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Entrepreneurial Opportunities for Small and Medium-Sized Enterprises in the Environmental Goods and Services Industry

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Abstract
Scholars, government agencies and policy makers all agree that the world faces serious environmental problems and that the development and application of environmental technologies is essential to solving our environmental problems. Because of the need for environmental goods and services, the demand for these goods and services has been increasing rapidly and has created tremendous opportunities for small and medium-sized enterprises (SMEs). According to the Northwest Regional Development Agency (2010), the transition to a low carbon economy with increasing access to and use of environmental goods and services represent the most significant economic opportunities ever known.

This paper explores how SMEs can play a more significant role in the environmental industry. It focusses on the entrepreneurial opportunities for SMES in the environmental industry and suggests policies and incentives that are needed to help SMEs take advantage of the opportunities. The paper began with a discussion of the meaning and importance of SMES and the meaning and evolution of Environmental industry. It then reviewed the size and growth of the environmental goods and services industry and the main drivers of the industry growth. The next section gave the theoretical rationale for the environmental goods and services market and why entrepreneurial opportunities exist in the market. Finally, it discussed the entrepreneurial opportunities for SMES and presented several policies and incentives that government and other agencies could use to stimulate SME participation in the environmental industry.

Introduction

Over the years, there has been an increased economic and political interest in the environmental goods and services industry. It is widely seen as a new growth area that creates jobs and makes economic growth more environmentally friendly. As a result, government agencies and policy makers are paying greater attention, not only because it is generating wealth, but it is also playing a major role in the transition to the green economy (OECD, 1999). There is a growing recognition that the world faces serious environmental problems and that

the development and application of environmental technology is essential to solving these problems (Ingersoll, Foreso, Hughes, Land, Lusi, Mata, Moller, Polly & Shildneck, 1995)

Interest in environmental goods and services industry started at the beginning of the millennium (1990s), when the concept was addressed in various international forums, including the Millenium Declaration, the Monterrey Consensus, the World Trade Organization, and the World Summit on Sustainable Development (WSSD) (Lendo, 2005). The OECD also expressed strong interest in the environmental goods and services industry through the work of its "Industry Committee on Environmental Policy and Industrial Competitiveness" and its communication on "Industrial Competitiveness and Protection of the Environment" (p.3). The European Commission stressed that "the significance of the environmental goods and services industry as a fast expanding industrial market can no longer be denied"(OECD, 1999, p.3). In another communication, the Commission also recognized that the development of a strong environmental goods and services industry can make a major contribution to helping businesses better integrate cleaner technologies and environmental practices in their production to improve their environmental performance (OECD, 1999, pg. 3).

United States interest in the Environmental Goods and Services Industry started in 1993 with a letter from the Senate Finance Committee requesting that the United States International Trade Commission provide a report on the competitiveness of the US Environmental goods and services industry (Ingersoll, et al. 1995) In 1994, the United States Environmental Protection Agency and the Department of Commerce collaborated with the OECD to cosponsor a meeting in Washington to collect more comprehensive information for a clearer definition and classification of the environmental industry (OECD, 1999). Later in 2003, the United States interest was reaffirmed when congress mandated the United States Environmental Protection Agency (EPA) to setup a centralized office to facilitate the commercialization of cost effective environmental-related technologies. As a result, the Environmental Technology Opportunities Portal (ETOP) and the Office of Energy and Environmental Technologies were created in 2003 (Dooley, 2004).

Because of the growing interest in the environmental goods and services industry in the US and globally, demand for environmental goods and services have been increasing rapidly and as such created tremendous opportunities for small and medium enterprises (Leal, 2006). Leal stated that "If there is a potential market, there should be business opportunities." (p. 16). Northwest Regional Development Agency (2010), also suggested that the transition to a low carbon and environmental goods and services sector presents one of the most significant economic opportunities ever known. However, Bucher et al (2010) noted that despite the growth in the environmental goods and services market, there is still insufficient understanding of the potential business opportunities, especially new export business opportunities.

Purpose

The purpose of this paper is to explore how small and medium sized enterprises (SMES) can play a more prominent role in the environmental industry. It will identify the entrepreneurial opportunities in the environmental goods and services market for SMEs, and suggest ways to

help SMEs take advantage of these opportunities. Specifically, the paper will answer the following questions:

- What is the meaning of SMEs and their importance in developing the green economy?
- What does "the Environmental Goods and Services Industry" mean?
- How has been the evolution of the Environmental Goods and Services Sector?
- What is the current size of the environmental goods and services industry and how has it grown?
- What are the main factors that are driving growth in the environmental goods and services industry?
- What entrepreneurial opportunities exist for SMES in the environmental goods and services industry?
- What strategies/incentives/policies are needed to encourage and support SMES to take advantage of these opportunities?

Contribution to the Literature

This paper contributes to the literature in several ways: First, it focusses on SMES and explores the critical role they must play in helping to reduce the carbon footprint in the world. A mix of previous studies and reports dealt with business opportunities in the environmental goods and services market nationally and regionally. However, very few studies focused on the role of SMEs in the environmental goods and services sector.

Secondly, the paper provides significant baseline information on entrepreneurial opportunities in the environmental goods and services market and the potential for SMEs to access the opportunities in the market. The environmental goods and services industry is strategically very important because it increases access to and the use of environmental goods necessary to address our environmental concerns, and therefore supports the achievement of the sustainable development goals (Catulli, 2008). The paper contributes to this agenda by identifying the entrepreneurial opportunities so that the relevant agencies could provide the help the SMEs need.

Thirdly, the paper proposes some directions and policy decisions for the government and other agencies to support SMEs in the sector. Increasing awareness of the policy gaps and weaknesses in the environmental goods and services sector will lead to programs and initiatives to help SMEs take advantage of the entrepreneurial opportunities in the environmental goods and services market. Overall, the paper adds to the current knowledge of the industry and points interested agencies and SMEs towards attractive opportunities in the sector in order to support the sustainability agenda.

Organization of the Paper

The rest of the paper is organized as follows: The next section gives the background to the topic, including the meaning of SMES and the critical role they must play in addressing environmental problems, and the meaning and evolution of the environmental goods and services industry. This section also includes a discussion of the environmental goods and services market and the drivers of growth in the industry. We then briefly explained the

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methodology used to identify the entrepreneurial opportunities in the market, followed by a discussion of the entrepreneurial opportunities for SMEs in the environmental goods and services industry, and the programs and incentives that might help SMEs take advantage of the opportunities. Finally, we discussed the conclusions and recommendations.

Background

Meaning and importance of SMES. According to the United States Small Business Administration (2012), a small business is independently owned and operated and has fewer than 500 employees. There are approximately 28 million small businesses in the United States and they represent 99.7 percent of all employer firms. Small businesses create the most net jobs in the economy (64 percent), employ almost half of the private sector workforce (49.2 percent), and contribute about 40 percent the Gross Domestic Product (GDP). Individually, small businesses have a relatively small or low environmental footprint, however, as a group, their collective impact can exceed that of a large corporation (McKeiver and Gadenne, 2005; OECD, 2012).

Given the importance of SMES to the economy, they must play a more prominent role in solving the environmental problems by creating new more environmentally friendly goods and services. According to Leal (2006), there is a growing demand for environmental goods and services and SMEs are under pressure to become more engaged in the environmental goods and services market. Another reason for the focus on SMES is the fact that they are very vulnerable and need assistance to take advantage of the entrepreneurial opportunities in the environmental sector. They are characterized by a small number of employees, their ownership, and management are concentrated in the same hands, and they usually rely on the opinion of other professionals, such as their supplier, accountant, banker, and attorney (OCED, 2012; Leal, 2006). They are also vulnerability because they lacked information on environmental issues, have little technical and management capability, and faced severe financial problems (Leal, 2006, p. 25). Despite their importance, there is an absence of policies and incentives to help them build capacity to effectively participate in the environmental goods and services market. Encouraging and supporting SMES to be more involved in the environmental goods and services industry will lead to job creation in a greener economy and a better environment for all (Travers, 2011).

Meaning of Environmental Goods and Services. There is no internationally agreed definition for environmental goods and services (Travers, 2011; Villarreal cited in Leal, 2006) because none of the international organizations, including the WTO Declaration and the WSSD Plan of Implementation has been able to reach consensus on a definition for the environmental goods and services sector. Definitions vary from country to country because some countries saw the proposed definitions as a good starting point for discussions, but not as a basis for negotiations (Hamwey, Hoffman, Vikhlyaev, & Vossenaar 2003, pg. 9). In 1994, the European Commission defined eco-industries (environmental industries) as firms producing goods and services capable of measuring, preventing, limiting, or correcting environmental damage, such as, the pollution of water, air, soil, as well as waste and noise related problems. They include clean

technologies where pollution and raw material use is being minimized (European Commission, 1994).

Later in 1996, the OECD in collaboration with Eurostat took the lead in defining and classifying the environmental industry at the international level. They defined the environmental industry as "consisting of activities which produced goods and services to measure, prevent, limit, minimize or correct environmental damage, such as the pollution of water, air, soil, as well as problems related to waste, noise, and ecosystem." The industry dealt with equipment and services for waste management and air and water pollution. It also included "cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource risk" (OECD, 1999). Based on this definition, environmental goods and services were classified under three broad categories: "pollution management, cleaner technologies and products, and resource management" (OECD, 1999). However, there were several criticisms of the definition. One argument was that the definition was presented as a one size fit all. Another criticism was that most of the environmental goods and services included were support goods and services, either for pollution control or natural resource management, as opposed to products and services derived from sustainable activities. Other criticism was that most of the goods included relied on capital intensive technological solutions to environmental problems and therefore gives a comparative advantage to developed countries (Lendo, 2005).

For the purposes of this paper, we have adopted the Environmental Business International (EBI) definition. It defines environmental industry as "goods and services that generate revenue associated with environmental protection, assessment, compliance with environmental regulations, pollution control and prevention, waste management, renewable energy, remediation and contaminated property, design and operations of environmental infrastructure, and the provision and delivery of environmental resources" (Environmental Business International 2015). Table 1 shows the fourteen segments or subsectors in the environmental industry. Most goods and services can be classified within one of these subsectors.

This definition like many others will continue to evolve because the environmental industry is growing rapidly and the products and services it covers are constantly changing, (Leal, 2006, p. 28). There are three reasons why it is very important to have a clear definition. First, it can lead to better environmental policy, which would reduce the imbalances that might cause environmental problems. Second, it makes it easier to design strategies to complement existing local capacities by making use of international flows of goods and services. Finally, it allows countries to use the clearest and best criteria possible in negotiating their multilateral agreements. Overall, countries will be able to facilitate and exchange information across borders and make better medium and long term decisions (Leal, 2006, p. 18).

Table 1: Environmental Industry Segments

Segment/Sub Sectors	Description
Environmental Services	
Environmental Testing and Analytical Services	Provide testing of environmental samples (soil, water, air, and some biological tissues)
Wastewater Treatment Works	Collection and treatment of residential, commercial and industrial wastewaters. Facilities are commonly known as POTWs or publicly owned treatment works
Solid Waste Management	Collection, processing and disposal of solid waste
Hazardous Waste Management	Collection, processing and disposal of hazardous medical waste, nuclear waste
Remediation/Industrial Services	Cleanup of contaminated sites, buildings and environmental cleaning of operating facilities
Environmental Consulting and Engineering (C&E)	Engineering Consulting, design, assessment. Permitting. Project management, O&M, monitoring, etc.
Engineering Equipment	
Water Equipment and Chemicals	Provide equipment, supplies and maintenance in the delivery and treatment of water and wastewater
Instruments and Information System	Produce instrumentation for the analysis of environmental samples. Includes information systems and software
Air Pollution Control Equipment	Produce equipment and technology to control air pollution. Indicate vehicle control.
Waste Management Equipment	Equipment for handling, storing or transporting solid, liquid, or hazardous waste. Includes recycling/remediation equipment
Process and Prevention Technology	Technology for in-process pollution prevention and waste recovery
Environmental Resources	
Water Utilities	Selling water to end users
Resource Recovery	Selling materials recovered and converted for industrial by products or post-consumer waste
Clean Energy Power and Systems	Selling power and systems in solar, wind, geothermal, small scale hydro, energy efficiency and DSM

Source: Environmental Business International, Inc. (2012) San Diego, California.

Evolution of Environmental Goods and Services Industry

Environmental goods and services are as old as the first human settlements. Environmental activities, such as, waste disposal cleanup and reuse were around as long as 12,000 years ago. Initially, environmental goods and services comprised mainly public infrastructure for pollution control and remediation. During the early years, there was also a very sophisticated water and sewage system in ancient Rome (Sinclair-Desgagne, 2008). Table 2 gives a timeline showing the evolution of the environmental goods and services industry.

Table 2: Evolution of the Environmental Goods and Services Industry

Year	Events
12,000 years ago	Environmental services comprised mainly of public infrastructure for pollution control, remediation (waste disposal, cleanup and reuse) A sophisticated water and sewage system existed in ancient Rome
End of 19th Century/end of 1890s	Public authorities started outsourcing the delivery of environmental services to private parties during the second industrial revolution) Public authorities in Europe and America outsourced the large scale management of urban trash and wastewater to public-private partnership (in response to growing cities, recurring epidemics, etc.) European cities start implementation of regular garbage collection. Farmers Associations frequently received permission to collect domestic waste to make compost New York public authorities reorganized Solid waste management into engineering units, e.g. street sweeping, refuse collection and transportation, resource recovery and disposal (implemented by Col. George Waring, New York) New York introduced motorized street sweepers and other innovations
1904	Chicago and Cleveland opened the first aluminum can recycling plants

	Cities started sorting and recycling glass bottles and metallic objects because of the shortages during the war. Cities recycled scrap cotton and linen rags to make paper
1910	Trucking companies responsible for collecting waste started burning trash in incinerators and landfills
1957	New York city stopped collecting commercial waste. Businesses were forced to hire private companies to collect their waste.
1960s and 1970s	Environmental policies increased demand for EGS, e.g. specific monitoring and pollution abatement technologies, equipment to measure, control, and abate noise.
1970	Government created the Occupational Safety and Health Administration and strengthened the industrial safety regulations Developments in the environmental industry created a sizeable market for ergonomics, hazard assessment, safety audits, and other professional services. Oregon passed the Bottle Bill which increased the need for recycling services. The state also passed the Noise Control Act and the Resource Conservation and Recovery Act
1980	Developments in the environmental industry led to the Implementation of Comprehensive Environmental Response, Compensation and Liability Act, increased demand for site remediation services, e.g. cleaned up thousands of sites containing hazardous waste
1990s	Policy makers increased attention on EGS Industry Better quality infrastructure, improved cost of compliance with

	regulations, increased and significant growth in international trade

Adapted from Sinclair-Desgagne, (2008).

Review of Environmental Market

Size of the Global Market. According to the EBI (2012), the global environmental goods and services market was estimated at $866 billion in 2011 (Table 3) and the German Institute for Economic Research projected that it could reach between $1.2 and $1.9 trillion by 2020 (Eco Canada, 2010). The environmental industry is bigger than the pharmaceutical industry, but less than the information technology industry. The largest segments are solid waste management ($145.1 billion), water utilities ($130 billion), clean energy systems and Power ($127 billion), water treatment works ($11.6 billion) and water equipment and Chemicals ($69.7 billion). The global water market represented over 35 per cent of the total global environmental market (Bucher, Drake-Brockman, Kasterine & Sugathan, 2014: United States Office of Energy and Environmental Industries, 2010).

The current market is dominated by the developed countries (Table 4). The United States is the leader with $311 billion, followed by Western Europe $256 billion, and Japan $103.3 billion (Bucher, et al, 2014). Developing and emerging markets, e.g. Asia, Latin America and Eastern Europe represent over 15 per cent of the total market (Leal, 2006). The OECD countries together account for about 90 per cent of the global environmental goods and services market.

Growth of the Global Market. The global environmental goods and services market has grown rapidly over the last decade, experiencing a rate of 5% annual growth during the 1990s and a rate of 7% to 9% per year for the period 2000 to 2005 (Eco Canada, 2010, p. 24). The German Institute for Economic Research estimated that the industry will have an average growth rate of between 4.7 percent and 7.7 percent from 2005 to 2020 (Eco Canada, 2020). The fastest growing subsectors according to Environmental Business International (2012) are resource recovery, clean energy systems and power, and waste management equipment. The water and the wastewater treatment sector and the renewable energy sectors have the greatest opportunities in the international market. Markets in the developing and emerging markets, e.g. Asia, Latin America, Middle East, Africa, and Eastern Europe will experience rapid growth (between 9 to 10 percent) because of economic growth and protection of the environment becoming a higher priority (Bucher, et al, 2014; Leal, 2006). Two other possible reasons for the rapid growth are the large populations who need environmental goods and the emphasis on sustainable development by the international agencies (Leal, 2006).

Global exports of environmental goods and services have also risen from $231 billion in 2001 to $656 billion in 2012, almost a tripling in trade volume since 2001. The top exporting countries from 2008-2013 are Germany, China, United States, and Japan and the leading importers are United States, China, Germany, France and United Kingdom (Bucher, et al. 2014).

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Table 3: Market Size and Growth for Environmental Goods and Services by Sub-Sector

Equipment	Market in US$ Billion (2011)	Percentage Growth (2011)
Water Equipment and Chemicals	69.7	1%
Air Pollution Control	50.2	2%
Instrument and Information Systems	9.4	4%
Waste Management Equipment	36	10%
Process and Prevention Technology	4.2	5%
Services		
Solid Waste Management	145.1	3%
Hazardous Waste Management	21.8	-1%
Consulting and Engineering	54.8	5%
Remediation/Industrial Services	39.5	5%
Analytical Services	5.4	3%
Resources		
Water Treatment Works	116.6	-1%
Water Utilities	130.0	0%
Resource Recovery	56.5	13%
Clean Energy Systems and Power	127.0	11%

Source: Environmental Business International (2012)

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Table 4: Market Size and Growth for Environmental Goods and Services by Region

Region	Market in US$ Billion (2011)	Percentage Growth (2011)
United States of America	311.3	5%
Western Europe	256.0	2%
Japan	103.3	-1%
Rest of Asia	78.0	9%
Latin America	28.5	5%
Australia/New Zealand	13.6	2%
Central and Eastern Europe	13.7	4%
Middle East	17.5	9%
Africa	10.3	10%

Source: Environmental Business International (2012).

Size of the United States Environmental Goods and Services Market. According to (United States Office of Energy and Environmental Industries (2010), the United States is the single largest producer of environmental goods and services and the biggest environmental market in the world. The United States Market is estimated at $300 billion in revenues which represents about 40 per cent of the $782 billion global market (Table 5). The revenue for each industry segment is 47 percent from services, 21 percent from equipment and 32 percent from resources. Approximately 119,000 companies are engaged in the environmental industry supporting almost 1.7million jobs (p.1).

Small and mid-sized companies account for approximately 99 percent of the industry and generate about 20 per cent of the total revenue. Large companies make up only one percent of all private sector activity, and account for 49 per cent of the total environmental industry revenue. Public sector municipalities and similar entities account for the remaining 31 per cent of the revenue and domestic water utilities, waste water treatment works, and solid waste management (United States Office of Energy and Environmental Industries, 2010).

According to the Environmental Business International (2012), the United States environmental goods and services Industry exported about 14.6 percent of total production ($43.1 billion). In 2008 the leading sub sectors for exports were resource recovery (58 percent) instruments and information system (46 percent), water equipment and chemicals (36 percent), waste management equipment (25 percent), and air pollution (16 percent).

Growth of the United States Environmental Goods and Services Market. The rate of US market growth has remained around 5 per cent since 2004, at the same time foreign markets,

especially those of developing countries, grew at a higher rate and as such offered great opportunities for United States companies. The United States share of the foreign environmental industry market continued to increase, especially with the introduction of the state-of-the-art products, such as, technologies applicable to water reuse and recycling, desalination, and technologies with comprehensive environmental management systems applications (United States Office of Energy and Environmental Industries, 2010)

Table 5: **Revenues from United States Environmental Market by Segment (Billions)**

Equipment	**US 2008**
Water Equipment and Chemicals	28.5
Air Pollution Control	18.0
Instruments and Information Control	5.9
Waste Management Equipment	11.4
Process and Prevention Technology	1.9
Services	
Solid Waste Management	53.1
Hazardous Waste Management	9.2
Consulting and Engineering	27.1
Remediation/Industrial Services	12.5
Analytical Services	1.9
Water Treatment Works	40.7
Resources	
Water Utilities	39.2
Resource Recovery	28.5
Clean Energy Systems and Power	21.5
Total	299.5

Source: Environmental Business International, Inc. (2012)

Drivers of Growth in the Environmental Goods and Services Industry

There are four main factors that are driving the growth of the environmental sector: (1) Environmental Policy and Regulations (2) Financial and Economic Drivers (3) Consumer demand

for environmentally-friendly products, and (4) Emerging market trends, such as, renewable energy, or carbon emission reduction (Eco Canada, 2010).

Environmental Policy and Regulations. Legislation and regulation are perhaps the most easily identified driver of growth in the environmental sector. Changes in the environmental regulations and the compliance by businesses tend to attract significant investment in innovative environmental goods and services that prevent, remediate, or alleviate environmental degradation. In a survey of Canadian firms that introduced energy efficiency innovations, 36% indicated that they did so to meet regulatory requirements. Similarly in a survey of German firms in 2003, more than one in five innovative companies indicated that the innovation was triggered by laws and regulations (Eco Canada, 2010, p. 38). Some regulations (end of pipe) regulate or treat existing pollution, while others (pollution control) prevent pollution and encourage the production and use of environmental goods and services. Some of the main environmental laws and regulations are clean Air Act, Clean Water Act, and the Resource Conservation and Recovery Act among others.

Tax policies are also important drivers of growth in the environmental industry. Tax policies, such as green or environmental taxes on consumption would stimulate demand for green technology, or used as a disincentives for unsustainable behavior.

Policy incentives, whether through direct financial support or through the use of tax credits has been an important driver of growth in the environmental industry. The 2009 Environmental Industry Report by the German Department of the Environment found that firms introducing environmental innovations did so mainly as a result of government financial incentives (Eco Canada, 2010, p. 38). Financial incentives are available as either direct financial support or through tax credits. Some examples of financial incentives for environmental innovation are loan guarantees, revolving loans, grants, subsidies, business angels, etc. All of these have the potential to significantly increase growth in the environmental industry.

Financial and Economic Drivers. High energy costs is one of the important drivers to growth in the environmental industry. Companies that adopted technology to improve energy efficiency indicated that the cost savings from the energy efficiency improvement was the man reason for the eco-innovation. Return on the investments therefore far exceeded corporate policy or government regulations as a driver for growth. Access to markets is also driving growth. Over the years the global environment industry has grown significantly and this has increased demand for environmental goods and services and created a strong financial opportunity for SMES to access and benefit from these growth markets (Eco Canada, 2010, p. 40).

Business demand. Business demand for environmental goods and services is also driving growth in the environmental industry. According to Eco Canada (2010) green purchasing practices which have been used the public sector for sometimes is also being adopted by the private sector. Business purchasing managers will be assigning more weight to climate impact in the criteria for their purchasing decisions. As a result, suppliers will be required to provide information about the carbon footprint of their products, but at the same time the government will be helping SMEs by purchasing their green products and showing other customers the benefits of purchasing green products. Green procurement policies in both the public and

private sector increase business demand for environmental goods and services and significantly affect the growth of the environmental industry.

Consumer Demand. Consumer attitudes towards protection of the environment is a key factor in the continued growth of the environmental goods and services entry. Consumers' long standing concern for the environment have led to various environmental legislations over the years, and also to changes in their purchasing decisions. As a result, most of these consumers are continuously seeking to purchase environmentally –friendly products and services. This trend has influenced the implementation of green business practices in businesses and has been a driver of growth in the in the environmental industry (Eco Canada, 2010, p. 41).

Emerging Market Trends. In addition to the drivers discussed above, Eco Canada (2010) identified three key emerging trends that are also driving the future growth of the environmental sector. These include carbon and climate change control, energy efficiency and renewable energy, and alternative fuels.

(a) Carbon Reduction and Climate Change Control. There is a great deal of interest in climate change, and any activities that would reduce carbon and control climate change have the potential to seriously impacts investments in the environmental sector. Because of the emission cap and trade legislation, there is a strong demand for low carbon products and services as well as a variety of new professional and technical services to reduce and mitigate carbon emissions. During the years 2000 and 2008, the global market for carbon credits increased from $38m to $126 billion, averaging 175% growth per year over the period. Given the growth in the carbon credit market, global companies such as Walmart are requiring their manufacturers throughout their global supply chain to reduce their carbon footprint. And all of these have the potential to significantly increase growth in the environmental sector. (p. 6.)

(b) Energy Efficiency and Renewable Energy Generation. Another emerging trend that is driving future growth is drive future growth is energy efficiency and renewable energy generation. In 2006, the energy efficiency expenditures were $1.97 billion which represent an increase of 16% per year between 2002 and 2006. Eco Canada (2010) reported that a study of Canadian firms found that cost reduction or return on investment as the main reason for investment in energy efficiency. Government incentives for energy efficiency improvements in residential and commercial sectors are also driving high growth in green construction.

According to Eco Canada (2010) the Renewable Energy Sector has also experienced double digit growth annually during the past decade. This level of renewable energy growth together with the high market growth for alternative fuels and alternative fuel vehicles is expected to continue. Growth in energy efficiency and renewable energy is an important trend that stimulates demand in the environmental sector and is a key driver of growth in the environmental goods and services market (p.6).

(c) Alternative Fuels and Vehicles. According to the United States Department of Energy (2011), alternative fuels and alternative fuel vehicles have strong growth in North

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America over the last decade. The number of alternative fuel vehicles manufactured in the United States has grown at an average annual rate of 12 per cent from 2003-2007. During that time period, manufacturing of alternative fuel vehicles globally grew by 50 per cent per year. The growth in investment in alternative fuel vehicles is an example of how manufacturers are introducing eco-innovations to add value to their products. Growth in alternative fuel vehicles has sparked growth in the production of alternative fuels (Eco Canada, 2010).

Theoretical Foundations

First, the Sustainable Development Concept provides the main theoretical rationale for the environmental goods and services market. Sustainable Development came into common use in 1987 with the publication of the Brundtland Report and the conclusions of the United Nations Conference on Environment and Development-Earth Summit in 1992 (Drexhage and Murphy, 2010). According to the Brundtland Report (1987), sustainable development is "development that meet the needs of the present without compromising the ability of future generations to meet their own needs". The concept suggests the importance of protecting the environment. Since our resources are finite, once consumed, many of them cannot be recreated and we could be left with diminishing resources or no natural resources (United Nations World Commission on Environment and Development, 1987; Volery, 2002, p. 542). Therefore society, including businesses have a responsibility to develop and use environmentally sound products and technologies that contribute to addressing the most pressing environmental challenges facing humanity (Dean and McMullen, 2007; York and Venkataraman, 2010).

Environmental goods and technologies are an important part of the solution. According to Stilwell (2008), climate change threatens to cost about 20% or more of GDP. Ecosystems are also under threat, which could result in a 'substantial and large irreversible loss in diversity of life on earth." The likely areas to be affected most are the poor communities and the developing countries, which usually does not have the capacities and resources needed to mitigate and adapt to these changes. Addressing the problem of climate change and sustaining ecosystems require access to environmental goods and technologies and as such increasing access to, as well as, the use of environmental goods and services can contribute to improving environmental quality and protecting our environment.

The importance of environmental technologies, goods and services to addressing our environmental problems is also reflected in in Agenda 21, especially chapter 4 which dealt with changing consumption patterns and chapter 9 which focused on protection of the atmosphere. Identifying and exploiting entrepreneurial opportunities in the environmental goods and services market is important to create more avenues for producing the environmental goods, services and technologies needed to solve our environmental problems (Stilwell, 2008, p.5).

Secondly, the Discovery Theory of Entrepreneurial Opportunity provides the theoretical foundation for entrepreneurial opportunities in the environmental goods and services sector. The discovery perspective can be traced to the Austrian economic tradition of Israel Kirzner (Kirzner, 1973). According to the theory, entrepreneurial opportunities exist as objective phenomena, waiting to be discovered and exploited by unusually alert people who are called entrepreneurs (Gaglio and Katz, 2001, Kirzner, 1973). Segurado (2014) explained that

opportunities are simply part of the natural environment and they are out there to be discovered. They exist independently of human interaction, time, and place. Entrepreneurial opportunities are objective phenomena because they depend on the industry or market structure and are independent of the entrepreneur –who may or may not be seeking to exploit them. For example, in a fragmented market, the primary opportunity is to exploit economies of scale through consolidation while in a mature market, the primary entrepreneurial opportunities will be product refinements and process improvements (Porter, 1980; Barney, 2002). The discovery theory of entrepreneurial opportunities suggests that entrepreneurial opportunities do exist in the environmental industry and that enterprising individuals will be able to find these opportunities by doing a systematic study of the industry (Alvarez and Barney, 2007).

Determinants of Entrepreneurial Opportunities.

What indicators suggest that entrepreneurial opportunities exist in the environmental goods and services industry? In other words, what are the determinants of entrepreneurial opportunities in the environmental goods and services industry? The answer to this question was provided by some of the most influential researchers in the field. Schumpeter (1961) suggests that technological changes, political and regulatory changes, and social and demographic changes are the main determinants or sources of entrepreneurial opportunities. Drucker (1985) also provided a similar answer. He developed a taxonomy showing that entrepreneurial opportunities exist because of seven changes: unexpected occurrences, incongruities, process needs, changes in industry structure or markets, demographic changes, changes in perception, and new knowledge. Stevenson and Gumpert (1985) added that external pressures, technology, consumer economics, social values, political action, and regulatory standards may also increase entrepreneurial opportunities. Wang, Ellinger and Wu (2013) also supports the view that contextual factors such as external jolts and uncertainty do lead to entrepreneurial opportunities.

According to Holcombe (2003), there are three other determinants of entrepreneurial opportunities. (1) Factors that put the market out of equilibrium, such as changes in taste, technologies, or available resources push the economy out of equilibrium and create profit opportunities. (2) Factors that enhance production possibilities, for example, changes in the mix of goods and services demanded as income grows, and increase in the extent of the market will make different production techniques more profitable. These changes will result in a reallocation of resources and lead to entrepreneurial opportunities, and (3) Entrepreneurial action, i.e. the act of entrepreneurship itself is the most important factor in creating entrepreneurial opportunities. When an entrepreneur acts, seizes a new entrepreneurial opportunity, more entrepreneurial opportunities or market possibilities are created. Entrepreneurship creates more opportunities and gives potential entrepreneurs more of an incentive to look for these opportunities. If an entrepreneur created a new product, that creates the possibility of complementary products, and increases the demand for inputs into the new product. If an entrepreneur discovers a better process for producing an existing product, this also creates opportunities for potential inputs from suppliers.

The determinants of entrepreneurial opportunities and the characteristics of the environmental industry, (for example, the increased growth and the constant changes in the environmental goods and services market, including the various regulatory changes), clearly suggest that there are entrepreneurial opportunities in the environmental goods and services industry.

Areas of Entrepreneurial Opportunities

Because of the rapid growth in the environmental goods and services industry, there is a growing need for environmental goods and services and as such there are numerous business opportunities for entrepreneurs, especially small and medium sized enterprises.

This section highlights the many entrepreneurial opportunities that exist within the environmental goods and services sector. These opportunities have been developed based on a thorough review of the literature and are categorized under the following headings: Water and wastewater treatment, waste management, solar energy, wind energy, and biomass.

Entrepreneurial Opportunities in Water and Wastewater Treatment

Water and Wastewater Technology. The biggest opportunities in the environmental goods and services industry will be in water and wastewater technologies and solutions. Presently, there is a huge need to completely replace and upgrade the existing water industry infrastructure by repairing, renewing and replacing distribution and transmission systems, treatment plants, and storage and source intake facilities. Upgrading the water distribution network is vital for ensuring security of supply, but also for reducing treatment and pumping costs for water providers.

Opportunities are also emerging for SMEs that are interested in developing more innovative piping products that are more resistant to corrosion, have a greater flow capacity, and easier to install. New technology is also needed to help utilities make better projections on infrastructure replacement and provide justification for proposed projects. (Iseley and Hromadka, 2013, pg. 3).

These entrepreneurial opportunities exist because the current water and wastewater treatment infrastructure is terribly dilapidated and facing a major crisis. Most pipes, installed during the civil war, have exceeded their useful lives, and are causing a large numerous leaks and main breaks (Global Water Intelligence, 2013; Maxwell, 2009). According to the American Water Works Association, there are 237,600 water line breaks each year costing Public Water Utilities approximately $2.8 billion annually for lost water, repairs, etc. Also, cities and towns lose about 7.6 billion gallons of treated drinking water and about 50% of “non-revenue water” from the main system each year. The EPA estimated that $384 billion in improvements will be needed for drinking water infrastructure in the United States over the next 20 years and about $203 billion over the same period for wastewater infrastructure. The American Water Works Association estimated more than $1 trillion over the next 25 years to maintain and improve the drinking water infrastructure (Maxwell, 2009; Berst, n. d).

Smart Monitoring Technology. Because of the tighter and more stringent water quality regulations the need for better measurement and monitoring technologies is becoming greater. The opportunity is for SMES either individually or in joint ventures with other entrepreneurs to

establish businesses that provide a wide variety of instruments, equipment and systems that will more accurately and efficiently track water volume, consumption, and conservation habits, e.g. broader use of water meters in individual homes. There is also need for in source water applications and ultrasonic devices which are increasingly used to measure flow rates of rivers and streams (Maxwell, 2009, p. 18). Other opportunities exist to develop and commercialize technologies for monitoring contaminants that are difficult to detect. Electronic instruments, such as, pressure and acoustic sensors with wireless connection wirelessly to a centralized and cloud-based monitoring systems will allow companies to detect and pinpoint leaks much quicker (IntertradeIreland, 2008).

Some efforts are also being made to develop the smart water grid technology which includes smart water meters, electromagnetic and acoustic sensors, and instrumentation that gather and present more accurate and real time water system data. Smart water grid technology also include the management software, real time data analysis and modeling software that analyze the data to address non-revenue water and predict potential problems based on location, time and weather, and historical events. There are opportunities for SMEs to further develop some of these technologies and take them to market to provide more accurate real-time data to increase energy efficiency and reduce costs (IntertradeIreland, 2008).

Entrepreneurial Opportunities in Water Reuse/Industrial Water Reuse Technology

Water Reuse Technology. Indirect reuse of treated wastewater is one of the growth areas in the water business. Water reuse and the use of unclaimed water are used widely in the United States and increasing. It is estimated that nationally about 2.5 billion gallons per day of treated wastewater is reused in the United States and the reuse volume is growing by an estimated 15% per year (Environmental Protection Agency, 2012; Bosna, 2013).

There is strong need for technologies and approaches to substantially increase water reuse and reduce pollution and energy use. Public utilities and the industrial sector are seeking ways to implement environmentally friendly and economically feasible solutions to conserve water resources while meeting water demands (Bosna, 2013, pg. 31).

The opportunity is for SMEs to develop and commercialize technologies which can remove contaminants from wastewater and at the same time make the material less harmful, increase its range of applications and increase its value. The opportunity includes SMEs establishing businesses to provide the technologies and processes across the value chain. (IntertradeIreland, 2008). Opportunities also exist for new technologies to transform wastewater into a resource for energy generation and a source of drinking water. Modular hybrid activated sludge digesters, for instance, are now removing nutrients to be used as fertilizers and are, in turn, driving down the energy required for treatment by up to half.

Mobile and Temporary Water Treatment Services. There is an increased demand for highly mobile water treatment facilities, especially in case of emergencies, scheduled maintenance to existing systems, and as an alternative to conventional water treatment system (Global Water Intelligence, 2013). Because of the Investments that are being made, there are opportunities for entrepreneurs providing technologies to treat high volumes of water to extract gas and inject it into the subsurface. As these technologies develop and we learn how to treat high

volumes of water, there will be cheaper, more potable treatment systems and more mobile water treatment facilities (Henley, 2013).

Nutrients Recovery and Removal. Monitoring and removal of contaminants will be a major concern in the United States water technology market in the coming years. These contaminants are found in both untreated and fully treated water and wastewater. Examples are pharmaceuticals, personal care products, pesticides, artificial chemicals, toxins as well as other metals and materials, such as, thermoplastics, ammonia, hydrogen, etc. Because of the need to reduce any nutrient pollution in surface and drinking water, there is a need for technologies to monitor and remove these contaminants from both drinking water and wastewater. There is also need for improved disinfection techniques for water and wastewater treatment processes. Many utilities are moving away from only chlorine disinfection to other techniques such as ultraviolet radiation systems in combination with chlora mines, electro-chlorination and biological infiltration. There are huge opportunities for entrepreneurs to establish businesses to supply these water treatment chemicals (Bosnia, 2013, pg. 33 & 36).

Storm water Management Tools. Sewer overflows from the heavy rains and the aging wastewater management systems are causing a serious threat to surface and ground water quality. As a result, there is need for SMEs to develop technologies for better storm water management, e.g. recharge basins, rapid infiltration beds and green infrastructure such as, green roofs, rain gardens, infiltration and bio-retention systems to capture and retain storm water (Bosna, 2013, pg.33)..

Intelligent Irrigation. This opportunity relates to technologies used to minimize over-watering and wasteful water consumption. There is a significant need for new systems and technologies that will stretch our limited water supplies, save money, reduce energy consumption and improve water quality. Perhaps the area most in need of improvement is agricultural irrigation. Approximately 70% of the world's freshwater is used by the agricultural industry. However, irrigation as it is used today waste large quantities of water. There is need for entrepreneurs to develop new and efficient technologies for the use of water in irrigation (Maxwell, 2009, pg. 16).

Entrepreneurial Opportunities in Waste Management

Smart Waste Collection Technology. The volume of municipal solid waste (MSW) is projected to reach 2.2 billion tons by 2023 and businesses are expected to invest about $42 billion in innovative technologies to help the collection, processing, energy recovery, and disposal of waste (Lawrence and Woods, 2014). Some of the emerging technologies in this space are (1) smarter collection processes enabled by radio frequency identification (RFID) tags and global positioning systems, e.g. the use of sensors into trash bins and containers that will indicate the best time to empty them and help authorities manage the collection routes and reduce logistics costs, (2) advanced processing techniques for recovering materials such as gold, silver, copper, palladium and other metals from electronic waste, (3)new energy recovery techniques, including waste to energy, waste to fuels, and landfill gas recovery options, and (4) improved disposal methods, such as, sanitary landfills, bioreactor landfills and solar integration into landfills. Given this landscape, there are significant opportunities for entrepreneurs to

commercialize some of these technologies and use them across the entire waste management value chain (Clancy, 2014; Lawrence and Woods, 2014).

Smart Energy Recovery Technology. Recently there has been a shift from waste disposal to energy recovery and energy recovery has become the largest segment of the municipal solid waste value chain. Energy Recovery involves diverting waste from landfills to advanced facilities for the production of renewable power or advanced biofuels. The two largest parts of this market are combustion-based WTE infrastructure and landfill Gas Recovery.

Combustion-based WTE technologies (e.g. incineration, biological or gasification) are used to produce electricity. These facilities are more advanced than incinerators and use sophisticated emission control systems to produce electricity. Given the focus on energy recovery and the strategic investments being made in the sector, there are opportunities for SMEs to establish WTE facilities using these technologies (gasification, Pyrolysis and Modular systems) and contribute to the growth of the Energy Recovery sector. Other opportunities exist in the advanced thermal treatment of waste for SMEs to use such technologies as gasification and pyrolysis to produce thermal energy. Gasification technology converts waste to energy (syngas) which can be burned to produce electricity, fertilizers, liquid fuel or substitute national gas (GSTC, n.d.). Pyrolysis technology, on the other hand, is the thermal decomposition of waste to generate electricity (Splainex Ecosystems Ltd n.d).

In addition, opportunities also exist in the area of gas recovery from landfill technology. There is need to develop renewable energy technology to produce a substitute natural gas from renewable resources. The problem is that the most common methods of producing methane gas are anaerobic digestion and gasification, however they require a reliable supply of feedstock which has become very expensive. Therefore, additional sources of carbon and relevant conversion technology are needed to solve the problem. Landfills represent a possible solution because the amount of waste they continuously generate is a good source of carbon. Significant entrepreneurship opportunities exist for entrepreneurs to develop and commercialize this technology that can be used to produce a substitute natural gas (Lawrence and Woods, 2014).

According to EAI (2012), other business opportunities in the waste to energy space include technology providers and fabricators, service technicians, producers and dealers of solid waste RDF pellets. SMEs could also offer services such as, production and sale of processed organic feedstock, power generation and sale of power, technology installers, and transportation and logistics, i.e. transporting solid waste from source to landfill or to processing centers for energy recovery.

Anaerobic Digester Technology. Anaerobic digester, a natural biological treatment process that transforms organic waste into bio-fertilizer and biogas, is also increasing in number. It is a reliable technology for processing waste into biogas which can be used to produce electricity and heat. Biogas can also be used in combined heat and power engines or as a supplement to natural gas. The opportunity involves entrepreneurs establishing anaerobic digester units to capture methane gas from waste and use it to provide electricity and heat for businesses, schools, transportation, etc. There is also need to find new ways of recovering energy from waste, (Gershman, Brickner and Bratton, 2008).

Integration of Solar Technology into Landfills. Some entrepreneurs are already introducing solar technology into landfills covers to generate solar energy. Solar panels are integrated into the landfill cap to generate renewable energy. Significant opportunities exist for entrepreneurs to utilize this technology and even further develop the technology to improve landfill management (Lawrence and Woods, 2014).

Bioreactor Landfill. The landfill introduces bioreactor technology (remote sensors) to increase the biodegradation rate of waste and thus decrease composting time to 5-10 years compared to 30 years or more for the conventional landfill. It provides biogas, which is a renewable energy. With the increased use of renewable energy, and the decline of traditional sources of carbon, there is need for entrepreneurs to leverage this technology by creating startups to provide this technology to conventional landfills. There is also need to find more innovative ways that would convert landfill biomass to electric Energy. (Lawrence and Woods, 2014).

Waste Transfer and Disposal. This opportunity involves SMEs individually or in partnership with larger companies to provide a range of equipment and services. Despite the regulation, landfilling remains an important method of waste disposal and opportunities exist for companies providing equipment, technologies and consulting services for new and existing landfill sites.

Entrepreneurial Opportunities in Solar Energy-Renewable Technologies

Causey, McClain, White and Causey, (2009) in a review of the literature and the trends in entrepreneurship in the solar energy sector identified the following entrepreneurial opportunities:

Photovoltaic (PV) cell Equipment Manufacturing. This opportunity is for entrepreneurs to build and operate plants that produce PV cells. This plant will allow entrepreneurs to provide a variety of services, such as procurement, training, servicing equipment, operating businesses as original equipment manufacturing representatives, and distributing or marketing PV cells from the plant to wholesale and other customers (pg.7).

PV Panel Shipments Distribution. Significant opportunities exist for SMEs to establish and operate distribution businesses that provide supplies for the rapidly growing solar energy market. These businesses will include warehouse product, inventory management, supply chain management, and product support (packaging, handling damaged goods, and other activities (p. 7).

PV Panel Installation. There is need for SMES to start businesses that will provide panels for direct installation in residential or commercial buildings. SMEs may choose from a variety of business models, for example, purchasing panels directly from the utility and then doing the installation, or simply allowing the utility to purchase all equipment and supplies and focusing on installation and service. Some utility companies, including Duke Energy has established an arrangement with entrepreneurs in the North Carolina marketplace which is similar to the second example (Duke Energy, 2009; Causey et al, 2009, p.8).

Conversion to Solar Energy Generation. As we transition from traditional energy sources to solar powered systems to solar powered systems, there will be strong demand for a variety of services within the electrical industry. There will be entrepreneurial opportunities for SMEs to

provide services, such as, installing, replacing, or modifying the equipment and infrastructure. SMEs can also a very important role in helping with the planning and implementing the energy system conversion projects, e.g. right sizing the new system to the old system (p. 8).

According to Van Fechtmann (2013), there also opportunities in solar energy for SMEs to create businesses to (a) sell products and after-market products-a large number of products are manufactured every day and here is need for distributors. There are also products that can be sold to people who already have solar installation (b) sell 3rd party provided services-i.e. services provided by other companies, such as, solar insurance products, solar cleaning, solar financing, etc. (c) provide informational products-there is a strong demand for quality information e.g. research reports, how to ebooks, instructional videos, solar training classes, etc.(d) independent solar consultant, solar appraisal, solar job placement, and solar panel cleaning.

Entrepreneurial Opportunities in Wind Energy

Wind Turbines. Opportunities exist for SMEs to provide wind turbine maintenance, repair, spare parts, etc. to increase reliability of wind turbine system and the success of wind energy projects. Wind turbines are the vital components of the wind farms. These turbines generate the power for converting kinetic Energy of wind to electrical energy. Turbine downtime directly affects its power generations and the project revenues. Wind turbine maintenance is an essential tool to increase profitability and life time of the project (Sudip, 2016).

Installing and Maintaining a Small Wind Electric System. This opportunity involves SMEs establishing a business that provides installing, siting or finding the best location for the system, estimating the system's annual energy output and choosing the current size turbine and tower, and deciding whether to connect the system to the electric grid or not (U.S. Department of Energy, n.d.).

Offshore Wind Technology. Significant opportunities exist for SMEs to develop and deploy offshore wind technology that can capture wind resources off the coast of the US and convert that wind into electricity. Offshore wind resources are abundant, stronger, and blow more consistently than land-based wind resources. This represent a substantial opportunity for SMEs, individually or in collaboration with other entrepreneurs, to develop and commercialize the technology needed to generate electricity. Since 60% of the offshore wind resource is located in areas with deep water where conventional foundations are not practical, there is need for entrepreneurs to develop innovative floating offshore wind platforms, e.g. spar Buoy, tension leg platform, etc. for use in the deep water (U.S. Department of Energy, n.d.).

Distributed Wind Energy System. Wind power is one of the most viable alternatives to reduce dependence on fossil fuels. Wind Power will save 1.5 billion tons of CO2 emissions by 2020. This opportunity relates to small wind turbine technology which has a rated capacity of less than or equal to 100 kilowatts. There is need for SMEs who are wind turbine installers to install the turbines on various sites, including residential, agricultural, commercial, industrial, and community sites. These turbines can range in size from 5 kilowatt turbine at a home to a multi-megawatt turbine at a manufacturing facility (U.S. Department of Energy, n.d.).

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Logistics Support for Wind Power. There are considerable opportunities for transportation providers to serve all sectors of the industry. Modes of transportation for the wind industry include trucking, shipping, and rail freight. A single wind turbine can require up to eight hauls, and for a large project of 150 MW, transportation requirements could be as much as 689 truckloads, 140 railcars, and eight ships (Tremwell and Ozment, 2007 cited in Energy Alternatives India, 2012).

Plant Construction Opportunities. Wind plant construction contractors provide engineering, procurement and construction services, including civil works, laying cables for electrical infrastructure, and installing wind turbines. Over the past decade, a number of construction companies in the United States and other countries have contributed to and benefitted from the wind energy sector growth, and this trend is expected to continue in future as well.

Operation and Maintenance. On the flip side, there are also opportunities for SMEs to provide operations and maintenance services. Operations include scheduling site personnel, observing turbine operation, dealing with equipment failure, and coordinating with the utility to respond to curtailments or outages. Maintenance includes both scheduled (preventive) services, such as periodic equipment inspections, oil and filter changes, calibration of electronic sensors, blade cleaning, and unscheduled services to repair component malfunctions

Insurance Services. There are entrepreneurial opportunities for SMEs specializing in underwriting, loss adjusting and risk engineering wind power projects provide insurance services. These include: Insurance cost estimating, Insurance Brokerage/Risk Management, Contract Review/Analysis/Document Drafting, Underwriting/Marketing, Fire Protection/Property Preservation, Risk Assessment, Life/Safety Risk Control.

Small Wind Turbine Manufacturers. This opportunity relates to Small and midsized companies (SMEs) across the United States to manufacture smaller wind turbines designed for use at the top of office towers and in facilities, such as airports and shopping malls. The small wind turbines, provide energy for houses, small business, or farms, where they can reduce electric bills by approximately 20 per cent (Borchardt, 2011).

Entrepreneurial Opportunities in the Biomass Sector

Bio-Power Facility. In the United States, biomass is already widely utilized as an energy feedstock. In 2005, biomass became the largest source of domestic renewable energy, accounting for nearly 50% of the national renewable energy resources and 10% of domestic renewable electricity capacity (National Research Council, 2010, Pg. 60). Significant opportunities exist for SMES to enter in joint ventures with other entrepreneurs to establish bio-power facilities which are renewable resource of baseload electricity, compared to solar and wind supply which are intermittent amounts of renewable energy.

Biomass or bio-Power plant operates on a lower temperature steam and the fuel is combusted, creating heat to produce high pressure steam, which drives a turbine to produce electricity. These bio-power plants comprise approximately 1100MW of installed electricity in the US representing roughly a quarter of the electricity generated by biomass (Kittler and Beauvais, 2010).

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Combined Heat and Power Technology. Another option for SMEs is the combined Heat and Power Technology (CHP) which is a process for generating electricity while at the same time harnessing useful thermal energy. Combined heat and power systems seeks to harness "waste heat" by integrating thermal energy systems for heating, cooling, or process applications (Environmental Protection Agency 2007). By using CHP technology to provide electricity from biomass, 60-80% of energy efficiency can be improved significantly (p.68). Also, because the CHP system are more efficient and use less fuel than separate processes, the emission profile is less that of systems generating electricity and steam through separate processes (Department of Energy, 2008).

Gasification Technology. There are opportunities for SMES to establish bio-power facilities using gasification technology. Gasification is a thermos-chemical process and the biomass integrated gasification combined cycle systems (BIGCC) is a new and promising biomass utilization technology. Instead of using direct combustion to power a single steam engine, BIGCC uses gasification process to produce "syngas" which is then used to produce electricity. The need is for SMEs to develop partnerships/joint ventures with larger biomass companies to take advantage of this technology. (National Research Council, 2010; IEA 2007; McKendry, 2012; Kittler and Beauvais, 2010).

Feedstock Producers. Several entrepreneurial opportunities exist for farmers and other biomass feedstock producers and collection agents. There are also opportunities in transportation and logistics services which include the operations necessary to move biomass feedstock from the field/forests to processing facilities, weighing services for cargoes, and services for loading biomass into heavy vehicles. It also involves production and distribution of dedicated vehicles for biomass transport, etc. (Energy Alternative India, 2012).

Consulting/Training and Coaching Services. The growing volume of biomass resources production and exploitation requires highly trained personnel from experienced professionals to farmers. The sector provides opportunities for a large number of consultants/coaches to provide expert assistance to biomass businesses. Opportunities also exist for entrepreneurs to provide training and coaching services to the biomass sectors in all areas of the business (Energy Alternative India, 2012).

Biomass Processing. Entrepreneurial opportunities exist for entrepreneurs interested in the owning and operating biomass processing plants. Other opportunities include the production and distribution of machinery and spare parts for raw material conversion, technical maintenance, and construction of biomass processing plants (Energy Alternative India, 2012).

Biomass Anaerobic Digester-interest in biogas continues to grow throughout the US. The EPA has a partnership with the US Department of Agriculture to promote growth of biogas through the AgSTAR Program. Currently there are about 151 on farm digesters and the plan is to increase the use of digesters to at least 1300 by 2020. The AgSTAR program projects that the United States has the potential for 8000 digesters.

Because of the large number of farms and food and dairy processing plants and the large amounts of solid and liquid waste they generate, these facilities are good candidates to utilize anaerobic digesters. The opportunity is for entrepreneurs individually or through public-private partnerships to establish digester units. For example, in 2011, University of Wisconsin Oshkosh

began producing electricity and heat for the campus from about 8000 tons of organic waste generated each year from the cafeteria. Other opportunities could include public/private partnership to build and finance digester project for schools and hospitals, etc. Benefits include methane gas can be directly injected into a natural gas pipeline after filtering and cleaning. Methane can also be used as a fuel for transportation or electricity (Radloff, 2011).

Strategies and Incentives Needed to Stimulate Entrepreneurship in the Environmental Industry

Given the importance of SMEs to the growth of a competitive environmental goods industry and the fact that entrepreneurial opportunities exist for SMES across the industry, what actions are needed to help SMEs take advantage of the entrepreneurial opportunities. According to the World Bank Group (2014), there is an important role for governments, developing agencies, and other public and private sector stakeholders to play in encouraging and supporting SMEs participation in the environmental goods and services industry. The growth of these SMEs are dependent on consistent support to overcome the challenges faced by environmental entrepreneurs.

The following are the areas in which policy makers and other stakeholders should provide support to stimulate SMEs to participate in the environmental goods and services industry.

1. Establish Entrepreneurship and Business Acceleration Program. Entrepreneurship and business acceleration program are designed to help SMEs turn their ideas into viable businesses or to scale up an existing business. The program provides an incubation facility for startups and early stage ventures. Selected businesses are required to complete commercial readiness assessment and will benefit from the use of test facilities, leading engineering and market experts, operators and general business specialists, as well as access to funding sources to help them commercialize their technologies.

   The program also offers a variety of services to owners or potential owners of entrepreneurial businesses including, direct training and capacity building, general financial and managerial skills, Information Technology skills, bookkeeping and tax advisory services, and advisory clinics. It is a one stop shop providing information and training services for would be entrepreneurs and established SMEs (World Bank, 2014).

2. Facilitate Collaboration among SMEs. Establish a program to develop collaborations and networks to assist SMEs in the environmental goods and services sector to share knowledge and experience. By pooling resources and potentially sharing R&D and intellectual property, the cost of technology deployment and access to markets can be reduced. Collaboration and networking among SMEs also facilitate inter-firm cooperation; labor market pooling and technological learning as well as providing a focal point for targeted policy support (McCormick, 1999).

SMES in the environmental goods and services market can also benefit from partnership with large firms corporations and industry groups. The government could help in arranging and promoting these partnerships. Such partnerships are beneficial to SMEs, in terms of access to technology, know-how, experience, knowledge of market, and access to information. At the same time, these partnerships are also beneficial to large companies because SMEs represent an entrée to local markets. Thus, partnerships with industry groups and/or corporations give SMEs varied opportunities, including access to network and contacts through which they can develop new businesses, as well as acquire training, technology and information (Leal, 2006, p. 169).

Collaborations between the government and the private sector can also support and stimulate the participation of the SMEs in the environmental goods and services market. This collaboration support the creation and sharing of technical knowledge among SMEs, while building upon the existing entrepreneurial culture. They can also help by sharing sources of financing and intellectual property sharing and finance the demonstration of complex technologies that have strategic transformative value. These benefits are achieved through education and capacity building, protection for intellectual property, and the provision of economic resources and legal services needed for the commercialization of technology (Work Bank, 2014, Pg. 73).

Finally, facilitate collaboration and networking among SMES and innovation intermediaries. An innovation intermediary is an organization which acts as an agent or broker on any aspect of the innovation process between two or more parties (Howells, 2006, p. 172). Some of the different types of intermediaries are governments and local authorities, NGOs, Universities, industry associations and consultants. This collaboration help SMES acquire knowledge outside their own organization boundaries (Clark and Roome, 1999) and as such SMEs gain access to direct assistance , e.g. advice on funding sources, advice on business operations, identification of potential collaborators, etc. which supplement the SMEs resources and can lead to a startup in the environmental industry (klewitz, Zeyen and Hansen, 2012).

3. Provide High Quality Information. High quality information is essential to encouraging and stimulating SMES participation in the environmental goods and services industry. Environmental innovation involve highly technical operations, and as such, very little can be accomplished without reliable information about the nature and extent of the problems, the range of solutions available, the costs, and how to minimize them (Banks and Heaton, 1995). Leal (2006) suggested the establishment of an information system to make it possible to evaluate the market and provide sectoral assessments, especially regarding the fastest growing niches. The data should make it possible to identify the growth trends, investments needs, and barriers to the entry of new firms in each segment. According to Cohen and Levinthal (1990), successful SMEs recognize opportunities that others do not see because they have better access to information

about the existence of the opportunities. Hermann (2011) also states that information availability help the entrepreneur get closer to the opportunity i.e. where the market changes are and what is needed to access them. Cleary, the provision of reliable information directly to the potential entrepreneur is a key factor in helping them make the starting decision (Schnick, Marxen & Freiman 2002).

4. Increase Access to Financing. Access to financing is critical for SMEs in the environmental goods and services industry to meet the cost of technical development and startup. Several studies have identified access to financing as the most significant barrier to SMES taking advantage of the entrepreneurial opportunities in the environmental goods and services market. The difficulty associated with accurate pricing, the relative risk of the investment, and the lack of history or track record of success among other reasons make it more difficulty for SMEs to obtain financing than it is for established firms (OECD, 2011). To stimulate the participation of new and existing SMEs in the environmental goods and services market, there is need for governments and investors to provide funding to bolster private sector lending to SMEs in the Environmental goods and services sector. These could include soft loans which are state subsidized loans on preferred terms, such as, less than market interest rates, more flexible collateral and repayment conditions and loan guarantees supported by state funds. Another way to strengthen financial support for SMES is for the investment community to develop relationship with SMEs and provide information about seed and venture capital and the various financial incentives available, e.g. subsidies, tax credits and grants. (OECD, 2008, OCED, 2011). There is also need for technology specific consumer credit facilities which would be particularly useful for technologies that require high upfront investments, such as renewable energy system (World Bank, 2014).

5. Market Development. A strong demand for new environmental products, technologies and services is a major driver of environmental innovation. There are a variety of actions that would increase demand for the environmental goods and services from SMEs and facilitate the overall growth of the environmental goods and services market. According to the World Bank Group (2014) there are several things the government can do to stimulate demand of environmental products and services. Regulatory policies that are strong predictable and clear will encourage environmental innovation. The regulation must discriminate in favor of new technologies rather than prolong the status quo. For example, reducing the reliance on available technology as the measure by which pollution control standards are set and looking instead to improve future capabilities (Banks and Heaton, 1995, pg.3).
   Product testing and Certification sometimes referred to as technology certification and validations will also increase market demand for environmental goods and services. The government through its standards Institute will evaluate the effectiveness of the new technology and certifies its compliance with the standards. It is a one-time scientific and technical evaluation as well as a regulatory certification of the technology. This

product testing and certification ensure quality control and reduces any uncertainty around the new technology and increases its acceptance. The certification is a third party validation of the technology which is critical to the EPA and purchasers of the innovative technology.

Similarly, management standards and product labelling are potentially powerful means to drive market demand for environmental goods and services. These are government imposed standards for the purchase or manufacture of appliances that must meet certain environmental performance. This action is most effective with consumer goods such as appliances. For example, government imposed standards for energy efficiency in buildings are important to drive demand for clean technologies that are likely to be supplied by SMEs. The Energy Star standard is the most successful label for energy efficient consumer goods which offers efficiencies about U.S. federal standards and has been adapted by EU and most OECD countries (World Bank Group, 2014, pg. 97).

Large organizations, whether they are private corporations or government departments have an important role to play in driving demand for environmental goods and services by mandating sustainable procurement policies (World Bank Group, 2014). Through the introduction of sustainability criteria into public procurement decisions, the government can stimulate the development and use of more environmentally-friendly technologies. The strategy should address responsibilities, resources, and monitoring and evaluation procedures. The goal should be significantly increasing the amount of green products and services purchased by the government (Ambachtsheer, Charest, Ksowski, Mitschele and Nielson, 2007).

Finally, there are various other "soft" interventions that government and NGOs can pursue to promote environmental goods and services. These include education programs through all levels of the system to raise consciousness and build capabilities and also competitions among SMEs, organizations, and municipalities based on production or consumption of clean technology (World Bank Group, 2014).

6. Technology Development-Facilitate Technology Development. Assisting SMES with the technical aspects of developing innovative products is part of the critical support needed to encourage their participation in the environmental goods and services sector. According to the World Bank Group (2014), these could include the following:
R&D Tax Credits which are various forms of tax exemptions or reductions granted to SMEs that are taking advantage of entrepreneurial opportunities in the environmental goods and services market. (World Bank Group, 2014).
Research Grants which are provided by the government for SMEs to conduct R&D in a specific area or application. The grants are awarded on a competitive basis to provide funding to early stage business and innovation ideas that are too high risk for private investors, e.g. ideas spinoff from university based research.

Publicly Funded Competitive Research Collaborations involve several SMEs with research and innovation projects collaborating to address a specific cross boundary problem. The SMEs combine research and innovation projects are funded by the government to achieve a faster rate of technology commercialization (World Bank Group, 2014, pg. 101). These collaborations are also demonstration projects funded by the government to demonstrate feasibility of near or far from market technologies.

Competitions which are mostly organized by government agencies to incentivize the invention of technologies. They may be designed as either open competitions based on the merit of the idea or to address specific technical problems or targets and offer a significant prize money. Competitions stimulate technical innovations in specific areas and help SMEs with the technical aspects of developing their product/technology (World Bank Group, 2014, pg. 102).

Conclusions and Recommendations

This section presents the conclusions and recommendations:

- Environmental goods and services has been playing a leading role in the shift to the green economy and in achieving the goal of economic sustainability.
- The United States and global environmental goods and services market have grown rapidly. This rapid growth has significantly increase entrepreneurial for SMEs. Several factors contributed to the increase growth, including environmental policy and regulations, financial and economic drivers, and emerging market trends, such as carbon and climate change mitigation and energy efficiency and renewable energy generation.
- SMEs must play a more prominent role in solving environmental problems for SMES by creating more environmentally friendly goods and services.
- Government action, e.g. polices and strategies are needed to stimulate and encourage SMEs to take advantage of the entrepreneurial opportunities.
- Better collaboration is needed among SMEs and between SMEs and large firms. This sharing of knowledge and experiences increase access to technology, information and markets. Increased collaboration between government and the private sector is also needed to stimulate SMEs participation in the environmental goods and services market.
- Some of the practical actions that the government can take to help SMEs in the environmental goods and services industry include, establishing an entrepreneurship and business acceleration program, increase access to financing, stimulate demand with regulatory policies, product testing and certification, among others.
- There is a significant trade deficit in the environmental goods and services market with imports exceeding exports. SMES should plan to meet the growing demand by producing high quality environmental goods to replace the imported ones.
- Soft interventions, such as education programs and competitions are used to promote environmental goods and services. Better collaboration between SMEs, government, and education institutions is needed to encourage universities to conduct more research into environmental goods and services industry and to create greater awareness of the

entrepreneurial opportunities in the rapidly growing environmental goods and services market.

References

Alvarez, S. A., & Barney, J. B. (2007). Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal,* 1(1-2): 11-26.

Ambachtsheer, J., Charest, C., Kasowski, B., Mitschele, J., & Nielson, R. (2007). *Capitalizing on green: Fostering Canada's Cleantech entrepreneurs.* Action Canada, Retrieved from http://www.actioncanada.ca/wp-content/uploads/2014/04/cleantech-0607.pdf

Banks, R. D. & Heaton, G. R. (1995). An innovation – driven environment policy. *Issues in Science and Technology*, 12(1), 43-48.

Barney, J. B. (2002). *Gaining and sustaining competitive advantage*. Upper saddle River, New Jersey: Prentice Hall.

Berst, J. (N. D). Patching up pipes: How smart technologies help cities prevent leaks and save money. Retrieved from:
http://www.waterworld.com/articles/print/volume-30/issue-7/editorial-features/patching-up-the-pipes-how-smart-technologies-help-cities-prevent-leaks-and-save-money.html

Borchardt, J. K. (2011). Small wind turbine manufacturers set up shop across the country. Retreived from
http://www.areadevelopment.com/EnergyEnvironment/Fall2011/United-States-wind-turbine-manufacturers-733219.shtml.

Bosna, M. A. (2013). *The water technology sector in the United States*, Netherlands office of science and technology, Royal Netherlands Embassy, Washington, D.C.

Bucher, H., Drake-Brockman., J., Kasterine, A., & Sugathan, M. (2014). *Trade in environmental goods and services: Opportunities and challenges.* International Trade Center Technical Paper, Geneva: Switzerland.

Causey, D., McClain, V. L., White, M. M., & Causey, D. (2009). Entrepreneurship opportunities in the solar industry. *Proceedings of the 35th Annual Conference*, *Association for Small Business and Entrepreneurship*, San Antonio, Texas.

Catulli, M. (2008). *Greening businesses: Update on the environmental goods and services industry in the United Kingdom*. The University of Hertfordshire, Hertfordshire: United Kingdom.

Clancy, H. (2014). *$42 billion for smarter waste management*. Forbes, Retrieved from
http://www.forbes.com/sites/heatherclancy/2014/09/29/42-billion-for-smarter-waste-management/#38cc6b1f221a

Clark, S. & Roome, N. (1999). Sustainable business: Learning action networks as organization assets. *Business Strategy and the Environment*, 8(5), 296-310.

Cohen, W. M. & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 36(1), 128-152.

Dooley, E. E. (2004). EHPnet: Environmental Technology opportunities portal. *National Health Perspectives*, Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1247532/

Duke Energy. (2009). *North Carolina Solar PV Distributed Generation Program*. Retrieved from http://www.duke-energy.com/nc-solar-panel/nc-solar-distributed-generation-program.asp

Drexhage, J. & Murphy, D. (2010). *Sustainable development*: *From Brundtland to Rio 2012.* International Institute for Sustainable Development, United Nations Headquarters, New York.

Drucker, P. (1985). *Innovation and entrepreneurship: Practice and Principles*. New York: Harper and Row.

Eco Canada. (2010). *Canadian environmental sector trends: Labor Market study*, Government of Canada's Sector Council Program, Alberta, Canada

Energy Alternatives India. (2012). *Business opportunities in the biomass energy sector*, Chennai, India

Energy Alternatives India (2012). *Wind energy business opportunities in India*, Chennai, India.

Environmental Protection Agency. (2012). *Guidelines for water reuse*. Office of water, Washington, D.C

Environmental Business International, Inc. (2015). Report 2020B: The U.S. Environmental Industry Overview, an executive summary. *Environmental Business International, San Diego, California*.

Environmental Business International. (2012). Strategic information for a changing industry. *Environmental Business Journal*, 25(6/7).

European Commission. (1994). *Eco-industries in the EC*, in panorama of European Community industry 94, Brussels: Belgium.

Gaglio, C. & Katz, J. (2001). The psychological basis of opportunity identification: Entrepreneurial alertness. *Journal of Small Business Economics*. 16(2), 95-111.

Gasification and Syngas Technologies Council (n.d.). Waste to energy gasification. Retrieved from
http://www.gasification-syngas.org/applications/waste-to-energy-gasification/

Gershman, Brickner & Bratton, Inc. (2008). *Alternative waste processing technologies assessment*. Gershman, Brickner, and Bratton, Inc, Fairfax: Virginia.

Global Water Intelligence. (2013). *Water and Power: Opportunities in water* and *wastewater treatment for tomorrow's energy needs*. Oxford: England.

Hamwey, R., Hoffman, U., Vikhlyaev, A. & Vossenaar, R. (2003). Liberalization of international trade in environmental goods and services. *Sub-Regional brainstorming workshop on the trade and environmental issues contained in paragraph 31 and 32 of the WTO Doha Ministerial Declaration*, July 30-August 1, 2003, Bangkok, Division of international trade in goods and services and commodities, UNCTAD secretariat

Henley, W. (2013). The new water technologies that could save the planet. *Guardian Sustainable Business*, Retrieved from
https://www.theguardian.com/sustainable-business/new-water-technologies-save-planet.

Hermann, R. R. (2011). *Cleaner shipping drivers as ecopreneurial opportunities* (Master's Thesis). Environmental studies, Aaborg University, Denmark. Retrieved from

http://projekter.aau.dk/projekter/files/52822263/2011_EM10_Roberto_Rivas_Herman n.pdf

Holcombe, R. G. (2003). The origins of entrepreneurial opportunities. *The Review of Austrian Economics*, 16(1), 25-43.

Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy*, 35, 715-728.

Ingersoll, D., Foreso, C., Hughes, R., Land, E., Lusi, S., Mata, R., Moller, R., Polly, L & Shildneck, A. (1995). *Global competitiveness of U.S. Environmental technology industries: Municipal and industrial water and wastewater*. U.S. International Trade Commission, Washington, D.C.

International Energy Agency. (2007). IEA Technology Essentials: Biomass for Power Generation and CHP. *IEA Energy Technology Essentials*. IEA, Paris: France.

International Trade Administration. (N.D). *SelectUSA*. Department of Commerce, Washington, D.C.

IntertradeIreland. (2008). *Environmental goods and services sector in the island of Ireland: Enterprise Opportunities and Policy implications*. IntertradeIreland, Ireland.

Iseley, T. & Hromadka, E. (2013). *Indianapolis Smart Water Grid Pilot Project demonstrates local solution for National Sustainable Infrastructure problem*. Global Water Technologies, Indianapolis: Indiana.

Jackson, F. (2008). The future of WTE: The new Waste-to-energy developments that will change the industry. *Waste Management World*. Retrieved from
https://waste-management-world.com/a/the-future-of-wte-the-new-waste-to-energy-developments-that-will-change-the-industry

Kirzer, I. (1973). *Competition and entrepreneurship*. Chicago and London: University of Chicago Press.

Kittler, B. A. and Beauvais, C. M. (2010). *The potential for sustainable wood-based bio-energy in Maryland.* Pinchot Institute for Conservation, Baltimore, Maryland.

Klewitz, J., Zeyen, A., & Hansen, E. G. (2012). Intermediaries driving eco-innovation in SMEs: A qualitative investigation. *European Journal of Innovation Management*, 15(4), 442-467.

Lawrence, M. & Woods, E. (2014). *Smart waste: Advanced collection, processing, energy recovery and disposal technologies for the municipal solid waste value chain*: *Global Market Analysis and forecasts*. Navigant Research Report, Boulder: Colorado.

Leal, J. (2006). *SMEs in the environmental goods and services market*: *Identifying areas of opportunities, policies and instruments: Case studies, Argentina, Chile, Columbia and Mexico.* United Nations, Santiago: Chile.

Lendo, E. (2005). *Defining environmental goods and services: A case study of Mexico*. International Centre for Trade and Sustainable Development, Geneva: Switzerland.

Maxwell, S. (2009). *The state of the water industry*. TechKnowledgeY Strategy Group, Boulder: Colorado.

McKeiver, C. & Gadenne, D. (2005) Environmental management system in small and medium businesses. *International Small Business Journal, 23*(5), 513-537.

McKendry, P. (2012). Energy Production from Biomass (Part 2): Conversion Technologies. *Bioresource Technology,* 83(1): 47-54.

McCormick, D. (1999). African enterprises clusters and industrialization: Theory and Reality, World Development, 27(9), 1531-1552.

National Research Council. (2010). *Electricity from renewable resources: Status*, *prospects and impediments*. Panel on Electricity from renewable resources, National Academy of sciences, National Academy of engineering and National Academies Press. Washington, D.C.

Northwest Regional Development Agency. (2010). *Low carbon and environmental* goods *and services sector strategy for England's Northwest*. Renaissance House, Warrington: England.

OECD. (2011). Fostering innovation for green growth, OECD, Paris Cedrex: France.

OECD. (2008). Eco-innovation policies in the United States, Environmental Directorate, OECD, Paris Cedrex: France

OECD. (1999). *The Environmental goods and services industry*: *Manual for data collection and analysis*. Organization for Economic Development Publications, Statistical Office of the European Communities, OECD, Paris Cedrex: France.

OECD. (N.D.). The global environmental goods and services industry, Retrieved from http://www.oecd.org/sti/ind/2090577.pdf

Porter, M. E. (1980). *Competitive Strategy*. New York: The Free Press.

Radloff. G. (2011*). The biogas opportunity in Wisconsin*. Wisconsin Bioenergy Initiative, Madison: Wisconsin.

Schnick, H., Marxen, S., & Freiman, J. (2002). Sustainability issues for startup entrepreneurs. *Greener Management International*, 38(Summer), 59-70.

Schumpeter, J. (1961*). The theory of economic development*. Cambridge, MA: Harvard University Press, New York.

Segurado, J. (2014). *Business opportunities: Discovered or created*. IESE Business School, University of Navaro, Pamplona: Spain. Entrepreneurship Blog Network, posted March 4, 2014.

Sinclair-Desgagne, B. (2008). The environmental goods and services industry. *International Review of Environmental and Resource Economics*, 2(1), 69-99. Retrieved from https://www.uclouvain.be/cps/ucl/doc/core/documents/sinclair2.pd

Splainex Ecosystems Limited (n.d.). Pyrolysis Technology. Retrieved from: http://www.splainex.com/

Stevenson, H. H. and Gumpert, D. E. (1985). The heart of entrepreneurship. *Harvard Business Review*, 63(2), 85-94.

Stilwell, M. (2008). *Advancing the WTO environmental goods negotiation: Options and* opportunities. Ecolomics International, Geneva, Switzerland.

Sudig, S. (2016). *Wind turbine maintenance-Industry survey and new* business *opportunities 2023*. Transparency market research. Retrieved from http://www.evwind.es/2016/04/22/wind-turbine-maintenance-industry-survey-and-new-business-opportunities-2023/56013

Travers, R. (2011). *Environmental goods and services in the ESCWA region*: *Opportunities for small and medium sized enterprises*. Economic and Social Commission for Western Asia (ESCWA), United Nations, New York.

Tremwell, T, & Ozment, S. (2007). Transportation management in the wind industry: problems and solutions facing the shipment of oversized products in the supply chain. University of Arkansas, Supply Chain Management Center.

United States Small Business Administration. (2012). *Frequently asked questions*, Office of Advocacy, Washington: D.C.

United Nations World Commission on Environment and Development. (1987). Our common future: The Brundtland Report, United Nations, Washington, D.C.

United States Office of Energy and Environmental Industries (2010). *Environmental technologies industries: FY 2010 Industry Assessment*. Washington, D.C.

United States Department of Energy. (2008) *Combined Heat and Power: Effective Energy Solutions for a Sustainable Future*. Oak Ridge National Laboratory, Oakridge: Tennessee.

United States Department of Energy. (2011). *Alternatives to traditional transportation fuels 2009*. United States Energy Information Administration, Office of Energy Consumption and Efficiency Statistics, US Department of Energy, Washington D.C.

United States Department of Energy. (n.d.). *Offshore wind research and development*. Office of Energy efficiency and Renewable energy, Washington D.C. Retrieved from http://energy.gov/eere/wind/offshore-wind-research-and-development

United States Department of Energy. (n.d.) *Distributed Wind*. Office of Energy Efficiency and Renewable Energy, Washington, D.C. Retrieved from http://energy.gov/eere/wind/distributed-wind

United States Department of Energy. (n.d.). *Installing and maintaining a small wind electric system*. Office of Energy Efficiency and Renewable Energy, Washington, DC. Retrieved from http://energy.gov/energysaver/installing-and-maintaining-small-wind-electric-system

United States Office of Energy and Environmental Industries. (2010). *Environmental industries: Industry facts*, International Trade Administration, United States Department of Commerce.

United States Office of Energy and Environmental industries. (2010). *The environmental technology industry in the United States: SelectUSA*, International Trade Administration, United States Department of Commerce.

Van Fechtmann, S. (2013). 20 solar business opportunities for you. *Solar Facts and Advice*, Alchemie Limited Inc. Dover: Delaware.

Volery, T. (2002). *Ecopreneurship: Rationale, current issues and future challenges*. In U. Figlisteraller, H. J. Pietner, T. Volery, W. Weber. (Eds). Radical change in the world: Will SMEs soar or crash? St. Gallen: KMU Verlag, pp. 541-553.

Wang, Y. L., Ellinger, A. D., & Wu, Y. C. J. (2013). Entrepreneurial opportunity recognition: An empirical study of R&D Personnel. *Management Decision*, 51(2), 248-266.

World Bank Group. (2014). *Building competitive green industries: the climate and clean technology opportunity for developing countries*. The World Bank, Washington, D.C.