Production Network (GPN). Such GPN analyses emphasize the ways that commodities, labor, and governance are interlinked across networks that span multiple national borders (Coe et al. 2008a). Much of this scholarship has focused on production networks and value chains of things which are traditionally and clearly physical commodities, which is why it is not obvious to think of such a production network for a valuable absence, consuming less energy. But because consuming less energy with energy efficiency involves consuming more technologies, a GPN framework can be useful.

In this research, I have shown three processes in the production of consuming less:

- In **Chapter 2**, I showed how consuming less is produced through subjectification, through which environmentalists and other electricity customers become neoliberal subjects who talk about and use CFLs to make and claim identities;
- In **Chapter 3**, I showed how the production of consuming less happens through such environmentalist subjects' private, gendered labor in their homes, cars, and stores; and

- In **Chapter 4**, I showed how consuming less is also produced through environmental governance which neoliberalizes the value of negawatts.

If these are three parts of the production of consuming less, what does the full production process look like? Although I cannot yet do it justice, I propose that thinking through the production of negawatts as a Global Production Network (GPN) holds potential for insights. For example, it might help us to think more systematically about the sustainability implications of focusing environmentalism and environmental governance on the production of consuming less with energy efficient technologies by helping us to build a more complete picture of the life-cycle analyses of such actions. It might also help us better analyze the wealth and other inequality implications of producing energy efficiency. In broad contours, thinking through the production of energy negawatts through a "cultural political economy approach" which acknowledges the connections of GPNs to people's lives and identities (Hudson 2008; Coe et al. 2008b) can help us to understand what is at stake in the ways that environmentalist, policy, and electricity provider struggles over the value of energy efficiency in terms of identities, labor, resources, and profits. **Figure 5.2** shows one way to think about the different parts of a cultural GPN for energy efficiency, which involves the production of two traditional commodities, electricity and CFLs, the production of a new subject, the CFL-user, and the production of energy efficiency as a valuable resource.

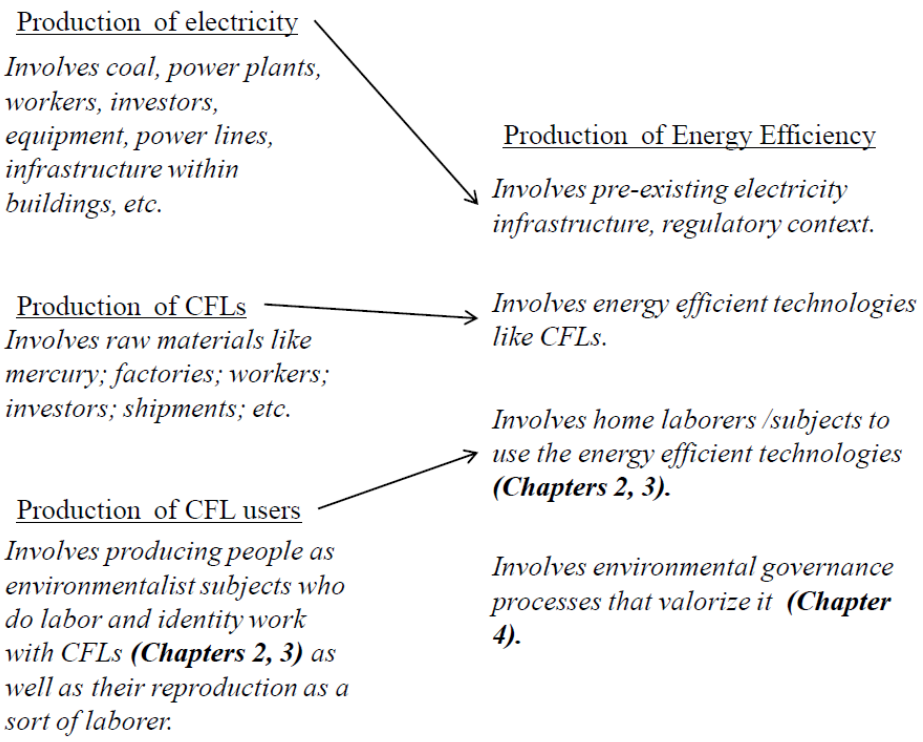


Figure 5.2. Broad Processes in the Production of Energy Efficiency. I propose that producing energy efficiency involves producing electricity, CFLs, CFL users, and negawatts, all of which involve their own labor, material, cultural, and political economic processes.

Because of negawatts' status as both a thing and an absence, the production of consuming less energy with energy efficiency involves producing both the technology (CFL) that uses less energy and the idea that negawatts are a valuable thing. The following is not exhaustive, but represents some of the processes of labor (re)production and material good production that I became aware of during this research that go into producing energy efficiency with CFLs:

(Re)production of Laborers, including:

- Workers who produce electricity, including those who:
    - Mine coal
    - Ship coal to power plants in NC
    - Operate power plants
    - Repair transmission, power lines, home electricity connections

- Workers who produce CFLs, including those who:
    - Mine the mercury and other raw material minerals
    - Ship the raw materials to factories for assembly
    - Assemble CFLs in factories in China
    - Ship the CFLs to distribution centers (big box stores) in the U.S.
    - Work at Wal-Mart
    - Administer Duke Energy's CFL programs
    - Package and ship Duke Energy's coupons or CFLs to customers
    - Landfill workers who dispose of the hazardous components of CFLs
- CFL users, including those who (**Chapter 3**)
    - Self-educate about and perform the "headwork" of CFL use
    - Drive to big box stores, buy CFLs, and transport them home
    - Clean up from broken CFLs and dispose of them at hazardous waste sites
- Others
    - Workers involved in the NCUC proceedings to make rules to implement REPS of 2007 (lawyers, ENGO employees, the utility commissioners, NCUC public staff, etc.)
    - Workers involved in the NCGA proceedings to make and sign REPS of 2007 (state legislators, their aids, etc.)

Production of Material Goods, including

- Electricity
    - Raw materials (e.g., coal)
    - Power plants and their equipment
    - Power and transmission lines
    - Infrastructure within customer buildings that link to electricity systems
- CFLs
    - Mercury, glass, other materials
    - CFL-assembling factories and their equipment

- Shipping centers and ships/trucks/trains which transport materials and CFLs
- CFL-distributing big box stores and their equipment
- Landfill stations for CFL disposal
- Cars for transporting CFL users to big box stores and landfills

As can be seen, there are many different kinds of laborers and labor involved in producing energy efficiency in NC with CFLs, including labor to produce electricity itself, labor to produce the CFLs (including their raw materials, assembly, transport, distribution, and IOU program components), and labor to use (and dispose of) CFLs in homes (**Chapter 3**). There is labor involved in the environmental governance that created energy efficiency as a valuable resource and the NCUC rulemaking proceedings through which this value was appropriated by IOUs. There are also many different kinds of material goods involved in consuming less energy. These include the raw materials, power plants, equipment, and other infrastructures involved in producing electricity; and the raw materials, factories, shipping, landfill, and other infrastructures for producing CFLs. This is where the materiality of CFLs matters: since consuming less (electricity) requires consuming more (of a technology, CFLs), it involves multiple types of GPNs with their attendant laborers and materials.

Because there are multiple types of global production networks involved in producing these two traditional commodities (electricity and light bulbs), this new subject (the CFL consumer-environmentalist), and a new almost-commodity (the negawatt), there are multiple layers of cultural and political-economic influences at stake. Here were some of the most important involved in this research:

Elements in the cultural and political-economic landscape of influences on these processes of (re)producing labor and materials:

- Production of electricity
    - Regulations by the North Carolina Utility Commission (**Chapter 4**)

- Production of CFLs
    - Anti-dumping tariffs in the EU (see **Chapter 1**)
    - EISA 2007 (see **Chapter 1**)
    - Duke Energy CFL giveaway programs in NC (**Chapter 4**)
- Production of CFL users
    - Processes to produce electricity customers and environmentalists as green neoliberal subjects (**Chapter 2**)
- Production of energy efficiency – beyond production of electricity, CFLs, CFL users
    - REPS of 2007 and its rulemaking processes (**Chapter 4**)

There are clearly other layers of cultural and political-economic influences here. Multiple types of laborers are subject to identity-making processes and there are regulations affecting most of the laborers and materials involved in the production of electricity and CFLs. A complete picture of the dynamics here (including how other GPNs for incandescent light bulbs, for example, are effected) is not yet possible.

One way that thinking about the GPN of energy efficiency is useful is that it highlights the complexity of labor, material, regulatory, and cultural processes hidden by neoliberal ideologies and discourses of green obsolescence. By calling CFLs easy to use (**Chapter 3**), the labor of using energy efficient technologies is made invisible, even though it is part of producing energy efficiency. The myth that environmentalism is "for everyone" (**Chapter 2**) hides household producers and makes it easier for IOUs and other energy providers to position themselves as the main producers of energy efficiency for which they should be paid (**Chapter 4**). These different production processes may also be thought of in terms of costs, where some costs are made invisible and thus treated as free (the costs of household labor, **Chapter 3**) while others are fully remunerated (the costs of energy efficiency for IOUs through higher electricity prices, **Chapter 4**). Further, the labor of many others in this process are also hidden. For

example, the labor of Duke Energy's workers in running CFL programs (or in the electricity system at all) is nearly completely absent from the REPS of 2007 rulemaking proceedings, which has not always been the case for struggles over energy resources. Coal miners, for example, are clear discursive players in struggles over mountaintop removal, in ways that Duke Energy's workers are not. In fact, in the REPS rulemaking, I noticed that "Duke Energy" as an actor was most commonly invoked to mean Duke Energy's CEO and/or shareholders, and never meant the company's laborers.

Directions for Future Research

This dissertation began in a question about light bulbs but has moved into a larger group of questions about power, identities, labor, production, and governance of energy. The research has opened up new lines of inquiry to help us better understand environmentalism in an era of neoliberalism, energy efficiency policies as environmental governance, global production networks for energy efficiency, green obsolescence, and the relational nature of "energy efficiency." I turn to these new directions to conclude.

Environmentalist Identities, Subjectivities, and Labor

Further work can expand on an understanding of environmental practices as identity work and as labor in several ways. Interviews with the leaders of national ENGOs could focus on better understanding environmentalists' assumptions about how social change happens to help explain how subcultural and individual identities get made in particular ways. Such interviews could ask about institutional histories and reasoning, asking how these groups came to choose not to calculate and/or publicize the <1% figure for CFLs (and similar figures for other actions); how they choose which scientific numbers and data to use; how they think people become environmentalists; and the roles they see for "things you can do to fight climate change" lists.

In a different direction to better understand green obsolescent identity work, a comparison with groups using CFLs in a more critical way could be done. Although these groups are by far in the minority, I did encounter their use of CFLs once in my research, while looking at CFL images online. In an protest against proposed national climate change legislation, Rising Tide North America and a few other ENGOs sometimes dismissed as "radical" distributed fake money showing Al Gore holding a CFL surrounded by flames, with the caption, "As the world burns" (Hiskes 2009; Merchant 2009). How are these groups turning the symbol of mainstream energy efficiency and climate change mitigation into part of an illustration protesting the mainstreaming of green neoliberalism? How do members of such groups view energy efficiency and light bulbs and their role in climate change mitigation? How do such groups' narratives about environmental social change compare with those of more mainstream ENGOs?

There is also work to be done about environmentalist imaginaries of sustainable energy futures. I noticed in some interviews during my research that the visions of future sustainable communities held and constructed by some environmentalists seemed to draw from racialized, gendered, and class-based tropes. For example, many seemed to draw inspiration from the trope of "sustainable Europe," a high-tech, super-modern vision of communities where people use the latest technologies and live in high-density neighborhoods. While useful in many ways, this vision of sustainability is of a white, affluent society and the vision often relies on gendered assumptions that someone is at home to provide environmental care labor around the house (or that people work fewer hours than in the U.S. and have more time for this labor?). Other sustainability tropes that interviewees in my dissertation research raised that would be useful to examine more deeply include: "sustainable Native America" (a vision of past communities living "in harmony with the Earth") and "sustainable 1950s America" (a vision of suburban

communities where everyone cooks their own food, cans, gardens, and performs other DIY activities). Understanding these visions of sustainability can help political ecologists to understand the ways that mainstream U.S. environmental movements can reproduce or resist inequalities in race, gender, and class, helping us understand how to make these movements more socially just. This research could be undertaken through a combination of short, open-ended surveys to a listserv of members of a state environmental group along with follow-up semi-structured interviews.

To understand the labor of environmentalism further, there is room to expand my research in several ways. First, a study could use a combination of qualitative and quantitative methods to find out the frequency with which different environmental labors (including unexpected phases and subphases) are performed by members of different groups as well as the ways that these labors are coded in gendered, classed, and racialized ways. A qualitative study should be conducted first, examining several different environmental actions beyond CFLs (including using other technologies, such as energy-efficient hot water heaters and clothes washing machines, and behaviors, such as composting and recycling). This qualitative component could illuminate the different labor components involved (since the vast majority of those for CFLs came as a surprise to me) and the ways performing them involves particular identity codes. A survey could follow this, asking a representative sampling of environmentalists about how much time they spend doing each task, who in their family performs them, and other questions about frequency, to understand better who is doing these pieces of labor and how much time they entail. Key variables I think will be useful to include are people's salaried labor, other household labor, and caregiving responsibilities, which can help us better understand the effects of other energy and time constraints on ability to perform environmentalist labors.

Energy Efficiency Policies as Environmental Governance

Another line of research could examine the implications and dynamics of energy efficiency policies as environmental governance. The magnitude of wealth transfer, the extent of GHG emissions reduced, and the amount of energy efficiency that have resulted from CFL and other programs resulting from NC's REPS policy are still unknown. The case of NC's energy efficiency part of its REPS could also be used to understand what is politically and economically at stake in other states' EEPS or a in a federal EEPS. Using data I have collected on the rulemaking procedures for implementing NC's energy efficiency portfolio standard and comparing with data from other states' experiences, the dominant issues that stakeholders debated concerning how to implement such policies could be analyzed, drawing out their implications for similar policies. Such stakes include GHG emissions, but also the question of who has a right to be compensated for using less energy and how, who can opt out of energy efficiency programs, and who reaps the monetary benefits of such programs.

It would also be useful to compare the case of the neoliberalization of negawatts in NC to other states' experiences with energy efficiency programs. Comparisons could include: states where negawatts have been more fully commodified, as well as government-run energy efficiency-promotion programs (at municipal levels, regional levels as with TVA or BPA, or at state levels). Such comparisons could help us understand the conditions under which energy efficiency is commodified or appropriated (and is it ever privatized?), illuminating the driving forces behind such changes in energy efficiency's political economy. Thinking through different institutional arrangements for promoting home energy efficiency can also illuminate the extent to which particular arrangements, including market forces, centralization, or hybridizations, may

have different implications for both sustainability goals (GHG emissions, net amounts of energy consumed) and social justice goals (transfers of wealth, gender inequalities, and others).

Energy Efficiency Global Production Networks and Green Obsolescence

To understand the cultural, political, and economic processes involved in the production of consuming less, further research should be done into the GPNs of energy efficiency. For the present case, that includes understanding CFLs' GPNs more clearly. Carefully tracing the geographies of where CFLs are manufactured, by what companies, out of what raw materials, how they are distributed and by whom, how value is added to the commodity networks, and which companies and countries benefit and lose to a switch from incandescent to CFL light bulbs can help build this GPN. Combining scholarship from GPNs and work on life cycle analyses can show the implications of environmentalists' promotions of one light bulb over another. Connecting back to questions of the labor involved in environmental actions, a study could compare several possible climate change mitigation policies through a fuller examination of the costs of the policies by including labor costs to individuals across the GPN.

Such a GPN should also extend into the spatial implications of the disposal of energy efficient technologies. For example, while many ENGOs and environmentalists cite the fact that net mercury emissions from using CFLs is lower than for incandescents because the burning of coal to make electricity also emits mercury (Eckelman et al. 2008), few talk about how the spatiality of these two mercury regimes is fundamentally different. Further research could better understand the ways that mercury pollution may be being privatized within homes (closer to children?) from this shift to CFLs. However, at the same time, because CFLs are not consumed at equal rates across different socio-economic classes of people, this new mercury regime is

likely to have complex spatial implications, and may even shift toxic substances away from poorer neighborhoods.

Using this research into the GPNs of energy efficiency, the idea of green obsolescence holds potential for further research to help us understand both environmentalism and energy companies under the influence of capitalist drives toward commodification and accumulation. Using critical theories of technology such as Feenberg's work, a study could be conducted to examine more explicitly how environmentalists envision technological change for green technologies like CFLs. A related study could analyze the history of the ways that regulations of energy efficient appliances and other equipment ratchet up expectations for efficiency. By researching negawatts' GPN dynamically, as a network that shifts over time, we might also understand the changes that have happened to make green obsolescence seem so acceptable. For example, one question that remains is how CFLs came to be promoted before LEDs, given that they were invented within years of each other. It is possible that the materiality of LEDs made them simply not able to be scaled up as quickly as CFLs because of some resource scarcity or technical reason. However, it is also possible that investing in a much more high-efficient bulb was not useful for companies in the long-run given the higher potential for profits from green obsolescence resulting from first investing in CFLs and then in LEDs.

Energy Efficiency as a Relationship

There is also a great potential for research into understanding energy efficiency as a relationship, or what might be thought of in short-hand as the social construction of energy efficiency. In this research, I found that environmentalists, policymakers, and energy providers often treat energy efficiency as a self-evident technical entity that is a good in itself. Yet this research has shown that it is not a static, technical thing. Further research could examine more

explicitly how energy efficiency is constructed in certain ways and how engineering discourses appear to fix energy efficiency as a thing when I would argue that it is really a relationship. This relationship aspect can be seen by asking "How much energy efficiency is there?" There is likely to be as much energy efficiency as there is energy consumed/produced, meaning that energy efficiency only exists in the context of a relationship with its Other, energy consumed/produced.

One way to understand this further would be to map energy efficiency across landscapes; to my knowledge, no one has attempted to do such a thing. How is energy efficiency measured, how much is there, and how does its meaning change over time and space? Analyses of renewable energy resources have mapped solar and wind energy potentials for states and countries. If we take seriously the idea that energy efficiency is a similar resource, as environmentalists and energy companies say it is, we should be able to map its potential as well. Yet doing so raises questions about how energy efficiency compares with other fuels and how it may be thought to "congeal" in particular spaces, for example urban vs. rural and poor vs. wealthy areas. It also shows the relational aspect of energy efficiency. For example, the "quantity" of energy efficiency in a home changes when we consider how much energy efficiency might be produced with a CFL versus an LED: a home "has" more energy efficiency if we think about the amount of energy efficiency in terms of LEDs than in terms of CFLs. In other words, energy efficiency's quantity or supply is dependent on a relationship between technologies, as an upgrade from incandescents to CFLs yields a different "supply" of energy efficiency than an upgrade from incandescents to LEDs or from CFLs to LEDs. The outcome of this project could be an online *Atlas of Energy Efficiency*, useful to scholars as well as city and state governments. This study could advance theoretical debates within the social science of

technologies and could be conducted through textual analyses and interviews with energy efficiency consultants.

Finally, there are two more outreach-oriented projects that could grow out of this research. First, I think it would be useful to create a website or white paper calculating, in percent of U.S. GHG emissions so that different actions might be compared, the maximum potential impact of a variety of individual and collective actions. I have already noted my surprise that no one has done this for CFLs or for other actions; not only would it be useful to my own and others' research, but it could be useful to those seeking environmental sustainability goals. Second, I found it surprisingly difficult to sort through the workings of the electricity system in NC, especially how prices are set; a white paper or "people's guide to electricity in NC" would likely be useful to ENGOs and other social movement organizations, as well as to electricity customers, in thinking through the implications of rate hikes and other electricity governance issues. For example, many people I spoke with over the course of my research expressed surprise when I told them they were paying higher rates of electricity to pay for the CFLs they received from Duke Energy. Many told me they thought the bulbs were "free" (a gift from Duke Energy). Such a people's guide to the political economics of electricity would help illuminate the ways that electricity prices are related to such programs.

APPENDIX: EFFECTS OF UTILITY-IMPLEMENTED ENERGY EFFICIENCY PROGRAMS UNDER REPS

The following figures are meant as a conceptual model of the relationships within utility-sponsored energy efficiency programs under REPS regulation between: electricity prices; utility costs, revenues, and profits; and customer electricity bills. I conclude that the effect of energy efficiency programs under REPS is a transfer of wealth from households to IOUs because the result of REPS rules are that utilities see higher profits and customers see higher electricity bills. This is especially true for those customers who do not take part in the utility programs; for example, not all Duke Energy residential customers receive free CFLs, but all receive higher prices of electricity to pay for such programs. These conceptual models are based upon my back-of-the envelope calculations, but are not surprising given the near-universal agreement among stakeholders in these proceedings that utilities should receive rates of return on energy efficiency investments higher than those they receive from traditional investments in order to incentivized such green investments.

Back-of-the-Envelope Calculations

The question of how much wealth is being transferred through the neoliberalization of negawatts in the energy efficiency programs IOUs use to fulfill REPS is surprisingly complex. Much of the data on the energy efficiency riders IOUs file to increase rates to pay for energy efficiency programs does not distinguish between the proportion going to pay for CFL giveaways vs. other programs. My back-of-the-envelope calculations assume that the main benefit the average Duke Energy customer receives from paying an increased price for all their electricity in the form of an energy efficiency rider is from the CFL programs, or receiving 12 CFLs, which is likely given how widespread this program is. I made to comparisons.

First, I compared a household's monetary costs and benefits if they buy CFLs on their own (including a standard price for CFLs from a big box store) in the absence of a REPS policy vs. if they received CFLs from their IOU but paid a higher price for all their electricity to compensate the IOUs. After one year, the benefits to such households are relatively similar whether they get their CFLs via REPS or buy them on their own. However, after four years (the initial time period estimated in the energy efficiency riders), such customers pay net $30 to Duke Energy for their CFLs, whereas if they had bought the bulbs themselves without the REPS rider, they would save $130 (which includes lower electricity bills).

Second, I compared a household's monetary costs and benefits if they do not buy CFLs on their own in the absence of a REPS policy vs. if they do not participate in the CFL giveaways in the presence of a REPS policy (i.e.: in the latter case, they experience higher rates to pay for the program but do not receive its benefits). In the first year, such customers pay $15 more in the presence of a REPS policy. However, after four years, they pay $60 in higher electricity prices in the presence of the REPS policy than they would have without it, and they receive no direct benefits.

Explaining the Figures

Figure A.1 is a reminder of the effect of customer-implemented energy efficiency on an electricity provider's sales. It shows how energy efficiency implemented in year two results in lowered sales compared with the predicted sales that were used in the rate case in year 0.

Fig. A.1. Effect of Customer-Implemented Energy Efficiency on an Electricity Provider's Sales

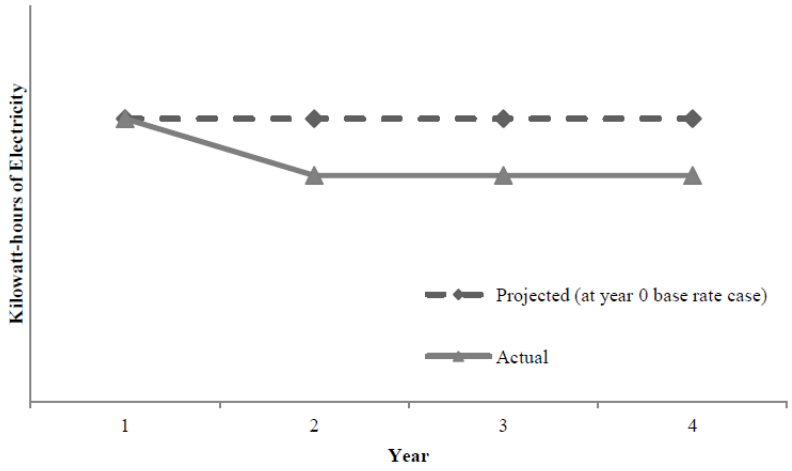


Figure A.2 shows the change in price of electricity in a traditional (pre-REPS) regulatory structure in comparison with the price changes under REPS. Recall that the model assumes that under traditional regulation, the utility responds to the lowered sales it experiences from energy efficiency implemented by customers by increasing the price at the next rate case, in year 3, which raises the price in year 4. Under REPS, the difference is that energy efficiency happens in year 2, but because it is implemented by utilities and is accompanied by a rider to increase the price of all electricity to compensate for the negawatts, the price of electricity increases at the same time as the energy efficiency, in year 2. The price is shown to increase beyond what would happen in year 4 under traditional regulation because IOUs are being incentivized beyond traditional investments to encourage investments in energy efficiency.

Fig. A.2. Changes in Price of Electricity from Energy Efficiency Programs

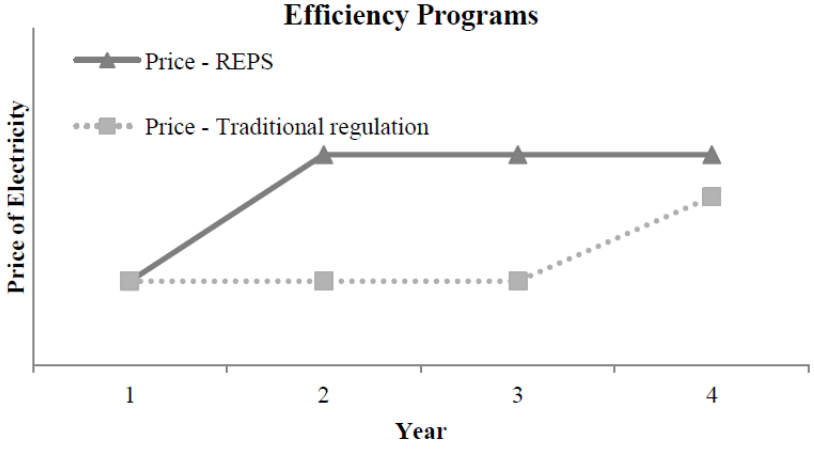


Figure A.3 shows the effect of utility-implemented energy efficiency on an IOU's costs and revenues under REPS. It shows that the revenues exceed the costs in years 3-4, resulting in profits for shareholders. I assumed that costs were mainly steady because most people argue that energy efficiency is a less expensive investment per kilowatt-hour/negawatt-hour produced than traditional investments. In actuality, the revenue requirement that is usually thought to be represented by costs is actually increasing because the rate of return on energy efficiency investments is higher than traditional investments, and profits are considered a cost. I chose to represent revenues as higher than costs in this case to illustrate that there is an increase in profit that the rise in costs hides.

Fig. A.3. Effect of Utility-Implemented Energy Efficency on the Electricity Provider's Costs and Revenues under REPS regulation

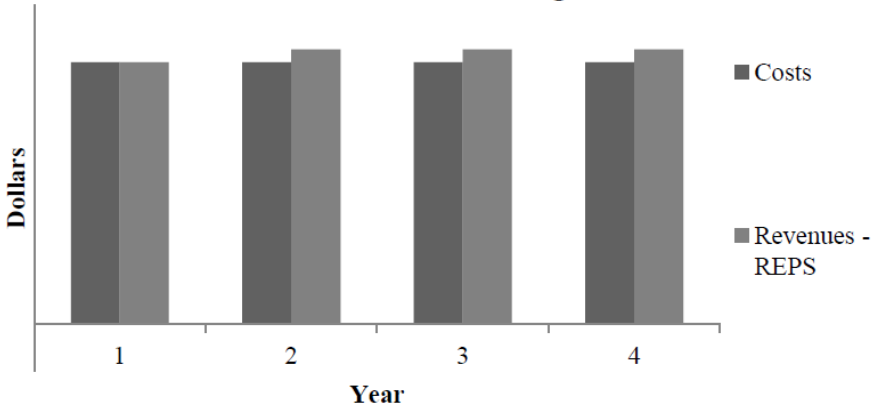


Figure A.4 shows the effects of the price increases in **Figure A.2** on customer electricity bills for the average customer who does not implement energy efficiency (e.g., does not receive the box of CFLs from Duke Energy). This shows that, for customers who do not receive the benefits of energy efficiency, electricity bills go up.

Fig. A.4. Effect of Fig. A.2 on Electricity Bills of Customers Who Do Not Implement Energy Efficiency

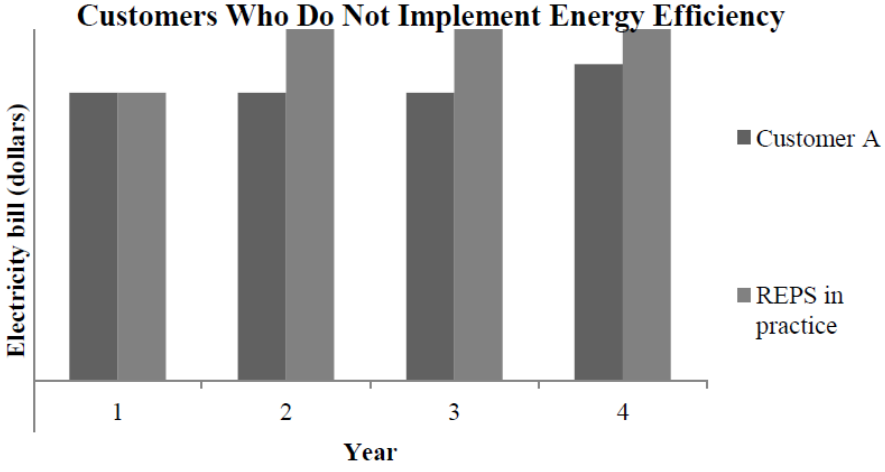
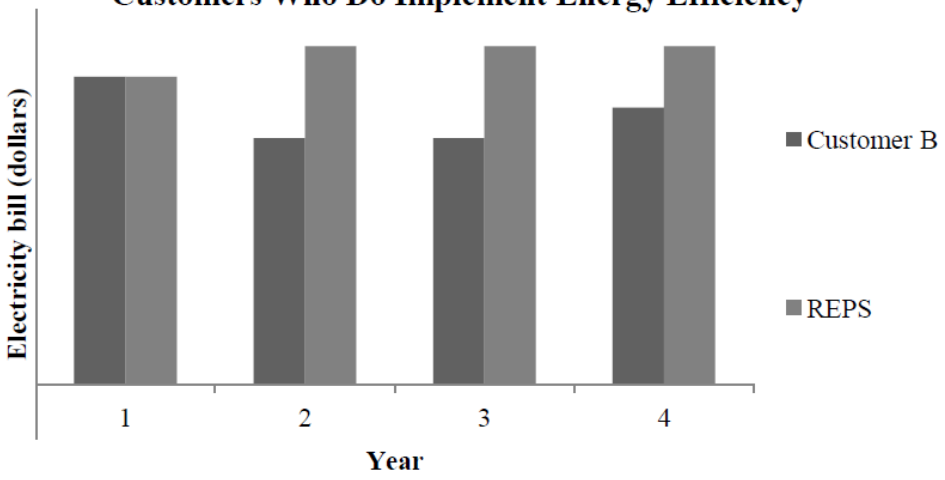


Figure A.5 shows the effects of the price increases in **Figure A.2** on customer electricity bills for the average customer who does implement energy efficiency (e.g., who does receive and install the box of CFLs from Duke Energy). This shows that, for customers who do implement energy efficiency, electricity bills still go up overall according to my estimates, so value is accumulated from all categories of residential customers, although the increase in electricity bills is lower than for those who do not implement energy efficiency.

Fig. A.5. Effect of Fig. A.2 on Electricity Bills of Customers Who Do Implement Energy Efficiency



Further research is needed to put numbers to these figures, which only show relationships at this time.

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