

## Chapter 5. The Green Industry's Potential to Drive Local Innovation in the Manufacturing Sector: Malta a Case Study for a Smart Specialisation Strategy in Eco-innovation

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### Abstract

*The green industry is facing growth due to various economical, social, political and environmental factors. This paper provides the context of innovative technologies within the local manufacturing green industry, in particular those related to renewable energy and energy efficiency. In exploring what constitutes a smart specialisation strategy, a consultation process with key players from different pillars of interest, mainly: Academia, Industry, Government, Political Parties and Public NGOs, was conducted in an effort to identify a range of different perspectives and understandings of such a strategy at a local level. This process was mapped onto a SWOT analysis and Scenario Planning exercise, highlighting the present context of the local green manufacturing industry. This research concluded by drawing on this research to identify a general framework for developing a specialisation strategy and approach for eco-innovation for small countries like Malta.*

### INTRODUCTION

This paper provides an evaluation of the factors stimulating the growth of the green industry and how this impacts on local innovation, particularly in the manufacturing sector in small countries. Governments, under pressure to meet low carbon targets, are seeking to capitalise on the opportunities opening up through the green economy and eco-innovation by designing strategies to stimulate investments in this sector. Such strategies need to be “smart” by building on local capacities and know-how, addressing local priorities and needs and focusing on niche areas of comparative advantage based on specialisation. In exploring what constitutes a smart specialisation strategy, a consultation process with key players was undertaken in an effort to identify a range of different perspectives and understandings of such a strategy at a local level. This research concludes by drawing on this research to identify a general framework for developing a specialisation strategy and approach for eco-innovation for small countries like Malta.

Global demand for natural resources is growing fast, European fish stocks are depleting and the sustenance of forests and soils is being increasingly threatened by climate change. Energy demand is increasing at an alarming rate with an average 1.3 percent growth per year, so leaders are calling for new technology innovations to meet a spike in demand that adhere to Governmental Energy policies. (Shen & Zeng, 2009, p. 27)

The challenge of climate change, security of supply and the culmination of three fundamental world crises (*Financial, Energy and Environmental*) have led to a major shift in global government policy. Due to the ageing infrastructure assets in the developed world and on the other hand an increase in energy demands from new economies, the green industry makes more sense today than ever to policy makers, the industry and consumers alike (Anex, 2000). The Green Industry proposes different innovative solutions in meeting today's and tomorrow's electrical and power demands. It is envisaged that within the next three years the green industry will create over two million jobs in the EU, many of which are within the manufacturing and services industry. Climate change challenges and agreements within the EU and beyond are increasing the pressure for countries to adopt a green agenda, which is undoubtedly resulting in the growth of the green industry. Furthermore, innovation, the creation and adoption of new, cleaner technologies and know-how will provide a means to achieve economic growth together with environmental goals at significantly lower costs (Cassingena Harper & Crehan, 2005. p. 11).

The MANUFUTURE 2004 stressed the “need for the development and implementation of a European manufacturing strategy based on research and innovation which would promote industrial transformation” (from resource-intensive to knowledge-intensive manufacturing), and a shift to innovating clean production based on knowledge and capital.

The key drivers of change affecting the manufacturing industry include:

- The rapid advances in science and technology
- Environmental challenges and sustainability requirements
- Regulatory environment and standards
- Values and public acceptance of technology

Investing in a green economy and having people working in green industries are both politically attractive and economically promising. Governments around the globe have enacted legislation designed to assist green businesses and to ensure that the employers in this industry have access to the workforce. (OECD, 2008) These initiatives include tax credits to biotechnology businesses for employee training and conducting research on the future workforce needs of green industries. The key drivers (political, economical, social and technological) which have contributed directly or indirectly towards the growth of the green industry are identified in *Figure 1*.

## METHODOLOGY

This study made use of a particular form of qualitative interviewing, namely convenience sampling. Forty seven distinct qualitative interviews were undertaken with stakeholders appertaining to five

pillars of interest, namely: Government, Political Parties, Academia, local Industry and non-profit organisations.

Interviewees from the public sector included policy makers, civil servants from the Ministry of Finance, Malta Environment and Planning Authority (MEPA) and members from Malta Council for Science and Technology (MCST) whilst those from political parties included the spokespersons for the environment and/or industry from Partit Nazzjonalista (PN), Partit Laburista (PL) and Alternattiva Demokratika (AD). Interviewees from the Academia pillar included members from the Faculty of Engineering, Faculty of Science, Faculty of Economics, Management and Accounting, Faculty of Arts, Faculty of ICT, Institute for Sustainable Development, The Edward de Bono Institute for the Design and Development of Thinking. Members from the Public pillar included spokespersons from Malta Energy Efficiency and Renewable Energy Association (MERE), Friends of the Earth, National Youth Council, Greenhouse and Żminijietna – Voice of the Left. In the industry section which was the most significant pillar for our research a select group of companies was chosen to represent the local green manufacturing and retail industries operating in Malta. Mainly this pillar is composed of four sub pillars, basically: a) Local companies manufacturing green

**Figure 1: Various forces contributing towards the growth of the green industry**

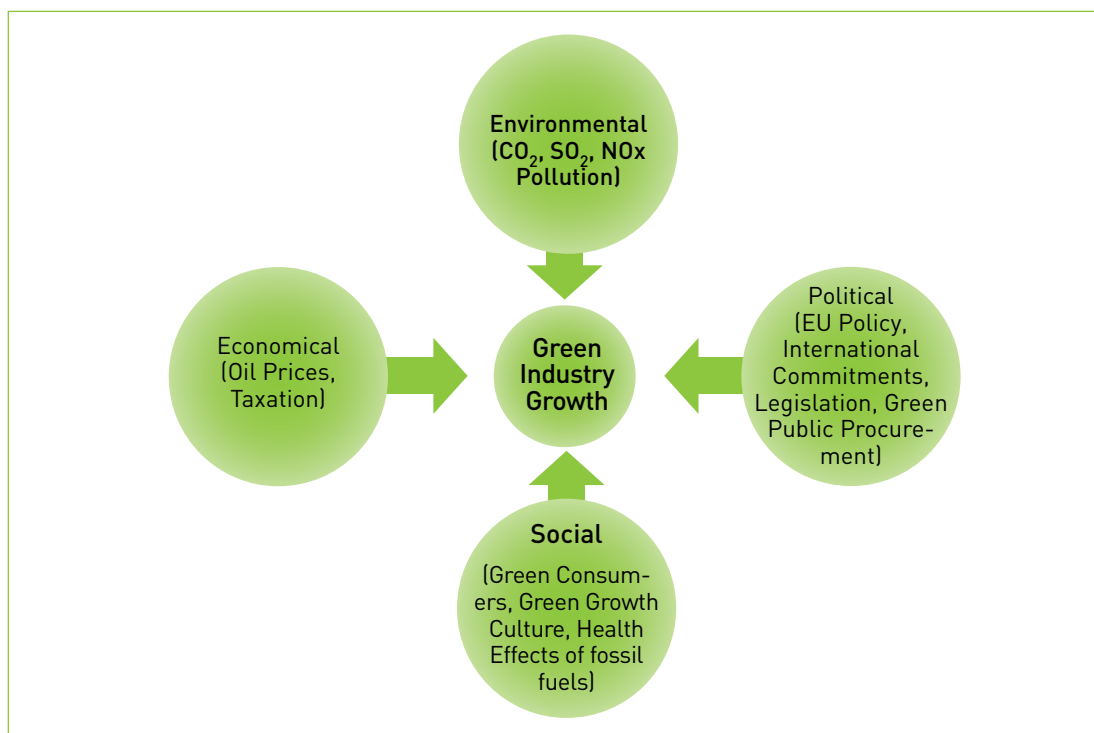
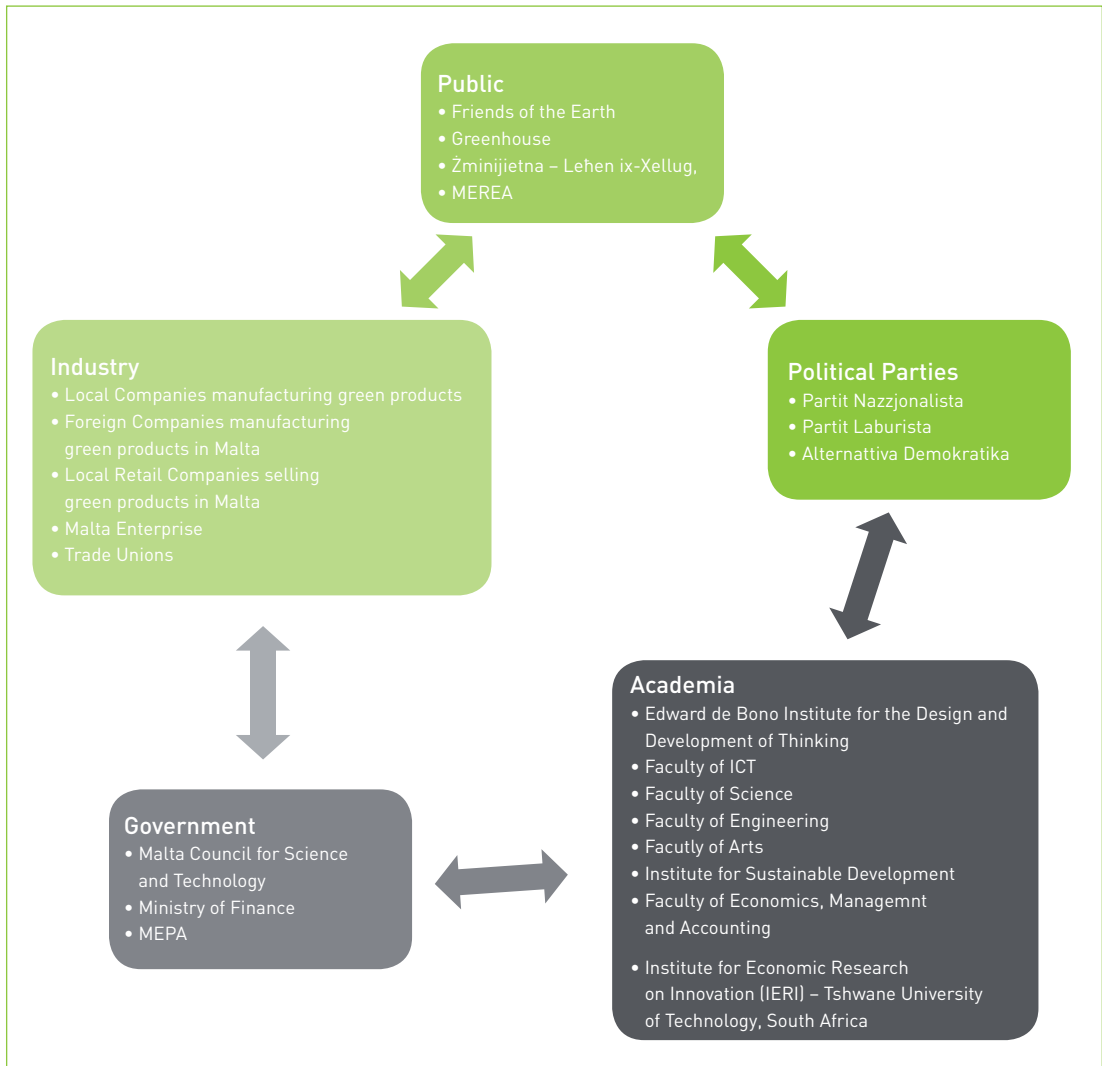


Figure 2: Key drivers that affect Green industry

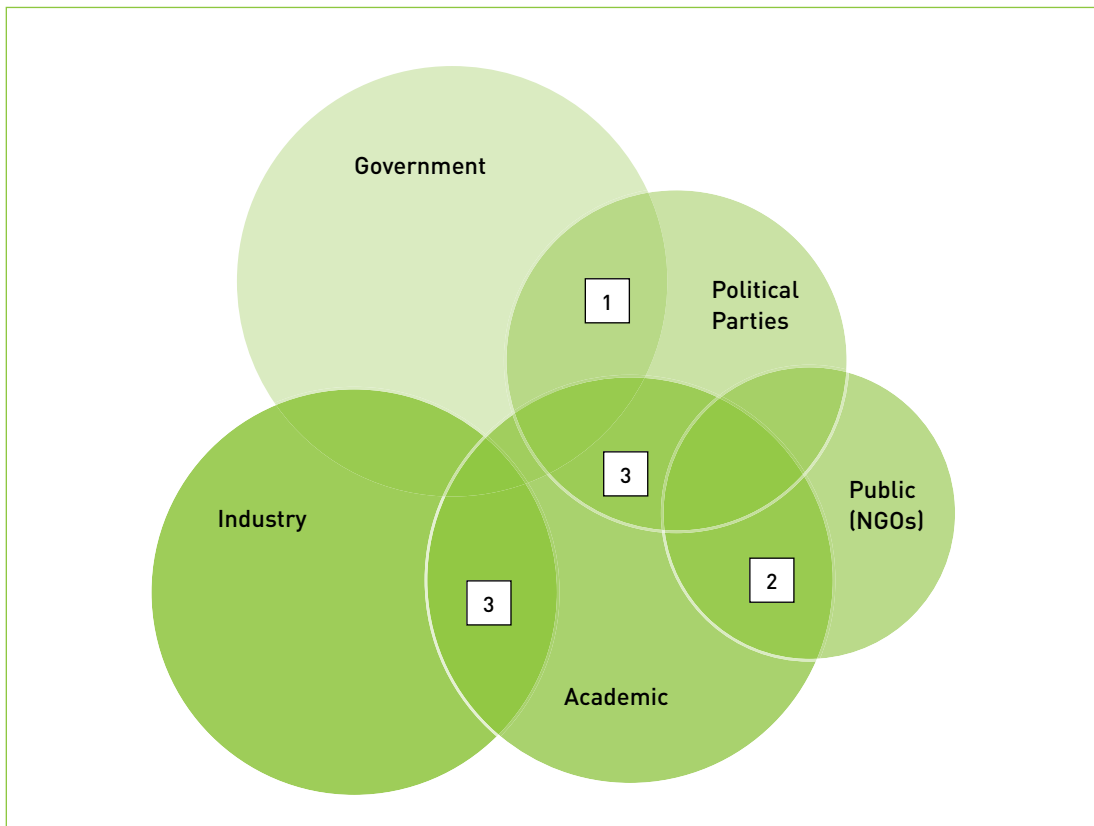


products, b) Foreign companies manufacturing green products in Malta, c) Manufacturing companies currently not producing for the green industry but holding potential, such as the aluminum and sheet metal areas, d) Local retail companies selling green technologies in Malta, such as companies importing and selling solar PV systems.

**A SMALL STATE VERITY: OVERLAP OF ROLES BETWEEN MEMBERS FROM DIFFERENT PILLARS**

The most striking point in a small state such as Malta, is that a number of interviewees tend to play various particular roles within society and thus could fall under various pillars of interest. This phenomenon proved to be highly beneficial for this research since interviewees helped the researcher examine both inter-pillar cohesion and extra-pillar coupling tribulations from different perspectives *Figure 3* depicts the overlap of roles between the five pillars of interest.

Figure 3: A small state verity: Overlap of roles between members from different pillars



This research is contextualised in the theoretical work carried out on smart specialisation and applying it to the small country context in order to define effective strategies in stimulating locally driven eco-innovation. In this process this research draws on the academic fields of innovation policy and entrepreneurship as well on approaches from the study of creativity and foresight.

Smart specialisation bridges with creativity and foresight in terms of how decisions on priority-setting and identifying niche areas are taken. This delicate process includes choosing who is it to be consulted, how and to what end/purpose. Given that eco-innovation needs to be driven by industry, firms should be actively involved and engaged in decisions regarding specialisation. Such decisions need to take account of local existing capacity and how firms are planning to develop and grow in the short, medium and long-term.

## RESEARCH QUESTIONS

The research focused on the following two questions:

- 1) What is smart specialisation strategy in green industry in the context of a small county like Malta?
- 2) What are the particular challenges and advantages of such an approach?

### 1. SWOT Analysis Findings

Addressing these two questions calls for the identification of the factors that are favourable or unfavourable for the growth of green industry in Malta. A SWOT analysis based on the responses of the interviewees taking part in the semi-structured interview which was part of the survey proved to be useful in the identification exercise of these factors. This analysis provides an in-depth understanding of the context for developing a smart specialisation strategy in green industry marking the Strengths, Weaknesses, Opportunities and Threats of various aspects of interest, such as government administration,

policy, educational, social, technological and industry.

### Strengths

- One of the interviewees from the Political cluster explained that Malta enjoys a stable political and regulatory environment.
- The government representative stated that the Maltese government has already introduced the idea of green procurement in various government departments.
- Interviewees representing two of the NGOs remarked that there has been an increase in public and industry awareness on environmental issues.
- Interviewee representing the Manufacturing sector explained that industry standards in Malta are considered very high and are at a par with European levels.
- A representative of Industry remarked that competitive labour market rates provide Malta with a competitive advantage.
- One of the academics remarked that Malta has a strong multi-lingual workforce, being the only EU country (of course apart from UK and the Republic of Ireland) where the English language is one of its official languages.
- Another interviewee from the Academic side explained the positive possibility of a spillover effects from high innovation sectors in Malta such as within the ICT, aviation and advanced micro-technology industries.
- Interviewee from the Government cluster remarked that Malta has an excellent location and facilities for conferencing and research.

### Weaknesses

- One of the NGO's remarked that in general as regards renewable energy, the local government is not meeting EU legislation and targets. Malta seems to be lagging behind in the uptake of alternative energies.
- Lack of relevant statistics and related resources relating to the green industry was highlighted by Resale cluster interviewee. There are few empirical studies related to green industry in Malta. These studies have been commissioned by government to entities such as the Employment and Training Corporation (ETC), Malta Environment and Planning Authority (MEPA) and the University of Malta.
- Resale cluster interviewee highlighted that there exists lack of coordination between gov-

ernment departments. In particular sometimes personnel from a particular government department do not know that a particular scheme or policy by another government entity had been published or is in the pipeline.

- Government and Resale participants remarked that Malta lacks a national green economic policy, that could be instrumental in attracting local and foreign direct investment in this sector.
- Industry interviewee stated that the training grant application process of ETC is very cumbersome and complex.
- An interviewee from the Manufacturing cluster remarked that quality certification of green technologies poses difficulties for local green manufacturing companies. The cost involved in the ISO and eco-labelling certification are considered to be relatively high for firms operating in the Maltese small market economy. Furthermore, EU-Government solar technology grants for consumers require that the products are eco-labelled, making it very difficult for local manufacturers to sell their technologies locally via these schemes.
- Members from the NGO cluster remarked that when compared to other countries, the price of solar technologies in Malta is relatively high. This could be due to possible extra inflation of prices by local importers and due to high transportation costs incurred by importers. Furthermore aspects of the green manufacturing industry are not so green, in particular those related to the manufacture of solar energy technologies, create wastes by-products even though most of these can be recycled.
- Various interviewees remarked that the collaboration between the University of Malta and the local industry is limited.
- Industry interviewee stated that Malta's limited natural resources necessitate that nearly all of the raw materials needed to produce green technologies, have to be imported. Furthermore, manufactured products need to be exported and transported via different transport networks such as road surface and air. This raises the cost of the product, thus making the product less competitive on the international market.
- An interviewee from the Manufacturing sector remarked that lack of raw materials, necessitates that these have to be imported. The fact that finished green technology systems are large in size, necessitates high freight costs for export.

## Opportunities

■ One of the Academic cluster interviewees stated that the Edward de Bono Institute for the Design and Development of Thinking can aid the industry by organising lectures and seminars on the use and practice of various thinking tools, the implementation of idea management systems and the fostering of creativity and innovation in organisations.

■ An interviewee from the Academic cluster remarked that the Institute for Sustainable Development at the University of Malta will soon be launching a website as a hub for information and support mechanisms for the general public, in particular for those in the entrepreneurship world.

■ A representative from the Manufacturing cluster stated that via in-house research they are studying the development of special solar water heaters tailor-made for the particular needs of Maltese population and the features of Malta's climate. Furthermore the same entity is developing a solar water heater that could be fixed with balcony railings. This can be an incentive to a significant number of the Maltese population who live in apartments which provide limited space on their roofs for the installation of solar water heaters.

■ A representative from the manufacturing cluster stated that Maltese companies should try and identify areas that need a high quality input such as manufacture of glass bulbs used in UV water filters for water recycling which are currently being produced in Malta.

## Threats

■ A member from the NGO cluster commented that in the field of science and technology Malta is suffering from a brain drain as a substantial number of qualified persons specialising in these areas of study, due to better pay and prospects in other countries, are going abroad to seek employment.

■ Member of the Government cluster remarked that sometimes the Maltese government is forced to recruit foreigners to make up for the shortages in the area of renewable energy and environmental policy. The snag is that these foreigners sometimes fail to adapt and attune their expertise to the requirements of Malta's micro state status. One of the Industry cluster interviewees explained that Malta has limited physical space for the installation of renewable technology products. The demolition of terraced houses to make space for blocks of apartments with a penthouse on the roof is aggravating this problem.

## 2. The Context: Various Eco-innovation Manufacture facets within the local Green Industry

The research has helped identify various facets for eco-innovation within the local green industry, in particular within the wind and solar renewable energy and water heating systems.

### Wind Energy

There are various components of wind turbine systems which can be manufactured or assembled locally. One particular case is the transmission system, which even though it might be difficult to manufacture from scratch, local companies could assemble the transmission system tailored to particular systems and design. At present there are companies in Malta that manufacture generators, which however do not operate on wind turbines. Local companies that manufacture generators can move into manufacturing generators of wind turbines. Furthermore, there is a niche market of wind turbine electronics such as switches. The blades of wind turbines are manufactured either from fibre glass or from wood. In Malta we have a number of industries manufacturing fibre glass products which could be interested in manufacturing the blades for the wind turbines

### Solar Water Heaters

Currently in Malta at least one company is already producing solar water heater tanks of stainless steel selling the full stainless steel model and the stainless steel glass lined models. Whilst stainless steel is considered as a weaker substitute to glass, stainless steel tanks are considered to be high quality products, and very durable. This area is of medium to high value added, with most of the production process needing high skilled labour input. Stainless steel tanks have the potential of being the main locally manufactured component of exporting solar water heater systems made and assembled in Malta. Solar water heater stands are currently being manufactured in Malta, mostly from aluminum. The numerous local companies in the area of sheet metal, stainless steel and aluminum can serve as a support base for the manufacturing of solar water heater stands and frames.

Solar Water Heater assembly also presents various possibilities, even though this operation is of limited value added. EU experience has shown

that the assembly of green technologies could possibly lead to the development of supporting industries and also aids in attracting horizontal integration. Furthermore the assembly of solar water heaters can be induced in Malta by the introduction of *do it yourself* assembly kits of these technologies, as happened in other EU countries.

### Photo voltaic (PV) systems

There are various facets and sectors related to the manufacture of photo voltaic systems. As discussed earlier this area includes high value added sectors which with its high demand, makes it potential for growth. Currently in Malta there is at least one foreign owned company that produces products that are used in the manufacture of PV systems. In particular this company produces semi conductor tubes that are used for lamps in the sterilisation process when manufacturing silicon PV chips. This area is high value added demanding high quality skilled labour input, with a medium level of automation. However, as is the case with the semi-conductor chip industry all the raw materials for this productive sector have to be imported. When compared to the semi conductor chip industry, PV cells are of less value added nature since they are much less complicated and thus require less expertise, capital and skill. The economics of feasibility make it difficult to be competitive in a sector which has been well exploited by other countries. In this context the most feasible solution for the manufacture of PV systems in Malta will be to group with an established European company to set up a plant in Malta. This has been successfully achieved lately in Sicily. The advantage of this initiative is that the foreign entity will bring its expertise to Malta together with the direct investment that is needed for such a venture. Furthermore the end product will be branded. In this way the foreign partner will use its established market, and thus will use Malta to ship to countries preferably within the Mediterranean region.

As regards physical space for PV plants to achieve economical feasibility a large enterprise would be necessary. A plant in the Bulebel or Marsa industrial estate region will possibly suffice. Whilst this plant could also serve the local population, it must focus on exports.

## 3. Green Specialisation Framework Strategy

Having formulated a green specialisation general framework strategy for small countries like Malta based upon the previous sections of this study, the following section tries to design a smart specialisation strategy in the green industry for small countries which would be relevant to and applicable in the context of a small country like Malta. Although the context is a small country within the EU, the general strategy can also be applied to small countries in other continents.

### 3.1 Formulation of a green Technology policy

Countries selecting the green industry as a specialisation area should formulate a green technology policy. The aim for this policy is to effectively direct investment, research and innovation towards this area. Furthermore a strategic committee should be responsible for the holistic implementation and materialisation of the green technology policy. For this to have full political support it would be a good idea if the respective minister would head the main strategic committee, together with local and possibly foreign sector experts. This will ensure that the policy is being given its due importance and effective measures are being implemented.

### 3.2 Reduction of high compliance cost regulation

Industry compliance regulation at times entails high and rising costs, increasing the difficulties for local manufactures. This must be seen in the context that manufacturers within small countries have limited economies of scale. This may lead firms to be conservative in their approach. Such an approach tends to leave little room for eco-innovation, since each time innovation is implemented at a large scale, compliance related costs increase exponentially. In this context regulation that is reaping little or no benefits, together with compliance regulation entailing high operating costs should be removed and lightened in order to make space for a more innovative entrepreneurship climate. This is particularly true for areas supporting the green industry, such as regulation related to VAT departments, environmental and industry related authorities and entities.

### 3.3 Government green procurement

Governments of small countries can continue aiding and supporting the green industry by increasing green procurement amongst their various departments and authorities. As purchasers, public authorities have huge buying power and there is enormous scope for them to influence suppliers to innovate and produce more environmentally friendly goods and services. Furthermore, the government has the potential to persuade private sector companies and the general public to change their consumption habits, and thus help the green industry grow. This initiative can make use of the EU GPP training toolkit.

### 3.4 Creation of Green cluster Industrial Park (Green Park)

Governments of small countries should select a physical area for the re-development of an industrial park dedicated to the research, development and innovation of green related technologies and energy efficiency. The green park could be administered by a government's authority and leased at sub-commercial competitive rates for manufacturing, assembly, maintenance, consultancy and research and innovation oriented purposes. Whilst helping in the creation of jobs and the development of technical skills this park will indirectly help supporting industries as well as helping in the spillage of green, technical and manufacturing skills into adjacent areas.

### 3.5 Fellowships for technology and policy research related to green manufacturing

Government should classify research on green technologies, the environment and environmental policy as priority areas when it comes to student scholarships and support. Supporting students and academic institutions financially when carrying out studies at Masters and PhD level in this area will help move research towards the green direction.

### 3.6 Careers Fair on Green Manufacturing

Governments in collaboration with the industry could organise a yearly green manufacturing careers' fair. The aim of this fair will be to dis-

play possible vacancies and careers within the green manufacturing technology fields and other related areas. Possible careers will be those related to solar and wind technology engineering, ICT, maintenance and installation, high precision engineering, aqua marine culture, energy efficiency research and eco-innovation. This fair will be the initiative of the government in full collaboration with industry stakeholders. The fair will enable the local and international green related entities, to advertise their products, inform the public and increase and develop contacts.

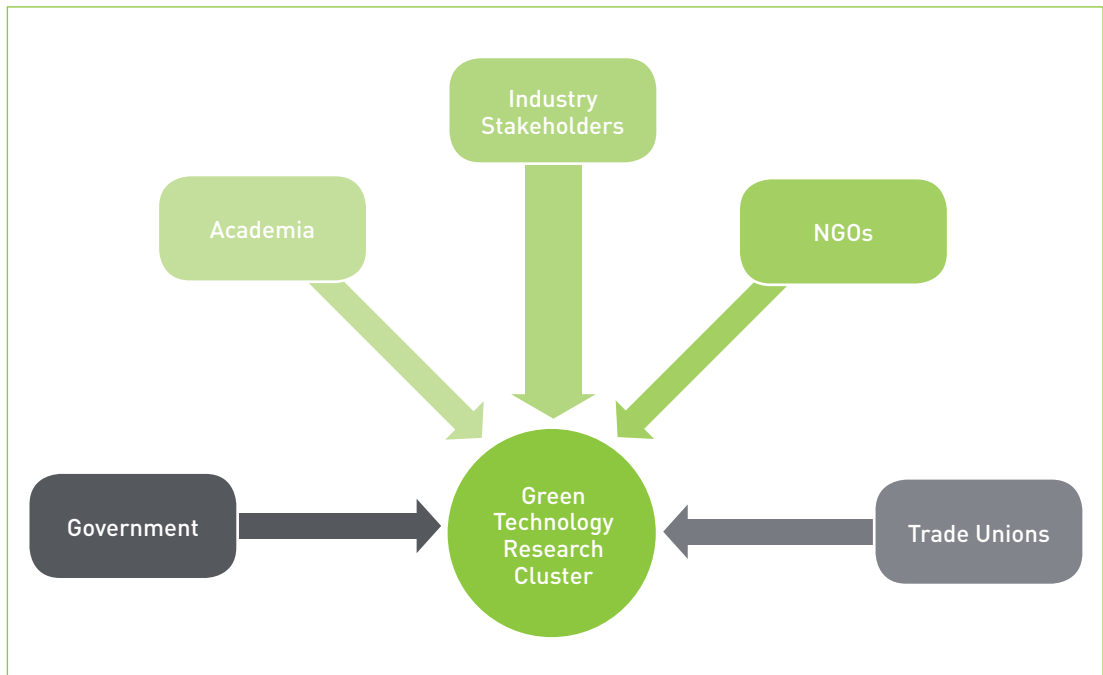
### 3.7 The Green Industry as one of the pillars for National branding

National branding is deemed fundamental in ensuring that green technology specialised countries are appropriately positioned in the markets which are being targeted. This could also be achieved by linking specific brands of products and services within the green industry to the national brand.

### 3.8 Formation of a green technology research cluster

Governments should be responsible for aiding the grouping and development of a local green technology research cluster. This consortium will comprise government officials, academics, NGOs representatives and industry stakeholders. The main aim of this unit will be research, development, innovation and commercialisation of green technologies. The cluster will also be able to make alliances with international industry research groups to study, develop and commercialize green technologies. Trade unions can also give a valid contribution by forming part of the cluster. Figure 4 depicts the formulation of a green technology research cluster, the arrows pointing from the consortia to the cluster represent the effort and input from the respective entities. The arrow width represents the foreseen relative effort and input needed from each of the entities. Trade Unions could also contribute to this research cluster by providing training, premises, labour and project development together with labour representation. Furthermore, it would be a good idea if countries would disseminate knowledge by participating in existing wider international clusters.

Figure 4: Composition of a Green Technology Research Cluster



### 3.9 Public Awareness via NGOs

Governments should support NGOs, in particular environmental ones, wishing to organise educational activities relating to green technologies. Governments can introduce schemes whereby printed material and other equipment used for public awareness on green technologies will be partially or fully financed by the government. Empowering the public by strengthening their belief that they are making a difference through NGOs could be an important element of a successful green educational strategy. Upbeat and positive messages that educate consumers could further be used to create this sense of empowerment. To make the system fully feasible, governments can issue tenders for the printing of published material, whereby organisations will get their published material printed via government selected third parties.

### 3.10. Technical green skills and know how

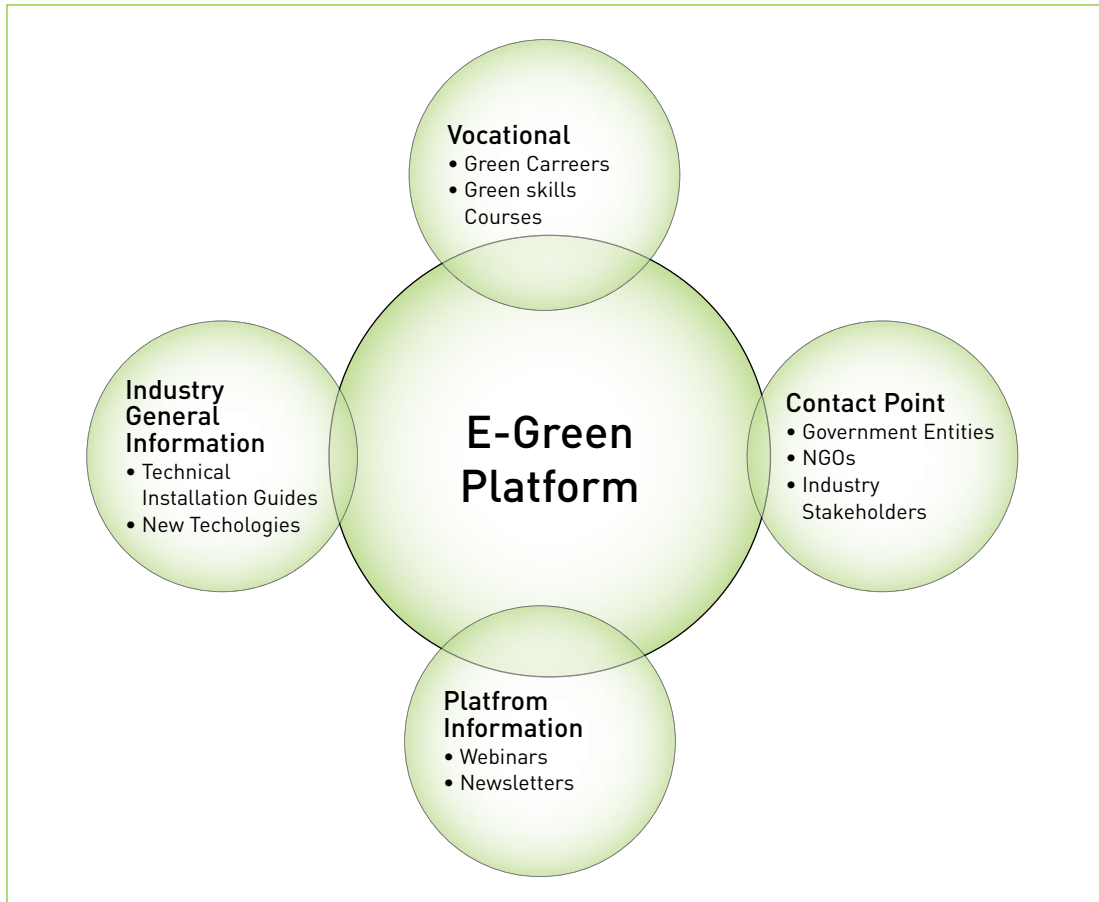
Plumbers, electricians, builders and persons with similar or related trades, that are now being asked to install these new environmen-

tal friendly technologies, for both domestic and industrial use should be given the opportunity to train in basic green technology skills via government educational institutions. These skills can be learned through trade courses organised by technical educational institutions, and offered on a part-time and full-time basis. Furthermore these institutions could include modules or sub-units relating to green industry technologies in the course programmes of engineering and plumbing and other trades. They can also formulate a course specially designed for technical skills within green industry technologies.

### 3.11. E-Green Platform

Small countries specialising in the green industry should opt for the development of an Internet based electronic platform related to green technologies and the local green industry cluster. The aim of this electronic platform which will be vested in a website, will be to create links and networks between industry stakeholders. Another aim of this platform would be to offer and direct the public towards green technology courses, possibly online via the same platform.

Figure 5: E-Green Platform



### 3.12 Marketing of Green Technology Strategy, Park and Cluster

Governments should give importance to the disseminating of information related to the green technology strategy, park and cluster to industry, academia and public sector. This should be carried out in a professional manner through a marketing campaign carried both within that country and on an international basis with the aim of attracting and strengthening investment in the area. A secondary aim of the campaign will be to market the green manufacturing and R&I incentives locally and abroad using government and partner media such as websites and newsletters. A special emphasis should also be given to inform and aid the networking of players within the green cluster.

The marketing should be carried out through:

- the setting up of an online database listing companies and consultants offering green services and technologies, banks offering venture capital and technology needs;

- the organisation of various breakfast briefings with banks, business networks and venture capital organisations;
- the mobilisation of local environment NGOs through a dedicated activity;
- the launch of an award for research and innovation in green manufacturing.

It is highly important that the green research development cluster is well-promoted to develop and strengthen. Marketing should be done amongst the following players:

- public sector (targeting the green procurement initiative);
- banks (local and foreign) and other financial intermediaries;
- research laboratories;
- intermediaries in Europe.

## CONCLUSION

The focus of this paper is on smart specialisation and applied to a small country context in order to define effective strategies in stimulating locally driven eco-innovation. It draws on the academic fields of innovation policy and entrepreneurship approaches from the study of creativity and foresight. The main conclusion is that green strategies and policies call for an innovative management. In other words it encompasses on the demand side measures supporting innovation management

such as public procurement, research driven clusters and supply measures like the development of specialised industrial parks. As it explores the discovery of smart specialisation domains in which a region can hope to excel it calls on the academic domain to aid in the development of the smart specialisation strategy. Indeed this paper provides the practical skeleton for other academic studies, where the aim of the study will be in developing an innovation framework for the manufacturing industry, based on a country case study.

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