A critical review of the interplay between policy instruments and business models: greening the built environment a case in point

Yasser Al-Saleh*, Sami Mahroum 1

INSEAD Innovation and Policy Initiative, P.O. Box 48049, Abu Dhabi, United Arab Emirates

**A R T I C L E   I N F O**

Article history:
Received 25 April 2014
Received in revised form 28 June 2014
Accepted 14 August 2014
Available online 3 September 2014

Keywords:
Green business models
Environmental policy
Sustainable built environment
Green entrepreneurship

**A B S T R A C T**

Policy instruments introduced with the aim of promoting environmental sustainability are often designed and evaluated in terms of their impact with regard to facilitating technological change. Most ‘green’ policy instruments that have emerged in recent decades have targeted facilitation of the development and adoption of greener processes, goods and services. Concurrent business models have sought to create and capture value arising from this policy-induced transition to more environmentally sustainable practices. Both such policy instruments and the business models are, however, often evaluated more in terms of their impact on the development and adoption of innovations and less in terms of their impact on behavioural change. This paper provides a critical review of the interplay between green policy instruments and business models from a behavioural perspective. Instead of looking at policy instruments from a technology-push and demand-pull perspective, this paper samples them in terms of ‘sticks’, ‘carrots’ and ‘sermons’ and then provides a critical review of business models that have emerged in response to these types of policy regimes. The paper finds that most green business models that have emerged in the built environment - in response to sticks - may be characterised as buck-passing, i.e. passing costs to others and skirting around the stick of regulation. Those that emerge in response to carrots as opportunistic carpet-bagging aimed at capturing a temporary gain. Finally, those that emerged in response to sermon-orientated awareness campaigns, show a tendency to diffuse even in the absence of supportive fiscal conditions.

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1. Introduction

There is widespread agreement that the cost of mitigating climate change is a significant fiscal issue across the globe (IEA, 2013; UN, 2013). Governments have limited financial capacity, so a large proportion of the green investment required to address this issue is expected to come from the private sector. Given the high level of upfront investment usually associated with green energy technologies, a range of innovative policy instruments and business models have emerged to create potentially lucrative green markets (WEF, 2013). A review of the literature pertaining to sustainability transitions reveals that – with a few exceptions – the interplay between business models and policy has not been well addressed in previous research (Doranova, 2012; Kivimaa and Virkamaki, 2014; Provance et al., 2011; Truffer et al., 2012). This is despite intense pressure on politicians and managers alike to create and capture value from eco-investments (Desyllas and Sako, 2013; Kiron et al., 2013; Nidumolu et al., 2009; OECD, 2013; Orsato, 2009). Contrary to the conventional wisdom of most business leaders and mainstream economists, Porter (1991) floated the idea that environmental regulations could actually enhance the productivity and competitiveness of firms. Many economists remain sceptical of such ‘win–win theorising’, yet Porter and van der Linde (1995) offer several case studies of companies that appear to have benefited (i.e. through value capture) from developing or adopting green technologies in response to market-based environmental regulations. There is a growing awareness that new business opportunities may be created through green business model innovation, but empirical data regarding their sustainability is limited (Huijbens and Verbong, 2013).

The built environment is a case in point. A review of the literature indicates that the topic of green business models in the built
environment sector has been subject to little academic scrutiny (IEA-RETD, 2013). The built environment is not only affected greatly by climate change, it is also a major consumer of energy and a contributor to climate change. There has been recent massive growth in new construction within developing economies, compounding the issue of inefficient building stock that exists worldwide. The current business-as-usual scenario envisaged by the United Nations Environment Programme (2009) is that greenhouse contributions from the built environment sector will more than double over the next twenty years. This forecast takes into consideration the entry of new technologies into the market that have the potential to significantly reduce greenhouse gas emissions (IPCC, 2007; Mahroum and Al-Saleh, 2012).

The ‘greening’ of the built environment is often associated with the implementation of energy efficiency measures and/or renewable energy technologies. Their uptake, despite the availability of cost-effective technologies, has been slow (Gillingham et al., 2009; Zhang et al., 2011) with the dominant policy paradigm being focused on designing and introducing policy instruments with twofold aims. These are: (i) generating new energy-efficient and cleaner technologies and (ii) accelerating the adoption of these technologies by consumers (e.g. see OECD, 2012). In other words, the innovation literature is dominated by the so-called technology-pushing and demand-pulling perspective; where success and failure are measured in terms of technology development and diffusion (Horbach et al., 2012; Vollenbroek, 2002). There are, however, concerns about the sustainability of temporary gains made in this regard, particularly given that many of these ‘push’ and ‘pull’ dynamics are the result of heavy subsidies (Taylor, 2008). This applies both to the cost of technology development and of technology adoption, which has the probable effect of slowing down the emergence of sustainable business models that are not underpinned by the presence of government subsidies (Gan et al., 2007). While the behavioural implications of policy interventions may have significant potential in addressing such concerns, they are often seen as precursors for technological development rather than ultimate policy objectives.

So, what happens if or when the subsidies go away? How sustainable are the gains made through utilising these green policy instruments? How does the business community behave in response to various types of green policy interventions? This paper does not claim to provide a definitive answer to these questions, but rather proposes an approach for examining the sustainability of such gains. It will also examine the behavioural changes that emanate from the interplay between green policy instruments and business models taking the built environment as a case in point.

Our review is based on over a dozen semi-structured interviews and in-depth discussions with green business professionals and policy-makers from around the world. This field research was augmented with a review of green business models that have recently emerged in relation to the built environment. The review also draws upon a range of international examples of successful and unsuccessful experiences in greening the built environment. Data was analysed manually in a qualitative manner by identifying emerging themes from the interviews and literature review. The remainder of the paper is structured as follows. The next section establishes a basic understanding of the rationale behind green policy intervention, followed by an overview of types of green policy instruments (Section 3). The paper then provides a synthesis of a range of green business models in terms of policy instruments that have emerged in the built environment (Section 4). Section 5 examines the voluntary emergence of green business models in the form of entrepreneurship with the aim of distilling further the interplay between the fields of environmental policy and entrepreneurship studies. In Section 6, we propose a behavioural framework for examining the sustainability of gains that result from the interplay between policy and business models. The paper concludes with Section 7; a discussion that summarises the findings of the paper and reinforces the importance of further consideration of behavioural aspects in mainstream environmental policy debates.

2. Rationale for green policy intervention

In spite of the apparent abundance of clean and profitable energy-saving opportunities, green technologies often fail to be diffused widely within markets (Gillingham et al., 2009; Jaffe, 1994). Neoclassical economists provide reasons to explain the limited adoption of such cost-effective technologies. They generally boil down to so-called ‘market failures’, which in turn provide a justification for policy intervention as suggested by Arrow (1962). Market failures can be a result of several factors including misplaced incentives; negative externalities (i.e. unpriced costs such as air pollution); imperfect competition; path dependency; free riding; distortionary fiscal, economic and regulatory policies; and asymmetric information (Cornes and Sandler, 1996; Foxon and Pearson, 2008; Jaffe and Stavins, 1994; Marques et al., 2013; Weber and Rohracher, 2012). Misplaced incentives are of particular relevance to the built environment sector. These are the result of the so-called ‘principal-agent problem’ in economics literature — where an agent has the authority to act on behalf of a customer, yet does not fully reflect their best interests (Brown, 2001). For example, consider the moral hazard that may arise in the landlord-tenant relationship; the former is not usually incentivised to invest in energy-efficient equipment as the latter is the party that will usually pay the energy bills and benefit from any savings. The landlord is not able to recover the cost of energy efficiency investment through the purchase price or rent charged for the property, and the tenant is being encouraged to under-invest in energy efficiency relative to the social optimum, thereby creating a market failure (Gillingham et al., 2009).

Fig. 1 shows a matrix of three possible avenues for split incentives in the landlord-tenant relationship (the agent making the hidden action in the landlord-tenant problem is indicated in parentheses).

Another example of market failures is a power plant with no economic incentive to minimise the external costs of pollution. In this case, governments might attempt to serve the public good of clean air through creating new mechanisms such as a carbon trading scheme (Jaffe et al., 2005). Additionally, government may intervene to preserve commonly-shared resources such as water and non-renewable energy sources. Without government involvement, such resources could become overused or depleted (Agrawal, 2002). According to neoclassical welfare economics, the existence of such market failures impedes the attainment of socially-optimal levels of investment in energy efficiency and provides justification
for public policy intervention. However, whilst economic analysis of environmental policy is mainly based on the idea of correcting market failures with the aim of achieving economic efficiency, economists have long disputed the extent to which policy interventions are needed to foster the development and diffusion of low-carbon technologies and practices (e.g. see Kneese and Schultze, 1975). An examination of the environmental policy literature reveals increasing calls to replace the neoclassical rationale of market failure with one of systemic failure. The basic concept, which is not universally supported by all economists, is that policy intervention should aim to address the problems that hinder the operation and development of the innovation system as a whole (Edquist, 1997). In an attempt to further advance this debate, Jaffe et al. (2005) articulated the idea of ‘double market failure’, i.e. market failures associated with environmental pollution which interact with those associated with the innovation and diffusion of new technologies. The interplay between these two analytically distinct – yet linked – sets of market imperfections decreases the likelihood that the rate of investment in development and diffusion could occur at a socially-optimal level. 

Along similar lines, Gillingham and Sweeney (2012) argue that although the high cost of renewable energy technologies constitutes a major barrier to their market penetration, it does not necessarily present a rationale for policy intervention on economic efficiency grounds (i.e. the possibility to improve welfare for at least some people, whilst concurrently making no one worse off). Raising questions about the fundamental theorem of welfare economics, they suggest that economists should be hesitant about justifying a subsidy to stimulate the diffusion of such low-carbon technologies unless there is clear evidence suggesting a sizable R&D (research and development) spill-over. A valid analytical basis for considering such policies might be that the social benefits associated with a speedy diffusion of green technologies are unlikely to be fully captured by private innovators (Jaffe et al., 2005). Some scholars nevertheless caution that subsidising green technologies – on the grounds of positive spill-over effects – can sometimes be welfare-worsening as it may delay the introduction of new technologies (Kverndokk et al., 2004). Subsidies for ethanol production may, for example, hamper the creation of new firms that are looking for alternative green fuels (York andVenkataraman, 2010). This means that although the existence of multiple market failures and policy targets may justify employing several policy instruments, the disproportionate use of pricing interventions can prejudice the introduction of potentially better products and services. This has been seen to be the case in the Brazilian ‘Pro Alcohol/Ethanol Programme’ (Mahroum et al., 2011).

### 3. A closer look at green policy instruments

Contemporary discussion in environmental policy circles has moved on from justifying whether government intervention is needed to support green innovation, to how this ought to be designed for optimal effect (Vugeler, 2012). An extensive toolkit of policy instruments has emerged to facilitate protection of the environment and support the generation and diffusion of green innovation. These instruments can be mapped into two broad categories; (i) technology vs. market dynamics; (ii) deterre nts vs. rewards. The first analytical category deals with policy instruments that aim to foster technological change using either technology-push instruments, or market-pull mechanisms (Mowery and Rosenberg, 1979), Table 1 shows some recent examples of both types.

Despite its inclusion in some contemporary debate, the technology-push/demand-pull typology reflects an arguably outdated thread in the economics of innovation literature, i.e. a linear progression from basic science to applied research to product development to commercialisation (e.g. see Horbach et al., 2012; Miles, 2010). In classical innovation literature, there exists a tendency to view innovation as a ‘black box’ into which R&D inputs flow and out of which commercial technologies diffuse into the marketplace (Jaffe et al., 2002). Just as the economics of innovation literature moved beyond the narrow technology versus market dichotomy, we suggest that it is time for environmental policy researchers and analysts to also transcend this.

An alternative and underexplored analytical category of policy instrument is the ‘deterrent vs. reward’ formulation, more commonly known by its ‘stick’ versus ‘carrot’ idiom in reference to the use of rewards and punishments to induce certain behaviours. Some environmental economists have further suggested public influence (i.e. sermon) as a third type of policy instruments (Vedung and van der Doelen, 2010). Table 2 illustrates examples of how various policy instruments may be mapped along the deterrent—reward axis.

We propose a mapping framework that links policy instruments to both business model design and economic agent behaviour. Adopting a stick, carrot and sermon perspective as opposed to technology-push vs. demand-pull approach allows the linking of various policy instruments to their expected behavioural responses. This helps not only in terms of designing, but also in evaluating policy interventions. According to Taylor (2008), a lack of systemic policy evaluation has often been identified as a reason behind a weak empirical basis for green policy design recommendations.

Regarding carrots and sticks, there seems to be an overwhelming consensus – in the literature at least – that carrots should be used for correcting positive externalities and sticks for addressing negative externalities (Wittman, 1984). When addressing environmental pollution, internalising the environmental costs or imposing a limit on the level of pollution makes more sense than subsidising pollution-reduction measures. The latter action could inject money into the industry and thus attract more polluters in the long run. Both carrots and sticks come with their own cost burdens; carrots generate transaction costs relating to compliance, whilst sticks do likewise but in relation to violation. Following this logic, one could argue that theft should be penalised rather than non-theft subsidised because the former occurs less frequently (Geest and Dari-Mattiacci, 2013). After examining the theoretical and empirical evidence pertaining to environmental policy, however, several scholars — including Fisher and Rothkopf (1989) and Jaffe et al. (2003) — accept that economists and policy analysts are far from having a well-established theoretical or empirical basis for when and what kind of green policy instruments

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<th>Demand-pull green instruments</th>
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<td>Feed-in Tariffs</td>
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<td>R&amp;D Grants</td>
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<td>Capital Cost Subsidies</td>
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3 Thaler and Sunstein (2008) popularised the term ‘nudges’ to refer to the shaping of behaviour. This paper adopts instead the term ‘sermon’ as opposed to ‘nudges’ because we believe that both sticks and carrots have a nudging effect. In other words, all types of policy actions send signals to investors that motivate them to behave in certain ways.
(e.g., sticks, carrots or sermons) are preferable in any given market conditions. There seems, however, to be unanimity of opinion that voluntary and incentive-orientated policy approaches are more likely to foster diffusion and compliance paths than rigid regulatory approaches (Sioshansi, 1994). There still remain the questions of how much penalty/reward is necessary and how it should be administered to induce certain behavioural change?

Having briefly discussed the potential connection between types of policy instrument and expected behaviour in terms of responses to sticks, carrots and sermons, we now turn our attention to the behaviour of the business community. This is particularly in terms of generation and adoption of green business models and again; we take the built environment as a case in point.

### 4. How have green business models emerged in response to policy actions? The built environment as a case in point

What do we mean by ‘business model’? The field of business model research has gathered momentum since the mid-1990s, yet its literature seems to be developing largely in silos with various scholars unable to agree on what constitutes a basic business model (Bocken et al., 2014; Klang et al., 2010; Zott et al., 2011). In broad terms, a business model defines business logic or a value proposition for the way that a company creates value and how it captures some of this value as profit (Teece, 2010). Green business models may be broadly defined as business plans which support the diffusion of products and services that offer an economically-viable environmental benefit (FORA, 2010). In the context of the built environment, building owners emerge as an important stakeholder because they often have the final say on whether or not to install renewable energy technology or energy-efficient measures. Several business models exist that present building owners with attractive opportunities to help address high up-front costs and other non-financial barriers, such as the hassle associated with buying, installing or maintaining green energy equipment (Huijben and Verbong, 2013; IEA-RETD, 2013). The following sub-sections evaluate the experience of some green business models, which have emerged within a stick, carrot or sermon-orientated policy environment. It should be borne in mind, however, that the three groupings are not always analytically conclusive as some policy—business interactions might not neatly fit into these classifications or can perhaps span more than one setting.

#### 4.1. Stick-induced green business models

Our research suggests that businesses respond to stick-type policy instruments by ‘passing the buck’ – a metaphor that refers to evading responsibility by passing it on to someone else. Stick-induced green business models thus tend toward buck-passing behaviour that offloads any additional costs to other parties (see Fig. 2).

The fragmented, transient and competitive nature of the built environment may deter parties from working together to achieve high levels of long-term environmental sustainability (The Voluntary Environmental Governance Project, 2013). As a result, Davis (2012) finds that energy-efficient appliances are less likely to be installed in rented dwellings; whilst Gillingham et al. (2012) show that owner-occupied houses are more likely to be well-insulated. Nevertheless, there is a growing understanding that building owners who do not occupy their buildings can profit from additional revenue opportunities if they are allowed to charge higher rents after undertaking energy-saving upgrade renovation. This business model aims to address the aforementioned problem of ‘split incentives’, which is commonly referred to in the energy efficiency debate as the ‘landlord/tenant dilemma’.

Quite often, there is a need for a change in legislation in order to allow landlords to pass on all or part of the cost of the investment to the tenant, mainly through a rent increase. A number of such regulatory changes have been introduced across the EU over the past few years. France, for example, adopted a tenants’ law in 2009 in order to enable owners to realise energy improvements and share energy-saving benefits with their tenants. In France and the Netherlands, the landlord is required to obtain the consent of the tenant to undertake renovation and the economic gain to the landlord cannot exceed half of the energy cost savings. Additionally, rents are allowed to rise only when the effect of the energy conservation measure has been proven. The results are usually monitored, allowing for rents to be adjusted if the expected results are not achieved. A potential risk of adopting this business model is that changes in regulations can be a time-consuming process. For instance, the change to rental price evaluation in the Netherlands was only realised after a tense political process that took three years (CEPI and UIPI, 2010; IEA-RETD, 2013). In the United States (US), it was noted that the need for change in existing legislations was only realised after a tense political process that took three years (CEPI and UIPI, 2010; IEA-RETD, 2013). In the United States (US), it was noted that the need for change in existing legislations has slowed down the emergence of third-party business models – i.e., where commercial companies own and operate customer-sited solar systems and lease the equipment or sell electricity to the building occupant (Drury et al., 2012). Since companies assume the risks associated with owning and operating green technologies, the

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**Table 2**

Examples of stick, carrot and sermon-type green policy instruments.

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<tr>
<th>'Sticks' as green policy instruments</th>
<th>'Carrots' as green policy instruments</th>
<th>'Sermons' as green policy instruments</th>
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<td>Feed-in Tariffs</td>
<td>Provision of Information</td>
</tr>
<tr>
<td>Mandatory Green Building Codes</td>
<td>Net Metering</td>
<td>Information</td>
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<tr>
<td>Renewable Portfolio Standards</td>
<td>Tradable Certificates</td>
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<td>Standards</td>
<td>Grants</td>
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<tr>
<td>Fuel/Carbon/Green Taxes</td>
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<td>Road/Congestion Charges</td>
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*Fig. 2. Stick-induced policy-business behaviour cycle.*
occupant is likely to adopt positive and collaborative attitudes towards installing such equipment in the property.

Energy Saving Obligation (ESO) schemes, sometimes referred to as ‘White Certificates’, are an example of a stick-type policy instrument that forces energy companies to realise energy savings at the level of the end-user. They represent documented and often tradable obligations that a certain reduction in energy consumption has to be attained. Such policy schemes have motivated energy companies to develop business models that realise mandated energy savings (IEA-RETD, 2013). In France, this was carried out through partnerships with electricians and installers to offer new energy-saving services to customers. In Italy, a large part of the obligation was outsourced to Energy Service Companies (ESCOs). In other words, ESO schemes played a role in stimulating the demand for — and growth of — the ESCO market (Boot, 2009). Indeed, if energy companies are allowed to pass on the costs of efficiency measures to customers through charging higher energy tariffs, such obligations could be considered as a potential financing mechanism for greening the built environment without having to use direct government funds. One successful ESO scheme has been enforced in the United Kingdom (UK) through a policy programme named the ‘Carbon Emission Reduction Target (CERT)’. Targeting low-income households, it has reduced the incidence of ‘free riding’ as this target group was less likely to adopt efficiency measures.

Mandatory green building codes are another example of a stick-type green policy instrument. A number of green building codes and certifications have been introduced around the world in order to assess and rate the environmental credentials of buildings (e.g. see Wang et al., 2014). Many property developers have voluntarily engaged in constructing buildings according to green certification schemes with the expectation of realising a price premium when green codes become mandatory. This business model is based on the assumption that such a premium will compensate for the additional costs associated with greening a building and obtaining certification. This is in addition to a greater level of profit. It should be noted here that it is difficult to assess the sustainability of this business model. The relatively short history of green certifications and codes means there is little evidence regarding the impact of green building certificates on decisions related to purchasing, renting or renovating a property. It has been noted, however, that speculation of a possible price premium accompanied the launch of the ‘Estidama’ scheme by the Government of Abu Dhabi as the Middle East region’s first — voluntary — green rating system (Nelson, 2011). This should not underplay the role of Estidama in raising awareness (i.e. sermons) with regard to sustainability in a place that has the enviable tag of being the world’s largest per capita emitter of carbon dioxide (Ghazal-Aswad et al., 2012). In other words, depending on the context in which a policy instrument is applied, it may result in dissimilar behavioural change.

Governments also engage in buck-passing to manage risks and this is likely to be one of the motivations behind government initiatives involving Public-Private Partnerships (PPPs) developed when governments are incapable of either adequately funding or running a construction project. Design, Build, Finance and Operate (DBFO) is a form of PPPs that has been used for building a number of climate-resilient infrastructural projects across the EU such as roads and hospitals. Innovative features of this model include the use of private finance in addition to merging the design/construction phase with the operation/maintenance phase. A private sector developer takes charge of the design, construction, finance and operation/maintenance of an infrastructural asset. Since the risks are passed on to the developers, they have an incentive to adopt a long-term view and to design and build the project so that it can be operated and maintained in an efficient manner for a typical period of 30—35 years. Given the increasing interest in green PPPs around the world, a stronger backing from public authorities — either through lending, guarantees or supportive regulatory frameworks — could encourage the private sector to invest more in green projects (IEA, 2012; IRENA, 2013; Limaye and Zhu, 2012). Examples of green business models that have emerged due to such carrot-type policy schemes are discussed next.

4 Energy Service Companies (ESCOs) emerged in the US and the EU following the energy crises of the 1970s. Quite often, ESCOs target existing buildings in order to achieve significant energy and cost reductions with no cost to the building owner (Peretz, 2009; Wargatt, 2011). This business model has been endorsed for its business and environmental credentials, yet it has attracted relatively little academic scrutiny, with most of the existing literature originating from industry and government sources. Many economists and policy scholars maintain that because the nature and long-term potential of the ESCO markets are poorly understood, it is difficult to adequately appreciate their potential contribution to sustaining a green economy (Hannon, 2012; Sorrel, 2005; Vine, 2005).

5 Some economists have raised criticisms about the neoclassical hypothesis of utility maximisation. For example, Van den Bergh et al. (2000) suggested that such deterministic models are based on a flawed assumption that choices are easily predictable because individuals behave consistently across different situations and periods (c.f. bounded rationality). Other economists further argue that experimental economics has provided evidence to show that individuals are less prone to free-riding than predicted by neoclassical theory. Broader explanations include ‘other-regarding’ and ‘reciprocal fairness’ where people reward and penalise the behaviour of others instead of acting strategically in their own self-interest alone (Gintis, 1998).

4.2. Carrot-induced green business models

A critical evaluation of international experiences confirms that whilst stick-induced business models tend to create buck-passing behaviour, uncontrolled offering of carrots often leads to opportunistic behaviour aimed at capturing temporary gains (see Fig. 3). In essence, this finding is in line with the utility maximisation hypothesis assumed in most economic analyses of firm behaviour — i.e. a firm acts so as to maximise its profits.5

The Netherlands is an instructive example of a built environment shaped by a carrot-orientated policy regime. It has the largest share of social housing in the EU, accounting for around 32% of total houses and approximately 75% of the rental stock in the country. The success of the aforementioned model of increasing rents after implementing energy saving measures in the Netherlands is partly attributed to the existence of a favourable environment. This is characterised by loan guarantees in addition to rent-price regulation. Registered social housing organisations are eligible to benefit from an innovative three-level security structure. The first security instrument is the Central Fund of Social Housing, an independent public entity that acts as a supervisor empowered to financially support such organisations when in difficulty. The second instrument is the Guarantee Fund for Social Housing: a private organisation created by housing organisations themselves to act as a solidarity-based mutual fund. In cases where these two instruments are unable to provide favourable conditions and interest rates, financially troubled social housing organisations may resort to a third option, the state and local authorities (CECODHAS Housing Europe, 2013). Although a favourable policy context exist in the Netherlands that has stimulated the rise of energy efficiency-based business models, the policy conditions have not been as rosy for its local solar energy market. Whilst Verhees et al. (2013) applauded the advent of a few innovative business models for solar technologies in the Netherlands, other scholars (e.g. Huijben and Verbong, 2013) argue that the financial viability of these green business models was found to be highly dependent on the
Quite often, the business community overlooks the fact that engaging in self-centred carrot-induced activities that allow value appropriation (i.e. capture), without value creation, is destined to fail. For example, consider US President Obama's stimulus package of $80 billion that was allocated to subsidise politically-preferred energy projects. As a result of the government approach of ‘picking winners’, a substantial share of the financial incentives was awarded to green energy companies that have since gone bankrupt (Schow, 2012). When considering the case of China — which is often portrayed as a great rival to the US in the green energy arena — it can be argued that the Chinese ESCO market has developed only modestly. This is despite its huge market potential and favourable political conditions which have, for example, encompassed a special subsidy for energy conservation projects run by ESCOs. It appears that this underperformance is largely attributable to market and institutional barriers in addition to a lack of trustworthy relationships between ESCOs and potential clients (Kostka and Shin, 2013; Lo, 2014). For that reason, one could argue that intensifying awareness campaigns is likely to alter attitudes and behaviour of consumers and investors alike in such nascent markets. The effect of awareness-building on the business community is discussed next.

4.3. Sermon-induced green business models

Sermon-induced business models emerge in response to demand sparked by a change in value systems. This is akin to the emergence of business models that foster fair trade, organic food and/or ethical businesses. Certain segments of society are willing to pay a premium for consuming goods and services that are produced in line with their value systems. Halal and Kosher businesses for Muslims and Jews are two examples of such values-based markets that have recently attracted scholarly interest (e.g. see Campbell et al., 2011; Verbeke et al., 2013). For example, Ibrahim (2011) reported that willingness to pay a premium for halal goat meat in Atlanta equates to 50 US-cents per pound. Hill and Lynchehaun (2002) argued that due to the high prices associated with organic food, consumers in the UK tend to perceive organic food to be of higher quality and tastier than conventionally-grown food. Likewise, over the last two decades, there has been a growing awareness about environmental degradation among the population resulting in the emergence of a green value-based market segment.

Consequently, there is considerable evidence to show that an increasing number of customers are willing to pay more for green products and services (Manget et al., 2009; Margolis et al., 2007; Orsato, 2009). A survey of more than 1000 companies by Kiron et al. (2013) revealed a growing number of green companies whose emergence had been driven by internal motivations as opposed to government regulations or market competition. A growing number of studies further recognise the importance of social acceptance and behavioural patterns in shaping environmental technologies and markets (e.g. see Keirstead, 2007; Rohracher, 2003; Wolsink, 2012). A review of the business management literature indicates a long-standing debate on how corporate environmentalism may improve financial performance for businesses. A company portraying itself as a ‘green firm’ sends a signal that supports a perception that it is a well-managed business, which can help in terms of both attracting good employees and low-cost capital from potential investors (e.g. see GiRIS, 2012; Odell, 2007).

At a theoretical level, a number of scholars (including Gillingham and Sweeney, 2012; Shu and Bazerman, 2010; Van den Bergh et al., 2000; Venkataraman, 2008) have challenged welfare economics principles. They cite behavioural and ideological anomalies which infer that insights from behavioural economics

existence of net metering regulations (i.e. carrots). Quite often, providing carrots for efficiency (through end-user subsidies) tends to create distorted price signals and may also encourage increased energy use and reduced incentives to use energy efficiently (i.e. the rebound effect). Evidence of such behavioural patterns among occupants of energy-efficient buildings is documented in the Netherlands (Santin, 2013) and other European countries (e.g. Haas et al., 1998; Hens et al., 2010).

One of the most popular incentivising policy structures for renewables in general, and rooftop solar panels in particular, is the Feed-in Tariff (FIT). Designed to address the barrier of high capital costs associated with most renewable energy technologies, the FIT scheme obliges utilities to purchase electricity from renewable energy producers/users at a rate per kWh that is higher than market electricity rates. Since a FIT scheme guarantees access to a predictable and long-term revenue stream from a usually reputable counterpart (i.e. government or network operator), it can serve as an incentivising basis for a green business model (Gifford et al., 2011; IEA-RETD, 2013; Mande, 2011). In addition, the FIT scheme has potential to drive the deployment of renewable energy technologies in ESCO models; as the building owner can outsource the installation and operation to the ESCO, as well as claiming FIT support. The introduction of the FIT by the UK Government in April 2010, with the aim of helping the UK meet legally-binding targets under the EU Renewable Energy Directive, has stimulated the growth of roof-mounted solar panels in the country. A large number of installation and consultancy firms have been set up to enable customers to gain from this scheme. The FIT has enabled landlords to either provide electricity for free — as a rental incentive — or impose higher rents based on the kind of benefit the tenant will receive (Ownergy, 2013; UK Energy Partners, 2013). Nevertheless, some building owners favour direct investment subsidies as opposed to FIT schemes, which sometimes have a payback period of around twenty years. Additionally, investment risks arise from inconsistent policy regimes that result in unpredictable changes in the tariffs. Some EU countries have implemented ‘stepped FIT’ schemes, where tariffs are decreased over time in accordance with expected technological learning and economies of scale. For instance, according to the German Renewable Energy Act, the FIT for new renewable energy installations is decreased annually in order to both avoid overcompensation and provide a continuous incentive for cost reduction in new plants (Klein et al., 2010).

![Fig. 3. Carrot-induced policy-business behaviour cycle.](Image)
are arguably more instructive in designing effective green policy instruments. For instance, decisions by consumers are swayed by their ethical values or a lack of information. Uncertainties regarding the detailed usage of electricity, or even the cost-effectiveness of energy efficiency measures, could lead to building owners under-evaluating potential future economic savings (Girotra and Netessine, 2013). Not only does the provision of information with regard to electricity consumption influence the conservation behaviour of occupants, but also heuristic-based social norms have a nudging effect as well. Schultz et al. (2007) demonstrated that providing households with information on how their electricity consumption compared to their neighbourhood average has significantly encouraged them to rationalise their consumption. The use of a smiley face or a frowning one (conveying social approval for under-average or disapproval for above-average) has also eliminated an undesirable boomerang effect.

Persuading the public to ‘go green’ may be achieved through the provision of information, education, eco-labelling or a sustainability awareness campaigns. Public campaigns have been carried out extensively using different means around the world to discourage habitual behaviours such as smoking, alcohol and other drug consumption. Empirical evidence shows that the outcomes of these campaigns yield mixed results in different domains and jurisdictions (Espinoza et al., 2012; Momin et al., 2014; Wakefield et al., 2010). In the context of the built environment, one could argue that raising the awareness of the value of sustainability among the public may be used to create a social value-based market for green buildings — i.e. a lower-cost policy option when compared to the use of sticks or carrots. Increasing awareness of sustainability does not necessarily guarantee that ‘greener’ actions will follow. Unlike the case with sticks and carrots, it might prove difficult to establish a clear and direct correlation between the use of sermons and the emergence of green business models. It would, however, be reasonable to assume that the magnitude of green business undertakings might be partly rather than wholly influenced by sermon-orientated policy regimes (see Fig. 4).

5. Voluntary emergence of green entrepreneurs beyond carrots and sticks: an example from Dubai

Approaching green business models from the angle of policy instruments does not mean that green business models can be triggered only by policy intervention. In this respect, the hydrocarbon-rich Middle East provides an instructive example given the near absence of green policy carrots and sticks in the region as a whole. Estimates provided by Frost and Sullivan (2011) show that the energy performance contracting market in the Middle East earned revenues of around US$79 million, and is expected to grow at an annual rate of 4.1%. To shed some light on the emergence of such a market in the absence of carrots and sticks, we look at an example from Dubai, in the United Arab Emirates (UAE), namely Taka Solutions, which is considered to be one of the few pioneering ESCOs to have adopted an energy performance contracting business model in the region. The near absence of green-oriented carrots and sticks in this region makes the niche emergence of such a green company noteworthy because it provides proof that given market opportunity, green business models can emerge without direct government support. Further scrutiny reveals that the UAE leads the broader region in terms of the extent of green building certification (i.e. Estidama), government-led sustainability awareness building campaigns and levels of environmental consciousness (Ghazal-Aswad et al., 2012).6 Taka Solutions is an example of the voluntary emergence of green entrepreneurship without the aid of sticks or carrots.

The company was established in 2012 with the aim of providing building owners with risk-free energy-efficiency upgrades that have the potential to enhance the durability and value of their buildings without the need for capital investment from the owners. When interviewed, Charles Blaschke IV — Founder and General Manager of Taka Solutions — indicated that “The establishment of this company was motivated by a desire to address a host of neglected problems currently facing the adoption of energy upgrades to existing buildings in the UAE”. Many organisations exist with old and inefficient building assets that would like to implement energy conservation measures, but have neither the technical expertise nor the capital to do so. This situation is a historical function of low utility rates, harsh weather conditions, occasionally inefficient planning, inferior quality of construction and amenities and conflicts of interest between owners, tenants and real estate investors and a lack of transparency with regard to energy usage.

Taka Solutions expect contract lengths of seven years or fewer to satisfy the project costs required to reduce energy by up to 30% and sometimes more. The company was formed in anticipation of things yet to come. For example, the Regulatory and Supervisory Bureau of the Dubai Government has started work on a framework to nurture the ESCO market in Dubai. Elements of this framework include launching an accreditation scheme for ESCOs and standardising energy performance contracts; this is in addition to setting up mechanisms for measurement, verification and dispute resolution (Sims, 2014). Such carrot-based legal frameworks that use ‘reputation-enhancing’ tools could help in terms of maintaining competitive market conditions given that the private sector — in its pursuit of value appropriation — may try to maximise profits beyond what many would agree is socially acceptable. Taka Solutions could be seen as a green entrepreneurial initiative that has decided to address a neglected societal problem (i.e. inefficient building stock) by challenging conventional wisdom through the

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6 Interestingly, our research indicates that a high level of sustainability awareness has not been the case in the UAE a few years ago. Interviewing an official from the Dubai Municipality revealed that due to intense opposition from the public, they had to abolish a law that mandated the installation of green roofs for every house in Dubai (i.e. a stick-type regulation). Green roofing is an energy conservation measure that was identified as a cost-effective means to reduce the carbon footprint of the UAE’s residential sector. Subsequently, in October 2009, the government decided to make green roofing optional, whilst at the same time launching intensive awareness campaigns that educate the public about the benefits of green roofs (i.e. sermons).
innovative green business model of energy performance contracting. Through targeting the low-hanging fruit of UAE buildings, it has demonstrated the viability of a green business avenue that has subsequently enticed government-owned utilities to fund a super ESCO, named ‘Etihad Energy Service Company’, which started operations in June 2013. This is a counter-intuitive development in a country that is characterised by artificially cheap energy and energy conservation is not a high priority through necessity.

Recent years have witnessed a growing awareness of the conditions in which entrepreneurs may surpass, or at least supplement, the efforts of governments, established firms and non-governmental organisations (York and Venkataraman, 2010). In this respect, Santos (2012) suggests that social entrepreneurship— which voluntarily green entrepreneurship could be seen as a subset of— is the pursuit of sustainable solutions to problems of neglected positive externalities. When substantial positive externalities exist, goods and/or services may be under-consumed or under-provided because self-interested actors do not perceive there to be a potential for value appropriation (Rangan et al., 2006). Governments have multiple roles and often scarce resources, not to mention that self-interested behaviour is not usually effective in the presence of positive externalities. These sustainability-orientated entrepreneurs are therefore usually the economic agents that end up trying to address these neglected externalities.

Accordingly, one could argue that Taka Solutions represents an example of a green entrepreneurial company which has emerged under an extant policy regime and market conditions that favour the incumbent energy system. The fact that its emergence did not require direct policy support suggests that market-tested business models have a chance of diffusing voluntarily, even without the presence of supportive regulatory conditions. In essence, such entrepreneurs could be viewed as being continuously enticed by the promise of competitive advantage and the possible enhancement in market power that ‘going green’ can offer. To remain sustainable, however, the importance of continuous innovation at the business model level cannot be overemphasised. The next section provides a broad synthesis of the various interactions between green policy and business model innovation, with a particular focus on the prospects for such sustainability.

6. On the sustainability of green business model innovation

For a green business model innovation to be sustainable, in any given sector, it needs to allow for both value creation and value appropriation. The importance of connecting value creation and value appropriation in the pursuit of a sustainable business model is well-established in the field of strategic management (see for example Girotra and Netessine, 2013; Lavie, 2007; Mizik and Jacobson, 2003). Whilst the value creation/value capture dichotomy is centuries old, the main purpose of firms is usually assumed by the business community to be value capture; hence the buck-passing and carpet-bagging behaviour that result from stick and carrot-type policy regimes. Fig. 5 illustrates a framework for examining the sustainability of gains and behavioural change emanating from the interplay between green policy instruments and business models.

Extending the arguments of Santos (2012) in his search for a plausible theory of social entrepreneurship, one could suggest that whilst it falls upon traditional commercially-orientated entrepreneurs to pursue new opportunities for value appropriation (through stick or carrot-induced green business models), green entrepreneurs focus on value creation opportunities (through ideology-driven green business models). The stick method forces the market to behave in certain ways using the ‘visible stick of regulation’. The carrot approach offers financial rewards to energy users to modify their energy consumption behaviour—and to investors to take their investment decisions—using the ‘invisible hand’ of economic theory (Sioshansi, 1994). Green entrepreneurship, on the other hand, could be seen as what Santos (2012) calls the “2nd invisible hand of Adam Smith”, which is driven by others-regard as opposed to self-interested and profit-maximising entrepreneurial behaviour. This activity is driven by a view of environmental degradation not only as an opportunity, but also an ethical issue (York, 2009). Adopting such ethical considerations in the work of green entrepreneurs has implications for the business world.

What sometimes tends to be overlooked in the business community is that without value being created, there is nothing to capture. It would be possible for a business to make more money through either maximising value capture or increasing the value it creates. An over-emphasis on monetising value may undermine the long-term sustainability of a business, while too much focus on value creation may deteriorate the ability of the organisation to compete and keep creating value (Ritelis, 2009). Moving away from such a narrow trade-off mentality, we argue that sustainable business model innovation should be based on creating ‘shared value’—an approach that links business success with social progress (Porter and Kramer, 2011). The central thesis of the ‘shared value’ notion is that since the competitiveness of a company and the health of its community are mutually dependent, the company should focus on creating economic value in a way that also creates societal benefits by addressing its needs and challenges. In effect, creating shared value should go beyond traditional CSR (Corporate Social Responsibility) programmes which tend to focus on boosting reputation with a limited connection to business (Porter and Kramer, 2011). This represents another contemporary endeavour to broaden both the concept of Adam Smith’s invisible hand and the construct of value, which has been overly simplified to focus narrowly on purely economic returns (Harrison and Wicks, 2013; Satz, 2010). Adopting such an approach is important because solving social problems can no longer be the sole responsibility of governments. Fig. 6 reflects these ideas on the so-called ‘Value/Business Behaviour Quadrant’.

- **Low Value Creation–Low Value Capture**: A state of affairs in which a business strives neither to create value nor to capture it. This is a stagnant business model with a limited value proposition.

- **Low Value Creation–High Value Capture**: Where a company behaves in an opportunistic fashion to maximise short-term profits, often in response to policies which it seeks to exploit. This attitude resonates with the utility maximisation hypothesis, a basic assumption of most economic analysis of firm behaviour.

- **High Value Creation–Low Value Capture**: Business model of green entrepreneurs who adopt others-regard as opposed to a self-interested mind-set.

- **High Value Creation–High Value Capture**: For a green business model innovation to be sustainable, it needs to allow for a balance of value creation and value capture (i.e. a shared value perspective).

On the policy-making front, we argue that environmental economists would benefit from further consideration of behavioural and ethical aspects as part of their rationale for environmentalism. As far as governments are concerned, behavioural-related issues—rather than the economic efficiency criterion—have the potential to justify a range of paternalistic (i.e. stick) policies that force consumers to purchase more green technologies than they would otherwise. Different reactions to negative and
positive sanctions have been widely studied in psychology and behavioural economics (e.g. see Feld and Frey, 2007; Gowdy, 2008). For instance, one of the key findings in behavioural economics research is that decision makers pay greater attention to losses than gains (Kahneman and Tversky, 1979). Consequently, carrot-based green policy instruments can be considered as a tool to overcome two cognitive barriers to environmental action; over-discounting the future and positive illusions. The first is a cognitive bias that means when making investment decisions, people tend to focus on short-term considerations as opposed to long-term concerns. Second, positive illusions lead us to conclude that either energy problems do not exist or that a ‘silver-bullet’ technology will be invented to solve energy problems in time (Shu and Bazerman, 2010). The fact is that the world is not short of green technologies. What is needed is green business model innovation that successfully brings such technologies to the market. Policy-makers, on the other hand, need to move away from a traditional technology-push versus demand-pull mentality and think more in terms of behavioural changes that result from different types of green policy actions. Clearly, policy interventions can influence firms to engage in environmental-conscious behaviour; whereas the question of whether to choose sticks, carrots or sermons also has effects on the sustainability of business behaviour as has been demonstrated by this paper.

7. Conclusions

In this paper, we have provided a critical review of the interplay between various policy instruments and emergent business models in the green built environment. This has allowed for a number of observations to be made, from which some normative prescriptions can be proposed. To start with, government rationale for policy intervention to support the transition into a more environmentally sustainable economy cannot be based on the premise of a market-failure in the eco-technology market alone. A technology policy approach to sustainable energy solutions assumes that once a green technology is found, market pull becomes the next immediate area for government intervention since on its own the new technology will not be able to survive. This has led to a situation where green business models have developed to a point where they are unsustainable without government support. The observations made in this paper suggest that while there is truth in the premise that many green technologies would not have survived without government support, the interventions used (i.e. the policy instruments) have generated significant negative externalities that have rendered them ineffective. The bulk of policy instruments deployed by environmentally-conscious governments have sought to stimulate demand for greener technological solutions by either bribing users to adopt a greener solution, or using a subsidised substitute to fuel a binging behaviour. The adopted policy instruments do not target behavioural change, but rather support a sense of entitlement to established wasteful behaviour. As a result, many government-supported programmes and initiatives have led only to temporary gains. These often quickly disappear as a result of negative externalities in the form of tactful behaviour (e.g. buck-passing and carpet-bagging behaviour). Stick-induced business models tend to engender a buck-passing attitude in the business community, whereas uncontrolled offering of carrots often leads to opportunistic carpet-bagging aimed at capturing short-term gains (i.e. value appropriation). Consequently, the emergent green business models are primarily aimed at capturing and distributing value rather than creating new sustainable value.

When externalities are overlooked by governments and established businesses, green entrepreneurs may hope to exploit what they see as potential opportunities for value creation from these identified positive externalities. They tend to be business opportunities characterised by high-value creation and capture. This was observed in the emergence of companies with green-based business models in the Middle East, where neither carrots nor sticks are available on any substantial scale. The emergence of such models lends support to the proposition that governments can achieve positive results by targeting behavioural change that leads to the
creation of new markets, rather than targeting the formation of an artificial demand for an alternative technology. While sticks and carrots can indeed be used effectively to cause such a change — for example as evident in the experience of some countries in reducing smoking habits — sermon-type interventions in the form of awareness and information campaigns have the ability to expand the opportunities for positive externalities to arise.

On the academic front, this paper challenges policy innovation and entrepreneurship researchers to design and innovate green business models that make the most sustainable policy regimes. It also highlights the importance of assessing whether these business models have achieved the ultimate objective of green policies with regard to causing a behavioural change among various economic agents. In addition, it argues that whilst the economics literature lacks a solid conceptual foundation that can clarify the rationale behind the voluntary emergence of green entrepreneurs, insights from behavioural economics and management studies may enhance our understanding with regard to the rationale for environmentalism. In that respect, one wonders to what extent ethical and commercial rationales or reputational concerns affect the entrepreneurial move towards achieving a rationale for environmentalism. In that respect, one wonders to what extent ethical and commercial rationales or reputational concerns affect the entrepreneurial move towards achieving a sustained green economy? Addressing this question to understand the emergence patterns of green entrepreneurs would require theory testing and conducting international case studies. The answers that will eventually emerge from extensive research into this area will have profound implications for both the theory and practice of sustainability transitions.

Acknowledgements

The authors would like to thank the anonymous reviewers for their constructive comments and informed suggestions in improving an earlier version of this manuscript. The authors also wish to acknowledge the financial support of the Abu Dhabi Education Council.

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