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ROLE OF LOCAL GOVERNMENTS IN PROMOTING RENEWABLE ENERGY BUSINESSES

A contribution to

the green urban economy

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ANALYSIS GREEN ECONOMY

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Role of local governments in promoting renewable energy businesses: A contribution to a green urban economy

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Findings of the study in brief

- Renewable energy business can be promoted through the formation of clusters. A cluster is commonly referred to as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions". Facilitating the growth of such businesses in renewable energy makes an important contribution to greening the urban economy.
- This report presents seven selected examples from around the world (Boading, China Green Power Valley; Calgary, Canada SURE; Hamburg, Germany Renewable Energy Cluster; San Diego, USA, CleanTECH San Diego; Piracicaba, Brazil, APLA; Casablanca, Morocco; San Antonio, USA, Mission Verde Alliance), where local governments have taken steps to create such a city cluster for the renewable energy sector. Their individual trajectories are assessed and interpreted to serve as an inspiration for those local leaders that have similar ideas for their municipality.
- Five different models (incubators, reformers, multipliers, executors, visionaries) for municipal engagement could be distinguished to facilitate the creation of a cluster initiative for the renewable energy sector.
- Based on the assessments, eight recommendations for local governments are formulated:

1. Invest in assessments: It is worth spending time and resources in identifying where the potential lies for a local renewable energy industry.
2. Build on local strengths: A city always has a certain advantage vis-à-vis other business locations, be it on economic, geographic or other grounds that can be built upon.
3. Work with what you have: Most cities are full of social networks; and these networks are full of committed people and organizations that can be engaged.
4. Address stakeholder's needs: Not everyone is waiting for a new structure to emerge as a cluster coordinating agency, which requires addressing the most urgent needs for a certain buy-in.
5. Create mutual benefits: It is important to find win-win solutions for both environment and industry.
6. Dare to lead: It is critical that local leaders, be it the mayor, business leaders or the local trade promotion agency, formulate a clear vision for a planned cluster initiative.
7. Think longer-term: While some municipalities have good experiences with maintaining close connections with cluster initiatives, it is worth looking into possibilities to create an independent structure and a sustainable business model, for example by collecting membership fees.
8. Encourage innovation: Research and development is expensive, and needs long-term commitment. Local authorities can play a number of supporting roles.

Foreword

Although policy-makers and entrepreneurs across the world are increasingly talking about the green economy, much of this debate still centers on the state of the global economy at the nation-state level. The role of renewable energy sourcing remains limited, while dependence on fossil fuels remains high. At the same time, local governments are increasingly recognized to play a crucial role in the design and the implementation of innovative, climate-friendly policies.

Due to an increasingly active network of local leaders – supported by organizations such as ICLEI - Local Governments for Sustainability – a consensus is emerging that the notion of "think global – act local" remains imperative to find sustainable solutions to the challenges of resource scarcity and climate change.

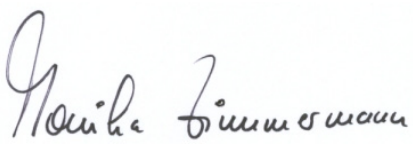
From a scientific perspective, a greater role for local actors requires a better understanding of what local governments are mandated to do, and how various initiatives with an explicit focus on the local context can be extended to bring together multiple levels of decision-making. This includes for example a close cooperation within international networks, and consultation with lower and higher scale levels of government. It is also important to understand the opportunities for actively involving other actors, such as the private sector and civil society organizations. How to deal with this multi-level governance challenge should be a key interest for local government officials, national policy-makers and researchers alike.

This report contributes to this growing field of knowledge, by focusing on a topic that is an emerging priority in many localities: how can a city benefit from a green(er) economy? What can local governments do in order to contribute to such a green urban economy?

The UN Conference on Sustainable Development (Rio+20) in June 2012 presents an important opportunity to highlight the role of local governments in promoting activities that are aimed at greening the local economy, and how local leaders can push forward an agenda for a renewable energy sector.

ICLEI's work across the world has long emphasized the need to look at concrete possibilities to improve the environmental footprint of municipalities, with hands-on advice to local projects and a series of international conferences in recent years. This Global Report presents therefore a meaningful opportunity to share important research with local governments and the international community.

The report looks at the implications of a local green industry in order to answer the question: "How can local governments promote the presence of renewable energy businesses, as part of a greening trend in the overall economy?" As the findings show, there are insightful lessons learned when it comes to the role of local governments and their efforts to align environmental, industrial and energy policy at the municipal level. We hope that some of these examples will give rise to new reflections and inspiration to local leaders working on sustainability.



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Content

1 Executive Summary

In 2011, some US$ 30 billion was invested globally in venture capital to finance new cleantech businesses. With the growing momentum for the global green economy, the number of businesses in the sector is set to increase further. If local governments are able to play a proactive role in raising their green industry profile, cities can benefit from this renewable energy boom.

A so-called cluster initiative is one of the possible ways to support the development of a local industry. A cluster is commonly referred to as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions". A local cluster can help to bring together entrepreneurs, researchers, public officials and other stakeholders in order to create an attractive green business environment.

What is a cluster?

The term cluster refers to a geographic concentration of interconnected economic and innovative activities in a particular field. Clusters exist whether companies are aware of it or not and exist independently of any intervention, project or organization. A cluster consists of members from industry, academia and government institutions (the triple helix) - often coordinated by an organizational unit in the cluster.

What is a cluster initiative?

The term cluster initiative denotes a cluster development project or cluster organization. It refers to the governance structure in place to manage a cluster. The main functions are to strengthen collaboration within the cluster and to facilitate e.g. information exchange, training and seminars, joint corporation projects, marketing and public relations, as well as internationalization.

Sources: Global Cluster Initiative Surveys 2003 and 2005; International Cleantech Network

With this briefing, ICLEI and the University of Amsterdam present seven selected examples of cities from around the globe where local governments have taken steps to create such a city cluster for the renewable energy sector. *Role of local governments in promoting renewable energy businesses* has been developed by the University of Amsterdam in collaboration with ICLEI.

The presented examples provide interesting insights into how local governments can stimulate green business by supporting cluster initiatives. While there is no silver bullet on how best to plan, establish and run such an initiative, it is possible to identify some of the lessons learned in the past decade. In general, it is evident that strong local leadership is crucial, and that personal networks are an important driving force behind progress. However, the local setting determines how much can be done in the areas of financial or political support. This report compiles, assesses and interprets some of these individual trajectories, and aims to serve as an inspiration for those local leaders that have similar ideas for their municipality.

FIVE MODELS FOR MUNICIPAL ENGAGEMENT

Based on the experiences presented in this report, it is possible to distinguish between five different city 'models' of local government policy-making to facilitate the creation of a cluster initiative for the renewable energy sector.

Incubators pursue a strategy of creating a new industry sector in their municipality. This 'building from scratch' requires committed city leaders and creative, resourceful support from within the local government.

Reformers are motivated by their history, such as an industrial legacy with challenging future prospects. The green economy offers a window of opportunity to reform a city's economic profile.

Multipliers are local governments that see a city cluster as a tool to strengthen their existing renewable energy industry, creating greater momentum and leading to additional economic development in the sector.

Executors have little autonomy vis-à-vis higher levels of government and de facto serve as a local node of a broader (i.e. national) policy framework. The "initiative power" of the municipality can still be of significance, but a centralized governance structure often presents a barrier to genuinely local, independent policy-making.

Visionaries are local governments that base their cluster policy on a longer track record of ambitious environmental policies. Having already succeeded in implementing a green agenda, the municipality aims to co-develop the local entrepreneurial potential through establishing a local cluster.

SUMMARIES OF THE SEVEN CITY EXAMPLES

BAODING: GREEN POWER VALLEY The city's Green Power Valley has been running for six years and de-facto falls under the Baoding High Tech Industrial Development Zone. The cluster's objective is to "promote the development of the Power Valley" and thus to make the city the nation's first address for manufacturing renewable and energy equipment (much of which is for export). In this, the municipality does not have a preference for a particular industry: the city promotes the development of solar energy equipment, wind power equipment, bio-energy, material efficiency, new mobility and electric vehicles as well as energy efficiency products. The mayor's commitment has been crucial for the development of the initiative, as well as the support by the high-tech zone management committee.

CALGARY: SURE The SURE cluster was devised to accelerate the growth of the sustainable energy sector in Calgary, helping the city to achieve its vision of becoming a global energy center. The SURE initiative is paid through the municipality's own economic development agency budget. However, given the city's track record in conventional energy business, the cluster's renewable energy goal is somewhat ambivalent. The largest projects are focused on carbon capture and storage, or other cleaner energy solutions. Renewable energy activities are most evident in the case of wind, which thrives on the provincial (not municipal) commitment to enhance renewable electricity supply. Involved parties emphasize that there is a significant presence of large corporate players and their growing interest in investing in (and with the assets to finance) clean and renewable energy solutions to be a key advantage.

HAMBURG: RENEWABLE ENERGY CLUSTER The cluster acts as an independent entity. At the same time, links with city authorities are tight: three out of six supervision board members are from the Hamburg municipality, and the cluster office is located within the premises of the city's Business Development Corporation. The cluster aims to strengthen and promote industry cooperation, and to benefit from the expected boom in the wind industry, especially in export markets. The municipality wants to make Hamburg Germany's wind capital, and to work together with neighbouring provinces to establish the region as the world's leading wind business location. Within a year of its inception in early 2011 with 57 founding members, some 100 new organisations, mainly companies, have joined the initiative.

SAN DIEGO: CLEANTECH SAN DIEGO While this cluster does not have a specific renewables focus, many of its cleantech businesses work on alternative energy. The local government has a close working relationship with the cluster and is part of its management structure. The stated objective reflects this connection: "to stimulate innovation and advance the adoption of clean technologies and sustainable industry practices for the economic, environmental and social benefit of the greater San Diego region." The cluster thus acts both as advisor and as an implementing partner for the city in achieving its sustainable policy goals. The supporting role of the cluster for innovation in the renewable energy sector is an important aspect of its work: smart grid developers, solar and wind energy companies are prominent members of the cluster.

PIRACICABA: APLA The cluster has a narrow focus on the sugar industry and aims to facilitate the interaction between its members, to increase the value of the productive chains of renewable fuels and its partners, and to contribute to the sustainable development of the region. Even though the latter reference to sustainable development remains rather unspecific, the cluster management aims to achieve concrete results in the form of industrial output of its members. The cluster is governed by a superior council, a strategic council and a technical council in which public and private organizations supervise the cluster's daily operations. The prefecture of Piracicaba is a member of the technical council.

CASABLANCA: PLANNED Casablanca's large industrial base would be the key characteristic for a potential renewable energy cluster. Feasibility studies show that the wind, solar PV and solar thermal sectors carry the greatest potential for Casablanca. Wind equipment is an interesting option because of the city's track record in the aeronautic business sector; and solar energy is attractive because local companies already produce various solar thermal components. Solar PV is far less developed, but the local electronics industry is well-established and could plug into the needs of a potential boom in photovoltaics. If local production were to start, the most important challenge would be competition with international low-cost manufacturers, i.e. in Turkey or China.

SAN ANTONIO (MISSION VERDE ALLIANCE) The Mission Verde Alliance's objective is "to bring green technology and sustainable economy to the region" and leaves no doubt that there is still a lot of potential in relocating businesses to San Antonio. One of its programs is directly aimed at green job creation, and includes a so-called green jobs leadership council with 15 members. The alliance has set out a comprehensive strategy, including conservation measures and the creation of a venture capital fund for multi-tech investments.

RECOMMENDATIONS FOR LOCAL GOVERNMENTS

Some of the municipal experiences provide useful entry points for those city authorities interested in starting similar projects. This report identifies eight recommendations that provide inspiration for future local government initiatives.

1) Invest in assessments: It is worth spending time and resources in identifying where the potential lies for a local renewable energy industry. San Antonio is a good example of how market research has been done in the preparatory phase of a cluster initiative. It can help to establish a sufficiently large database on corporate strategies, market developments and macro-trends in relevant sectors. In turn, it is useful to benchmark the local situation with comparable experiences in other cities (even from other economic sectors). Casablanca has started its planning process with such an assessment.

2) Build on local strengths: A city always has a certain advantage vis-à-vis other business locations, be it on economic, geographic or other grounds. Local authorities can therefore design cluster policies in a way that these strengths are taken into account. In Hamburg for example, the wind energy business determined much of how the cluster was set up, and how its management works to promote the private sector's pro-wind attitude as the city's added value.

3) Work with what you have: Most cities are full of social networks; and these networks are full of committed people. When starting an initiative to establish a cluster, or a similar green economy project, local authorities can try to engage these existing structures within public, private or civil society organizations. Experience shows that personal commitment is a major driver of change. Renewable energy is a popular issue and there is a good chance that the best proponents for a city initiative are already active in this field. San Antonio is an interesting example where personal engagement from various stakeholders was brought together to establish the Mission Verde Alliance.

4) Address stakeholder's needs: Not everyone is waiting for a new structure to emerge as a cluster coordinating agency. Before deciding on objectives, design and governance structure of a possible cluster initiative, local authorities can identify the most urgent needs within the renewable energy community (if there is already one). This creates the necessary buy-in and helps to bring key stakeholders to the table from the start. In the case of Piracicaba, there was a strong interest in further cooperation across the sugar industry; and Hamburg's wind energy entrepreneurs already had an interest in creating a platform.

5) Create mutual benefits: It is important to find win-win solutions for both environment and industry. Economic growth is often incompatible with environmental policy, but does not have to be a zero-sum game. Local governments can demonstrate how a local green (energy) cluster can help achieve economic development while also fostering environmental protection. In San Diego, the vision of a more sustainable city was the leading thought from the start of CleanTECH San Diego and continues to steer the cluster's work.

6) Dare to lead: It is critical that local leaders, be it the mayor, business leaders or the local trade promotion agency, formulate a clear vision for a planned cluster initiative. This can be bold and ambitious, because it should motivate people to act in its spirit. At the same time, realism is needed when detailing the concrete action plans. In Calgary, Baoding and San Antonio, local leadership was one of the most prominent features of the cluster initiative and had a major impact on the way the project was received by other stakeholders.

7) Think longer-term: While some municipalities have good experiences with maintaining close connections with cluster initiatives, it is worth looking into possibilities to create an independent structure and a sustainable business model, for example by collecting membership fees. As important as leadership and commitment are for setting up a cluster initiative, there is a danger of collapse if key advocates leave the scene. This is particularly the case in renewable energy, which is a relatively new sector and (still) dependent on political support. While none of the cities presented in this report have thus far encountered major problems because of discontinuity, leadership changes in San Diego and Baoding raise the question of how to make a cluster initiative a sustainable undertaking that is independent from a few key individuals.

8) Encourage innovation: Research and development is expensive, and needs long-term commitment. Local authorities can play a crucial role in supporting various dimensions of the educational landscape, be it through the promotion of vocational training centers, supporting training colleges, providing of study grants or financing test laboratories. San Diego and Piracicaba are interesting examples of how local renewable energy clusters can be integrated in a wider agenda to support research and development.

2 Introduction: Background and purpose

While the idea behind a green economy is spreading fast, much of the current discussion centers on national developments. An increasing majority of the world's population lives in cities, and it is high time to look at the urban dimension of such a 'green New Deal'. Local governments are seeking greater recognition of their role in greening the urban economy, and ICLEI aims to help cities take advantage of the many opportunities presented by a green economy. What can local governments do to become green leaders?

Many companies are looking for new business models to develop, produce and sell sustainable products and services – be it multinationals, large manufacturers or small- and medium-size enterprises. According to the Cleantech Group, the sector experienced a 26.1% growth between 2005 and 2011. It remains difficult to agree on exact numbers, but the trend is clear: green business is gradually becoming mainstream. For local governments, this development could be good news. With the right mix of companies, a city has the option to create a local industry that thrives on sustainability: the green urban economy.

The renewable energy sector is one example of an emerging business sector within the green economy. A growing number of firms are developing new products and services needed for the generation of solar- and wind energy, in the development of biofuels, hydropower or geothermal systems. In 2010, global investments in the renewable energy sector were estimated at US$ 243 billion. In light of increasing world demand and diminishing (as well as more expensive) fossil fuel supplies, the renewable energy sector is expected to become an increasingly important part of the green economy.

To date, many cities have started to invest in becoming a green business hub. Already for some time, local authorities have taken up the idea of becoming a green city in a bid to fight climate change. This comes in many different shapes, including carbon-neutral cities, CO_2 emission reduction targets, renewable energy usage, eco-cities, greening initiatives, energy efficiency measures or building standards. The costs of these policies for the municipal budgets can differ substantially. Many of these initiatives are subsidized by national governments; others require a pay-back period before costs are recovered.

Despite the feeling among local leaders that many cities will not have the resources to invest in greater sustainability, the green economy also offers economic benefits: it can create new businesses, provide new jobs and bring in new types of revenue for the local government. This more economic vision of 'being green' is the rationale for the green urban economy report at hand. In 2011 alone, some US$ 30 billion has been invested in venture capital to finance new cleantech businesses. With the growing momentum for the green economy, the number of businesses in the sector is set to grow further.

Economic clusters are well-known drivers for such a city/regional development because they help to create synergies between private actors, public stakeholders and research institutions. Particularly in the renewable energy sector, companies need to innovate and to invest in a continuous effort to improve technologies, materials, standards and business models. They are likely to thrive in a business environment where know-how is present, products can be tested, conditions for manufacturing and logistics are good and costs are acceptable. There are many examples in various economic sectors where economic clusters have been set up with the aim to make the city a (more) competitive business

location. A common definition reads: “the geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions”. Experts agree that the presence of clusters stimulates innovation and economic development. This is where local governments can play an important role as role models, regulators, supporters and promoters.

What is a cluster?

The term cluster refers to a geographic concentration of interconnected economic and innovative activities in a particular field. Clusters exist whether companies are aware of it or not and exist independently of any intervention, project or organization. A cluster consists of members from industry, academia and government institutions (the triple helix) - often coordinated by an organizational unit in the cluster.

What is a cluster initiative?

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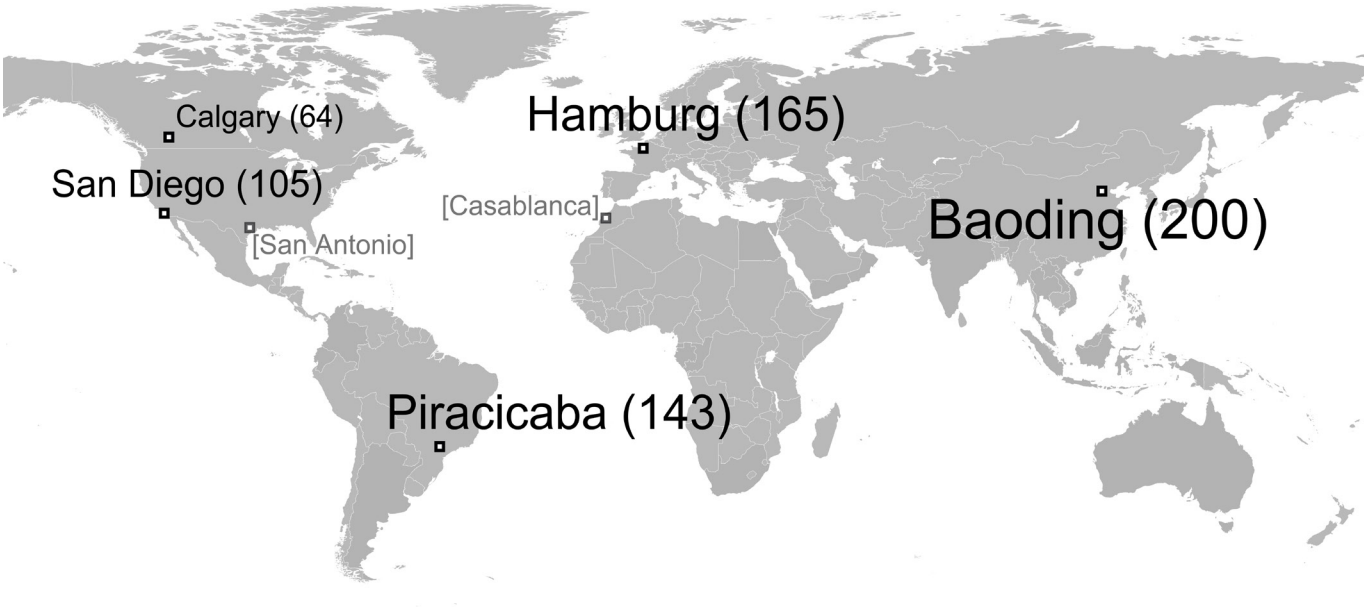
Sources: Global Cluster Initiative Surveys 2003 and 2005; International Cleantech Network

CITY SELECTION

For this report, we looked at so-called ‘cluster initiatives’, where there is an established effort to ‘manage’ an economic cluster. In other words, it was not enough for a city to have a relatively high number of relevant organizations within its territory; we were interested in those cities with a cluster management structure, or “cluster organization” in place (or planning to have one). A large number of these initiatives exist throughout the world, and have generally been recognized as a successful strategy to support local economic development. However, only a few have a focus on the renewable energy industry.



The map shows the selected city examples. Each city name includes in brackets the number

of member organizations for each city cluster initiative. The larger the membership, the larger the city name on the map.

With this briefing, seven examples of cities are presented from Africa, America, Asia and Europe where local governments have taken concrete steps to create such a renewable energy city cluster. This report *Role of local governments in promoting renewable energy businesses* has been developed by the University of Amsterdam in collaboration with ICLEI.

We hope to contribute to a policy dialogue among municipalities about successful strategies for urban agglomerations to benefit from the green economy. It should be noted that renewable energy developments have a somewhat longer track record in Europe. We have decided not to include the 'first-movers', even though well-established examples like Freiburg or Copenhagen might provide useful insights for lessons learned. Instead, this briefing focuses on more recent city-specific efforts to support the growth of a local renewable energy industry.

We think that these experiences are more suited to serve as an inspiration for those local leaders that are just starting to get interested in similar initiatives. The first part presents five cities and their experience in establishing a renewable energy cluster: Baoding (China), Calgary (Canada), Hamburg (Germany), San Diego (United States) and Piracicaba (Brazil). The second part includes two shorter examples of cities where a cluster is in the planning phase: Casablanca (Morocco) and San Antonio (United States).

METHODOLOGY

For this paper we collected public documentation, policy analyses, as well as a number of unpublished economic reports. We compiled all relevant data per cluster initiative and conducted a number of interviews with experts and key stakeholders. These were done either in person, by phone, email correspondence or through a short online questionnaire. For each city example we looked at eight aspects to explain the main characteristics of the cluster in question. All presented analyses are based on qualitative data and are designed to enable a comparison of the various cluster initiatives. We refrained from including more detailed descriptions of political or economic developments in the specific local contexts. A possible follow-up study within could take such a more in-depth assessment a step further.

Each cluster profile starts with a short cluster history, which highlights the major milestones that led to the cluster initiative. The cluster factsheet features some key facts about the set up, and presents the scores for seven indicators in a diagram. The cluster membership section explains the different types of organizations that are members of the cluster, and looks at their distribution across the value chain. A paragraph on local autonomy identifies the level of decentralization and what it means in terms of policy initiative for the local government. This is done for the fields of environmental, industrial and energy policy. This assessment is based on the degree of "power of initiative" and the "power of immunity" in each locality vis-à-vis higher levels of government.

The local government role describes the policies employed by the municipality in order to support the cluster initiative. For this, we used the four categories 'governing by authority' (i.e. introducing building standards to include solar water heaters=regulator), 'governing by provision' (i.e. providing financial support to start-ups=supporter), 'governing by enabling'

(i.e. promoting the city as renewable energy hub=promoter) and 'self-governing' (i.e. using solar panels for public buildings=role model),.

For the paragraph on cluster strategy we made a SWOT analysis and determined whether a local government's policies were primarily designed to a) build on a city's strengths, b) address its weaknesses, c) embrace opportunities or d) anticipate threats. This was done to highlight some of the drivers behind local municipal strategies in creating a renewable energy cluster.

The section on (potential) job creation is highly relevant for local authorities. Unfortunately, quantitative data is difficult to establish. Definitions for green jobs hardly exist and depend on the local context. In order to determine the impact on local employment in the presented examples, we used IRENA's report "Renewable Energy Jobs", which includes seven recommendations for creating renewable energy jobs. Three of these are directly applicable to cluster initiatives: the amount of manufacturing companies (as they host the highest amount of workers); local renewable energy deployment policies (which enhance the chance for businesses to thrive on local sales); training and education programs (which enable adequate levels of employment). The last section includes a short outlook and describes some of the major issues ahead.

The individual profiles are followed by a comparative assessment, five proposed city models of engagement, and recommendations for policy-makers. To compare the seven cases, we present an overall scoreboard for the sections cluster factsheet, local government role and cluster strategy. The scores are based on a qualitative analysis and range between 1 and 5 for the various indicators. 1 = very low; 2 = low; 3 = medium; 4 = high; 5 = very high (see table below).

	Baoding	Calgary	Hamburg	San Diego	Piracicaba	Casablanca	San Antonio
Cluster Factsheet							
Age / Maturity	●●●●	●●	●	●●●	●●●●	X	X
Diversity	●●●●	●●●	●●	●●●●	●	●●	●●
Territorial focus	●●●●●	●	●●●●●	●●●●	●●●●	●●●●	●●●●●
Local leadership at start	●●●●●	●●●●●	●●●	●●●●●	●●●	●●●	●●●●●
City in charge	●●●●●	●●●●●	●●	●●●●	●●●●	X	X
Degree of expansion	●●●●	●●	●●●●●	●●●●●	●	X	X
Focus on innovation	●●●●	●●●●	●●	●●●●	●●●●	●	●●●
Local Government Role							
Self-governing	●●	●●●●	●●●	●●●●	●	●	●●●
Governing by enabling	●●●●	●●●●	●●●●●	●●●	●●●●	●●●	●●●●●
Governing by authority	●●●●	●●●	●●	●●	●	●●	●
Governing by provision	●●●	●●●	●●●●	●●●●	●●●●	●●●	●●●
Local Government Strategy							
Building on strengths	●●●	●●●●	●●●●●	●●●	●●●●	●●●●●	●●●
Addressing weaknesses	●●●●●	●●	●●	●	●●	●	●
Embracing opportunities	●	●●	●●●	●●●●	●●●	●●●	●●●●●
Anticipating threats	●	●●●●	●	●	●●●	●	●●

3 City Examples

BAODING, CHINA: Green Power Valley

Geographic Location: 140 kms southwest of Beijing

Population: 11.194.000

GDP per capita: US$ 1.546

Territory: 137 km2 (metropolitan area); 11.159 km2

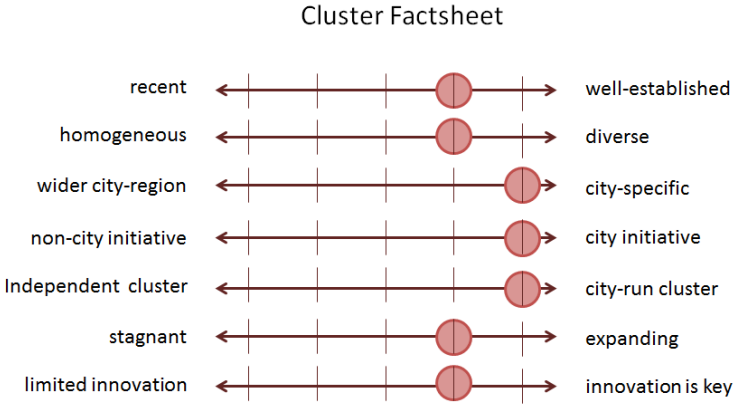
Summary: The city's Green Power Valley has been running for six years and de-facto falls under the Baoding High Tech Industrial Development Zone. The cluster's objective is to "promote the development of the Power Valley" and thus to make the city the nation's first address for manufacturing renewable and energy equipment (much of which for export).

Cluster History: Already back in 1992, Beijing approved the creation of the Baoding National High Tech Industrial Development Zone as one of 54 similar initiatives. After a number of corporate success stories from Baoding (such as Yingli and Huiyang Aviation), the municipality decided to establish the first renewable energy park in China in 2003. The Renewable Energy Law passed in 2005 (which included a renewable portfolio standard) and served as an additional incentive for Baoding's local authorities to further strengthen the city's renewable energy profile. In response to this national policy, Mayor Mr. Yu Qun, announced that Baoding would become China's green power valley. The local government published a range of regulations to encourage investment in the power valley, from tax exemptions to supporting renewable energy workers' families in settling down in Baoding. The city's cluster continued to grow and today Baoding's green power valley hosts more than 200 companies.

Cluster Factsheet: The Green Power Valley has been running for six years and in terms of organizational set up de-facto falls under the Baoding High Tech Industrial Development Zone. The cluster's objective is to "promote the development of the Power Valley" and thus to make the city the nation's first address for manufacturing renewable and energy equipment. In this,

Cluster Factsheet

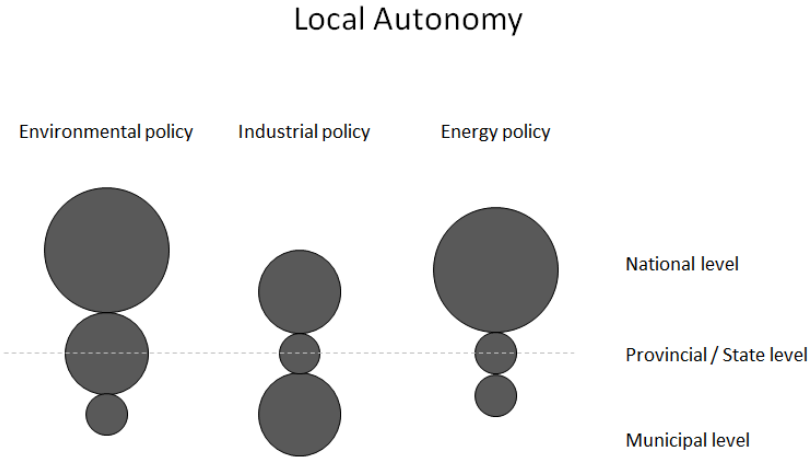
Seven indicators were used to give a quick overview of each cluster. These indicators include the age of the cluster initiative (how long has the cluster initiative been active?); the diversity of its membership structure (how many different types of companies, organizations are part of the cluster initiative?); its territorial focus (to what extent do cluster initiatives reach cities or surrounding regions?); the local leadership at the start (to what extent was the local government a driving force behind the establishment of the cluster?); city in charge (does the city have a say in the day-to-day running of the cluster initiative?); degree of expansion (to what extent has the number of members increased since the start of the cluster initiative?); focus on innovation (how important is the support of R&D activities within the cluster initiative's work?)



the municipality does not have a preference for a particular industry: the city promotes the development of solar energy equipment, wind power equipment, bio-energy, material efficiency, new mobility and electric vehicles as well as energy efficiency products.

The mayor's support has been crucial for the development of the initiative, and has been supported by the high-tech zone management committee. It is a cluster entirely run by the local government. As a result, Baoding's first man has become somewhat of a national celebrity as the "renewable energy mayor" after a presentation about the power valley at the National People's Congress in 2008.

Cluster membership: After a steady period of growth, the green power valley included some 160 companies in 2009, and approximately 200 in 2010. Many of the corporate outfits in the cluster have a focus on manufacturing parts, components or equipment for the solar and wind industry and are located within the high-tech zone. Because of its status as a national industrial project, much emphasis rests on technology innovation. The cluster includes five R&D institutions. Currently, the leading North China Electric Power University is setting up the first national renewable energy college.



Local Autonomy: The level of decentralization in China is marked on the one hand by a strong national leadership, and a move towards local policy-making on the other. Local governments are responsible for economic development plans and design their own strategies for going about it. This stems from the fact that since the economic liberalization of the 1980's urbanization policies were closely linked to economic growth policies.

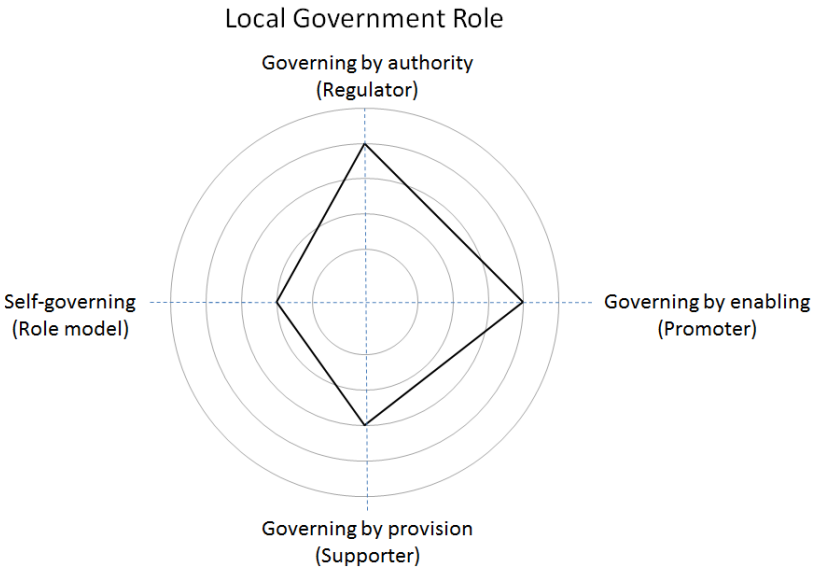
The local level has less autonomy regarding energy and environmental policies. For example, the national government decreed that cities over 500.000 inhabitants would have to treat at least 60% of their waste water. Another important reason for national influence over local governments rests in the incentive policies throughout the nation-wide bureaucracy. Until the 11th national five-year plan, economic growth was weighted as the top priority for local officials in order to be promoted in the party hierarchy. The current five-year plan now gives sustainability a similar weight. Experts expect that this might have a much greater effect than other policy arrangements.

Local Autonomy

Depending on the political system, local governments have limited room to maneuver when it comes to promoting renewable energy business. For the purpose of this report, we have looked at the possibilities for local governments to design and implement policy vis-à-vis environmental issues (e.g. CO_2 reduction targets), industrial (e.g. investment promotion) and energy (e.g. renewable energy targets) issues. The visualization included in each city example presents a qualitative judgment for the national, provincial and municipal level. Each level is represented by a circle (small, medium and large), which indicates the degree of authority (low, medium, high) regarding design and implementation of environmental, industrial and energy policies.

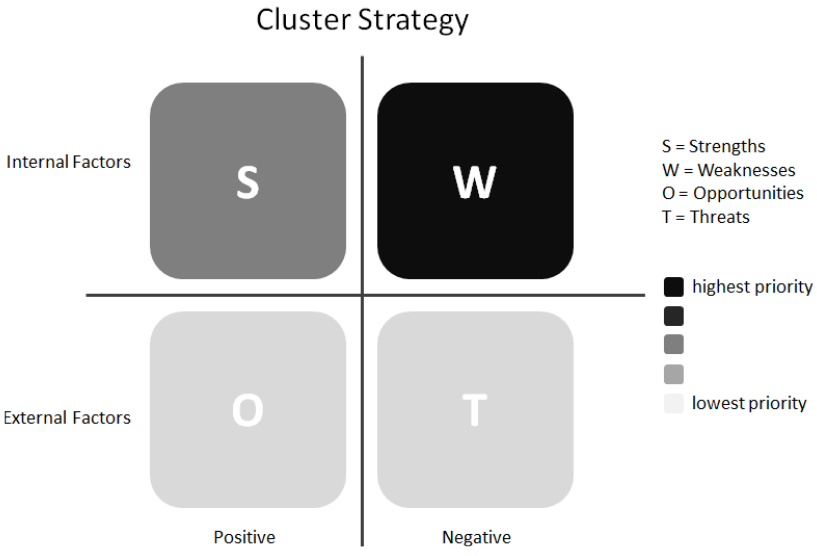
Local Government Role: The municipality's active role in initiating the cluster is reflected in the way it supports the advancement of the local renewable energy industry. An important element of the green power initiative is to help new companies to start business in Baoding. This is done through an active incubator policy, which includes the provision of office space and (later) land for own buildings. This way Baoding aims to stimulate innovation, rather than merely attract foreign direct investment. The municipality issued a number of local regulations under the title "Several Regulations about Encouraging Investment in the Power Valley". In 2007, the local government also invested US$ 7.6 million to become a solar energy city; and the city's green political agenda includes the target of a 35% CO_2 reduction by 2015 (and 48% by 2020). Beyond local policy efforts, the city's mayor has been a very active proponent of Baoding's renewable energy profile, and spent a lot of time lobbying key actors in Beijing to support Baoding's strategy.

Cluster Strategy: When in 2006 the nearby Baiyangdian Lake was heavily polluted by 29 industrial companies from Baoding, the mayor in response closed some 400 local businesses. The municipality saw an opportunity in fostering the renewable energy sector to mitigate the devastating effects on the local economy. The mayor developed a vision of decreasing the number of energy-intensive industries and the establishment of a renewable energy section within the High-tech Industry Development Zone. The Baoding municipality managed to turn its major weakness, a highly polluting industry with a bad reputation across the region, into a new development by building on the industrial legacy that was already present in the city.



Local Government Role

When pursuing a sustainability agenda, local governments have certain 'tools' at their disposal. We differentiate between four distinctive, yet interrelated types of tools: governing by authority (e.g. acting as a regulator); governing by enabling (e.g. promoting certain policies towards relevant stakeholders such as a national ministry); governing by provision (e.g. giving financial support to specific activities such as the purchase of solar water heaters); self-governing (e.g. being a role model in energy efficiency projects in public buildings). We scored each tool for the various city examples, ranging from one (low priority) to five (high priority). The scores are combined in a single graph: each of the four corners reflects the level of importance of a particular tool.



Cluster Strategy

This visualization is based on a SWOT analysis, which includes a qualitative assessment of strengths, weaknesses, opportunities and threats. The idea behind this assessment is to illustrate whether a local government places a particular priority on dealing with the external environment (opportunities and threats) or instead attempts to address internal factors (strengths and weaknesses). In the case of strengths and opportunities, local policies have a positive orientation (e.g. how can we build on the current situation?). In the case of weaknesses and threats, local leaders aim to deal with the negative (e.g. how can we address both existing and potential problems?)

Job Creation: With the city's power valley strategy, the total exports increased over the years and Baoding has become one of the fastest growing urban economies in Hebei province. This is reflected in the local employment. The Yingli Green Energy Group alone has a total workforce of more than 10.000 employees. A major advantage for the Baoding job market is the fact that much of the renewable energy dynamism has come at a time when the city's local industry faced a major crisis. With the new sector's steady growth, a sizable portion of the industrial workforce found new employment in the urban green economy. Training programs like those offered by the Power Valley College will now have to nurture a new generation of energy engineers.

Outlook: With sustainability featuring high on the Chinese agenda for the 12th national five-year plan (2011-2015), the development of renewable energy will continue to receive much attention from Beijing, provincial authorities and municipalities. Baoding's new mayor Mr. Li Qian is set to continue the supportive policies vis-à-vis the green power valley. As part of Baoding's local 12th five-year plan, the high-tech zone is going to be enlarged to a total of 130 km2 by 2015 with an expected industrial turnover of US$ 23.7 billion. Baoding is also one of the pilot low-carbon cities, which could further stimulate local demand.

CALGARY, CANADA:
Sustainable and Renewable Energy Cluster

Name: Sustainable and Renewable Energy Cluster

Geographic Location: 80kms east of Rocky Mountains

Population: 1.182.000

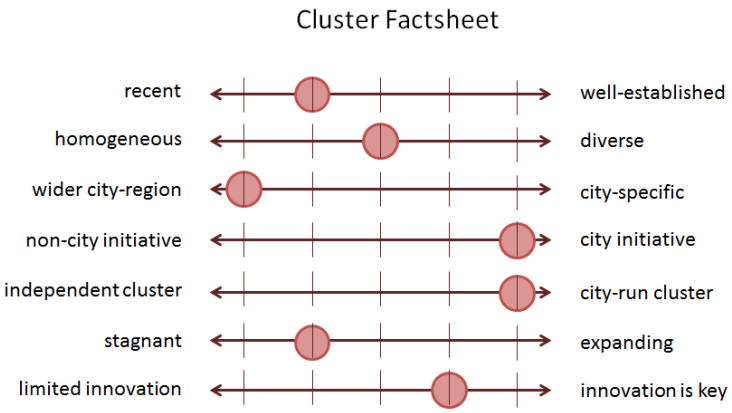
GDP/capita: US$ 48.718

Territory: 726 km2

Summary: The SURE cluster was devised to accelerate the growth of the sustainable energy sector in Calgary, helping the city to achieve its vision of becoming a global energy center.

Cluster History: The Sustainable and Renewable Energy Cluster (SURE) was the initiative of the Calgary Economic Development (CED), the city's lead economic development agency. The cluster structure was set up in 2009, and the private sector was not directly involved in the establishment of the cluster. The underlying idea was to develop Calgary as a global energy center, building on the strength, expertise and innovation within the oil and gas sector and the fact that the city has a large number of oil and gas companies: 91 headquarters of major international corporate outfits are located in the city. For the establishment of the cluster, CED proactively contacted potential members within the business community. A particular focus rested on larger companies with a certain level of credibility; others joined later in the process. In 2012, the cluster management includes two part-time staff members from within CED's structure.

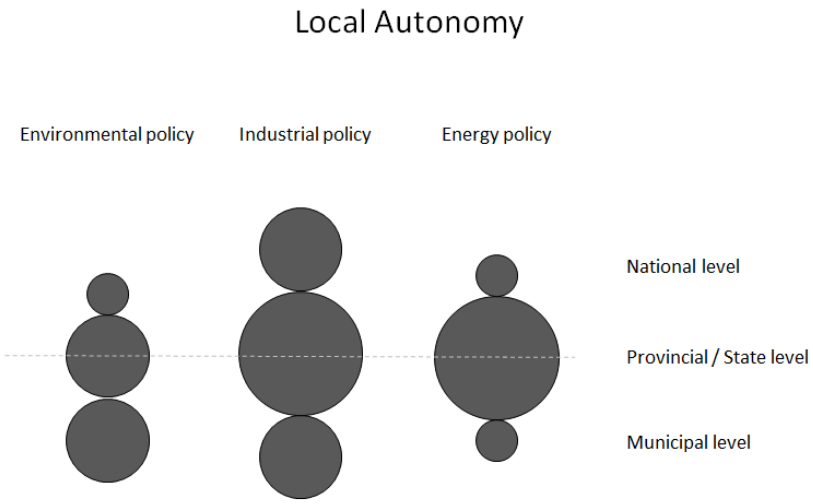
Cluster Factsheet: The cluster's objective is to "connect local companies with peers, potential partners, funders and clients, with the overarching goal of accelerating growth of the sustainable and renewable energy sector in Calgary". The aim is to contribute to the city's standing as a global energy center. The SURE initiative is paid through the municipality's own economic development budget.



Given the city's track record in the conventional energy business, the character of SURE's renewable energy goal is somewhat ambivalent. On the one hand, the largest projects are focused on carbon capture and storage, or other cleaner energy solutions. On the other hand, renewable energy activities are most evident in the case of wind, which thrives on the provincial (not municipal) commitment to enhance renewable electricity supply. According to SURE, one of the city's key advantages lies in the presence of large corporate players, and that these have a growing interest in investing in (and have the assets to finance) clean and renewable energy solutions.

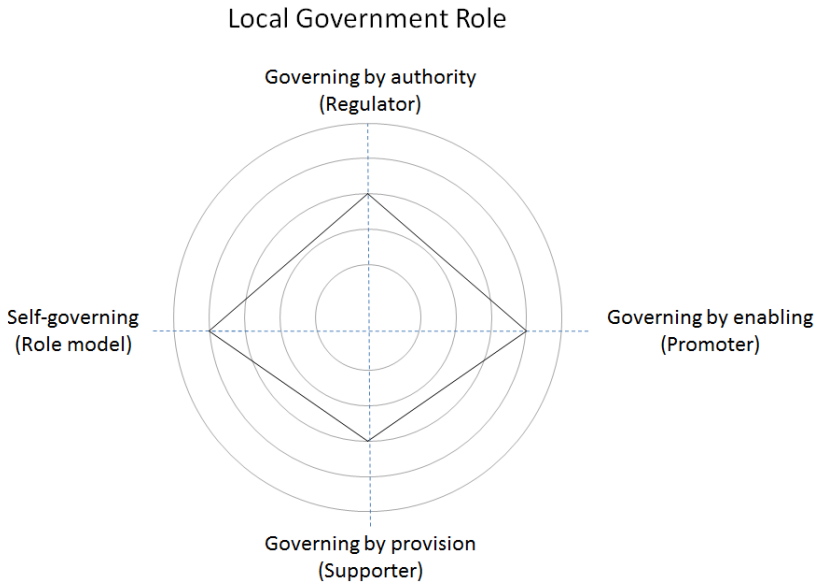
Cluster membership: SURE aims to focus on medium and large size companies,

but also includes smaller outfits. A number of key players in the conventional energy sector are not members, even though many of them are increasingly interested to engage in renewable energy. Consultants and developers make up half of the clusters membership structure, followed by manufacturers of components (19%) and system providers (14%). Research and education is much less present, with five organizations in 2012. The cluster aims to expand to include more private sector players of the oil and gas business, as well as academic and research institutions working on energy-related topics.



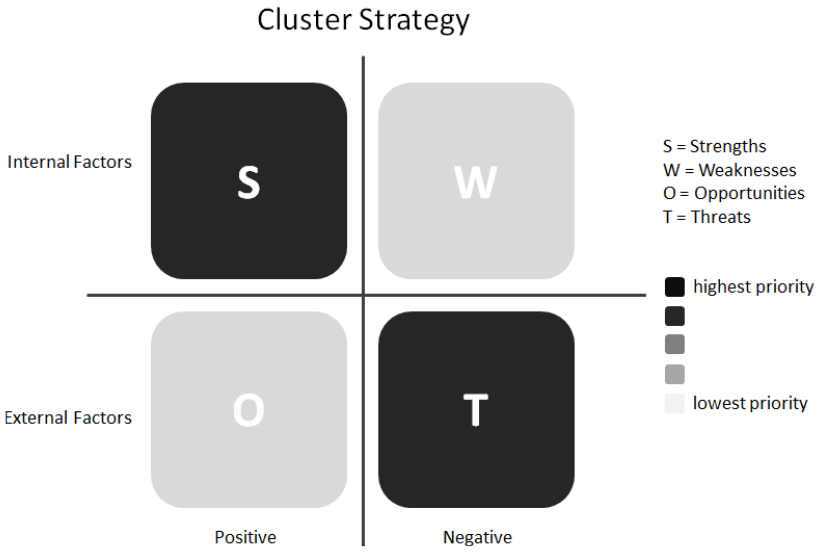
Local Autonomy: Canada's federal system puts the provincial government in the city of Edmonton in the driver's seat. Municipalities retain revenues from property tax, and the provincial government receives the royalties from oil and gas production. Municipal autonomy is greatest regarding trade and investment policies, as well as environmental regulations.

As the owner of the local ENMAX energy company, Calgary also has a significant influence on renewable energy developments: 100% of the city's electricity is expected to be supplied by the company's own renewable energy supply by 2012. At the same time, the city has limited leverage vis-à-vis the provincial government, which is in charge of energy supply. Alberta has a very strong policy framework to support the development of renewable energy and energy efficiency. One of the reasons for this policy lies in the expected need to increase the installed capacity by 11.500 MW by 2030 (partly to compensate for aging plants). As part of this effort, the province plans an additional 7.670 MW of wind generation capacity in the coming years.



Local Government Role: Already in 2011, Calgary introduced a 100% wind power supplied light rail transit system. Clean energy and energy efficiency has since been high on the municipal agenda. The municipality is the primary funder to CED, which in turn manages the cluster. This means that there is a strong city involvement. Looking beyond the cluster, Calgary's sustainable policy framework divides into four aspects: a municipal climate change policy, energy supply agreements, energy demand management strategy and a sustainable building policy. This interest in energy supply is reflected in a long-term agreement between the mu-

nicipality and its energy utility ENMAX. The city also engages in networking, facilitating meetings between stakeholders, and is a member of the World Energy Cities Partnership. The city, with CED and SURE taking a leading role, hosted the Global Clean Energy Congress and the Virgin Earth Challenge last year, and will host the International Sustainable Energy Congress in 2012.



Cluster Strategy: The city of Calgary is well-known as an industrial center for the oil and gas sector. Because Calgary is highly dependent on the volatility of the oil market, the CED's SURE initiative stems from the wish to diversify the local economy to enhance the economic resilience of the city and to harness and expand upon existing strengths in the energy sector to become a leader in the innovation of sustainable and renewable technologies. For local leaders, the doom scenario (although admittedly unlikely) is a decreasing energy demand in the United States and an inability to export to Asia, resulting in an economic downturn in Calgary's local energy industry. On the positive side, the city's strength lies in a high concentration of engineers and a local financial industry with a good knowledge of the energy business, a good prerequisite to develop a renewable energy sector.

Job Creation: The city's workforce is well-suited for employment in the renewable energy business. In the case of a sustained renewable boom however, many jobs in the conventional energy sector might be at stake as a consequence. The challenge for Calgary is to create a new energy business without affecting the old energy business. Either way, Calgary's track record in the upstream business holds interesting opportunities for significant employment even though today's cluster membership is not particularly strong in the manufacturing sector.

Outlook: The city holds significant potential for a local renewable energy sector, but the city's convenient starting position (enough space, limited pollution, sufficient energy, and strong industrial footprint in the conventional fuels sector) means that a major push for systemic change is a hard sell to the general public. A major incentive for renewable energy might instead lie in the availability of corporate financial assets and venture capital, which could attract start-ups in the wind and biomass sector, maybe even in solar energy technology (especially since Calgary is one of the sunniest cities in the country). Given the city's oil-heavy economy, business prospects for clean energy and energy efficiency innovations might also be promising in the medium-term. In the meantime, the CED's most important activities under the banner of the SURE cluster remain knowledge exchange and networking activities to support the development of the local renewable energy business.

HAMBURG, GERMANY:
Renewable Energy Cluster Hamburg

Geographic Location: Port city, 70km from North Sea

Population: 1.788.000

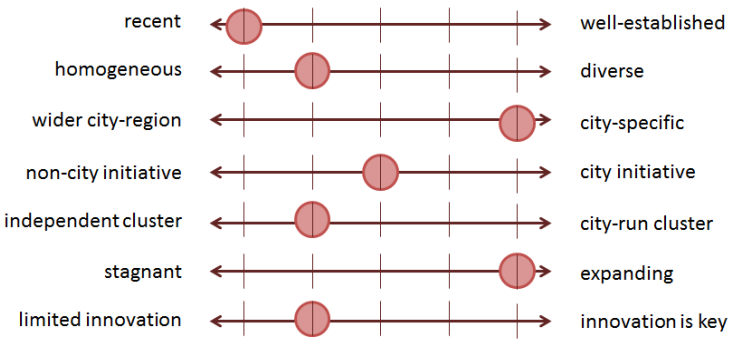
GDP/capita: US$ 56.828

Territory: 755 km2

Summary: The cluster has developed as a platform for the local wind industry and has close ties the city's Business Development Corporation (HWF). The cluster aims to strengthen industry cooperation, and to benefit from the expected boom in the wind industry.

Cluster History: The Hamburg Renewable Energy Cluster is above all a wind energy cluster. Its origins can be traced back to a growing wind turbine manufacturing scene in the mid 1980's, when various wharfs throughout the wider region struggled to keep business afloat. In terms of engineering, wind turbine towers can be built with the infrastructure and know-how needed of the local ship-building industry. In the early 2000's more wind companies such as Repower set up business in the city and created an emerging wind energy sector. At the time of the financial crisis in 2008, the city authorities started to get more interested in the economic potential of the wind business in Hamburg. Long before this move, the private sector had already been advocating a joint platform to promote the interests of the local wind industry. Fighting an economic downturn, the municipality also started to see the cluster as a means to diversify Hamburg's economic portfolio. In 2011, the local government helped establish the cluster and provided significant co-financing.

Cluster Factsheet



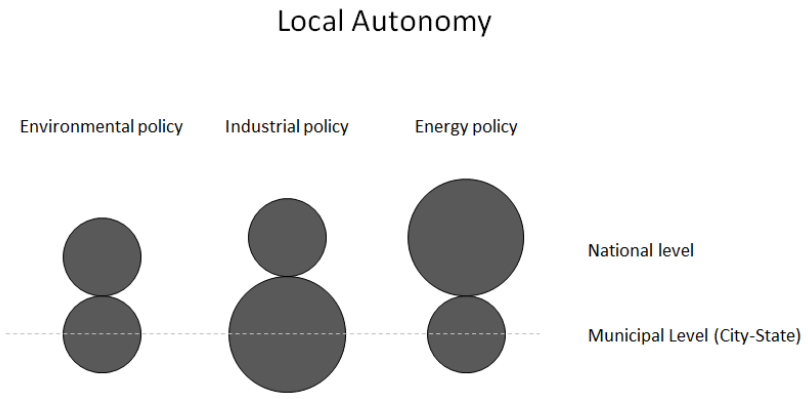
Cluster Factsheet: The cluster acts as an independent entity. At the same time, links with city authorities are tight: three out of six supervisory board members are from the Hamburg municipality, and the cluster office is located within the premises of the city's Business Development Corporation (HWF).

The cluster aims to strengthen and promote industry cooperation, and to benefit from the expected boom in the wind industry, especially in export markets. The municipality is keen to make Hamburg Germany's wind capital, and works together with neighbouring provinces to establish the wider region as the world's leading wind business location. Since its inception in early 2011 with 57 founding members, some 100 new organisations, mainly companies, have joined the initiative within a year's time.

Cluster Membership: On the one hand, Hamburg's renewable energy cluster includes many different types of organizations. There are manufacturers, engineering services, and consultancies, logistics companies, project developers, public entities, educational institutions, certification specialists and even human resource agencies. The consultants/devel-

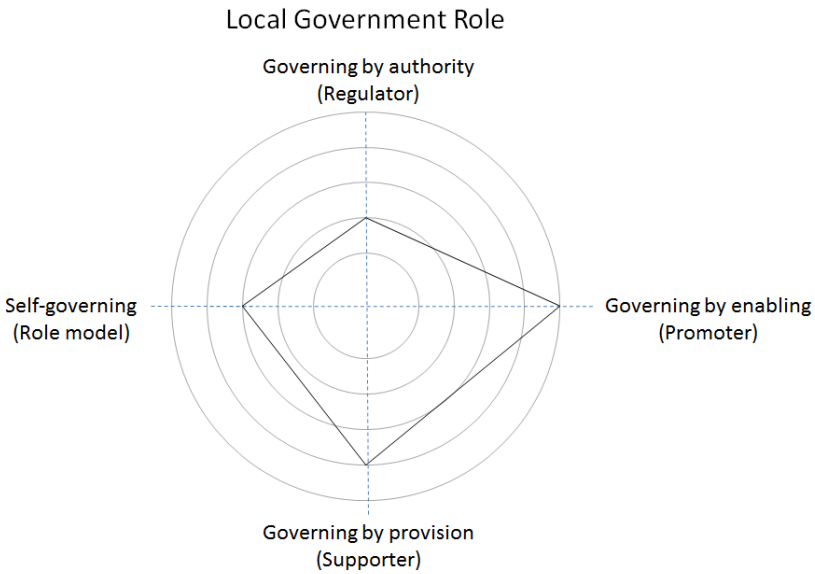
opers form the largest group in the cluster, followed by legal services and investment or finance specialists. On the other hand, there is less diversity in terms of the energy source; the largest share of these members is particularly interested in the wind energy sector. Only some of them are working in the field of solar energy or biomass. This is in line with the city's own ambition to become a prime location for the on- and offshore wind market. It is interesting to see however, that service-oriented companies have such a large presence in Hamburg's cluster.

Local Autonomy: Hamburg enjoys a far-reaching autonomy due to its city-state status. Germany's federal system includes fiscal and legal autonomy for its provinces, and the federal level has limited direct authority over each of the 'Länder'. This is not to say that there are no restrictions at all. Federal decisions have a binding character once agreed upon.

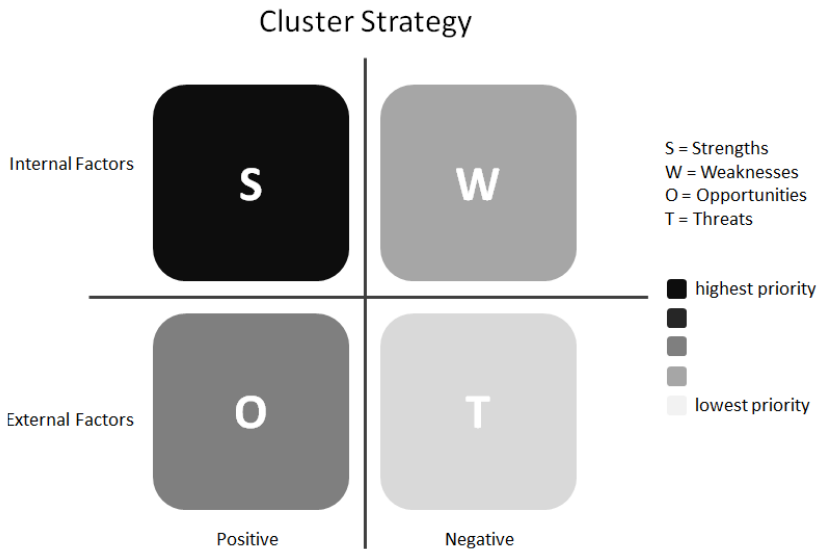


Another major influence from higher tiers of government in fact comes from the European level, where sector-specific standards are set, for example in terms of environmental guidelines. The differences in local autonomy for Hamburg's environmental, industrial and energy policies are therefore not significant.

Local Government Role: Until today, Hamburg's 1st priority has been to support the local renewable energy industry by coordinating, matchmaking and promotional activities. These types of activities are relatively cheap and are generally appreciated by the private sector. The financial support made available for the start of the cluster initiative is another important choice, which has facilitated a more structural exchange among the various stakeholders in the sector. Much of what used to be the municipality's investment promotion strategy for renewable energy businesses has now been taken over by the cluster management. Parallel to supporting the cluster initiative, Hamburg wants to encourage local energy generation, with the idea that local consumption would reinforce the city's standing as an attractive location for businesses in the wind, solar and bio-energy sector. While the municipality's goal is to stimulate economic growth across the entire spectrum of renewable energy, the most promising field of the cluster rests with the wind business. With plans underway to change current planning laws to allow for wind turbines in the maritime port areas, Hamburg could get one step closer to becoming the national wind capital.



Cluster Strategy: The Hamburg Renewable Energy Cluster was born out of the wish to diversify the city's economy. With the economic difficulties associated with the 2008 crisis, the municipality felt the need to guard against a too narrow economic portfolio. At the same time, the envisioned profile for the cluster took into account the specific strengths of the city as a business location: Hamburg has long been an administrative center for a large number of firms, many of which already have a long track record in the wind energy business. The ongoing boom of the offshore wind industry provided an additional incentive for the city to try to benefit from this trend.



Job Creation: Because Hamburg is an administrative hub, the level of manufacturing is much lower than in more industrial locations of the wind energy sector. With a booming wind energy industry, skilled workers might become increasingly scarce in the medium-term. Training and educational programs would therefore have to play a supportive role in addressing possible side-effects. The local market would also benefit if the municipality manages to further scale up its own procurement in wind energy products. However, local deployment is unlikely to be a major driver for the wind sector, compared to, for example, much larger offshore projects.

Outlook: As long as the offshore wind market in the North Sea is still booming, the Hamburg Renewable Energy Cluster has good prospects to attract new companies to join its ranks. A key priority however, is the support of an improved environment for research and development across the Hamburg metropolitan area. In addition, national policies in support of Germany's envisioned energy change (Energiewende) are expected to play a major role in stimulating local demand for renewable energy products. Hamburg's renewable energy profile could very well benefit from these developments if the city (and Germany in general) is able to maintain the momentum of the Energiewende. However, other regions in Germany are similarly active. In March 2012, the *Wirtschaftswoche* magazine ranked Hamburg only 6th out of 16 Länder scores measuring the level of implementation of the Energiewende.

SAN DIEGO, UNITED STATES: CleanTECH San Diego

Geographic Location: Coastal City, California

Population: 1.223.400

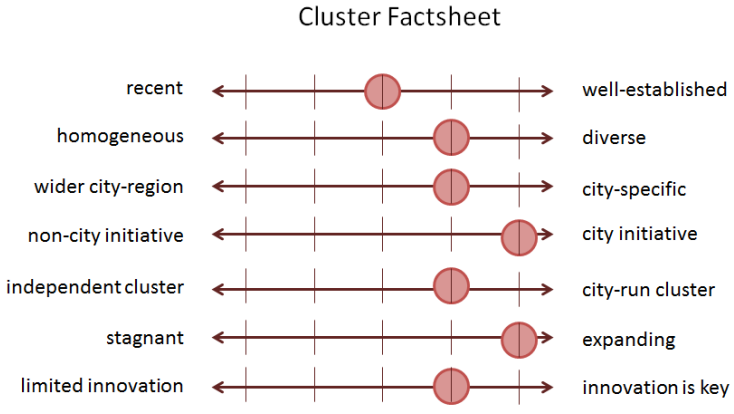
GDP/capita: US$ 56.422 (2008)

Territory: 885 km2

Summary: While this cluster does not have a specific renewables focus, many of its cleantech businesses work on alternative energy. The local government has a close working relationship with the cluster and is part of its management structure

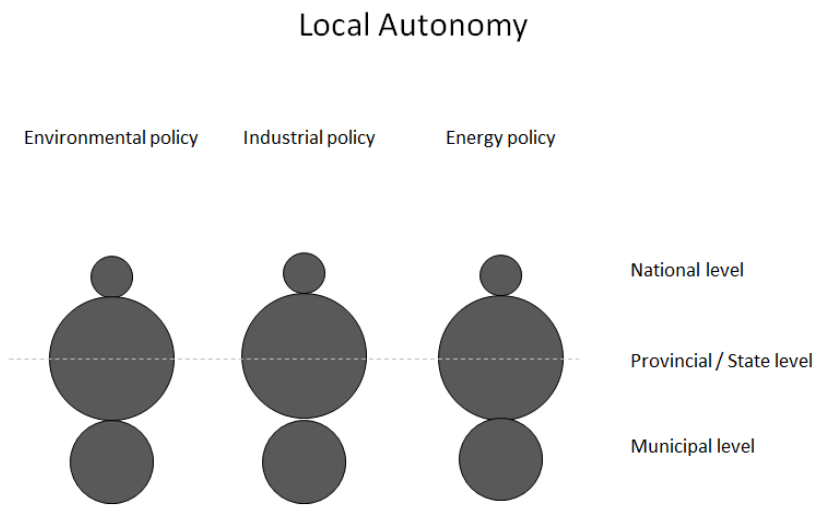
Cluster History: San Diego's cluster initiative started in 2007 with a city official who wanted to support the nascent cleantech business sector in San Diego. A similar initiative for the biotechnology sector had been successful earlier, and the set-up for the new cluster was modeled on that experience. The city's mayor was actively involved from the very beginning and viewed the cluster as a good investment in future economic development, and as a possible support mechanism for achieving San Diego's sustainability goals. The cluster organization was established as a separate entity and quickly became a key interlocutor between the private sector and the municipality. From the start, its proponents saw the cluster in a coordinating role: members would have a direct line to the municipality and could benefit from early insights into city projects and sustainability initiatives. The close connection between city and cluster cemented the idea of mutual benefit and helped the new cluster organization to attract its first members. In 2011 one of the cluster's early advocates in the mayor's office became the cluster's executive director.

Cluster Factsheet: Even though the cluster structure is independent from the municipality, the local government retains a close working relationship with the cluster. The city of San Diego is a member and the municipal energy adviser sits on the board of the cluster. Its objective reflects this close relationship: "to stimulate innovation and advance the adoption of clean technologies and sustainable industry practices for the economic, environmental and social benefit of the greater San Diego region". The cluster thus becomes partly advisor to, and partly an implementing partner for the city in achieving its stated sustainable policy goals.

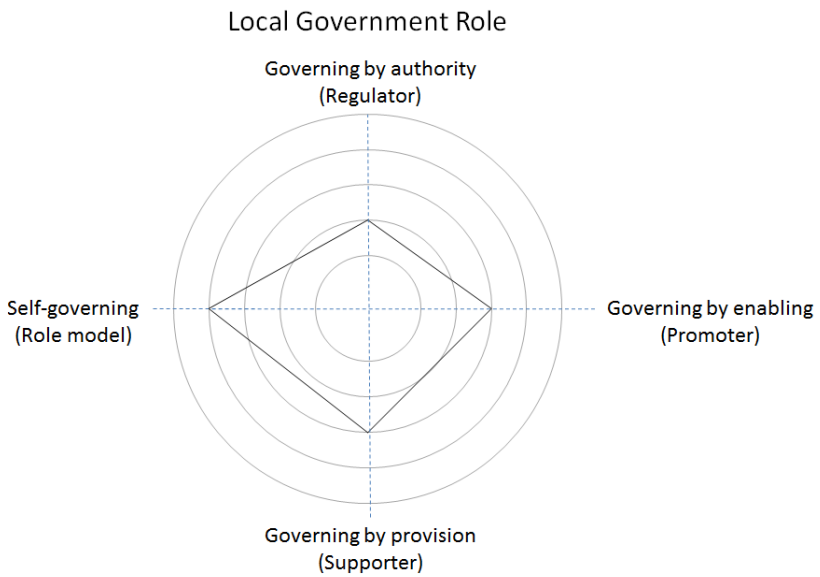


In this context, the term cleantech is often expanded to include renewable energies. The supporting role of the cluster for innovation in the renewable energy sector is an important aspect of its work: smart grids developers, solar and wind energy companies are prominent members of the cluster. The cluster has an annual budget of US$ 912.000 and has six full-time staff members; their salaries are paid through membership fees.

Cluster Membership: The cleantech sector in San Diego spans across a wide range of companies, and the sector is growing fast, (from 750 companies in 2010/11 to 822 in 2012). In 2012, 105 of these are cluster members, a tenfold increase in less than four years. In 2011, 29 new companies joined the cluster. The territorial concentration is relatively high, with 74% of its members based within the municipal boundaries. Compared to for example Piracicaba or Hamburg, San Diego is a much more diverse cluster. The energy & technology companies make up the largest group (33 companies), followed by professional services (29) and the business and financial sector (11). The cluster takes a proactive role in attracting new companies to the San Diego region and fosters firm-to-firm interaction to stimulate knowledge transfer. This is clear when looking at the size of the board, which includes 43 professionals from private and public entities. Innovation is high on agenda, and therefore research activities are important: the University of California San Diego is closely associated with the cluster's work.

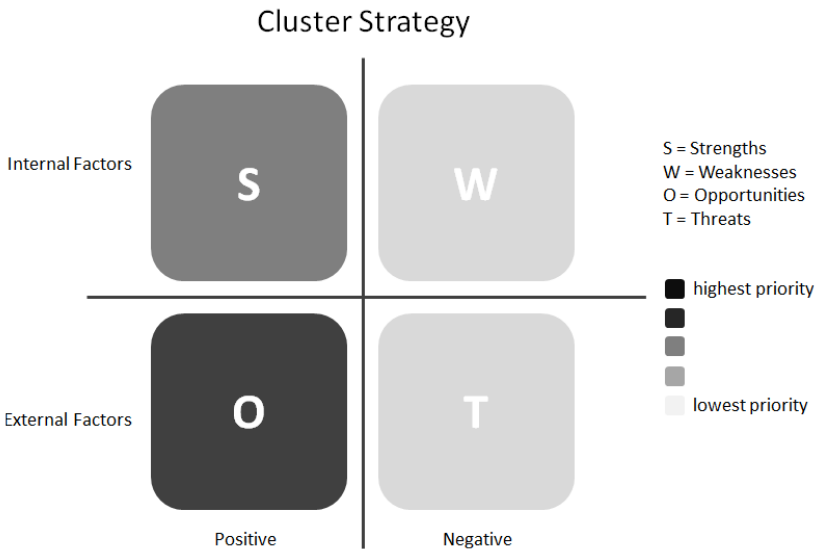


Local Autonomy: The Californian Constitution governs San Diego's local autonomy. The municipality is free to decide on regulatory issues in the fields of environmental, industrial and energy policies. At the same time, federal policies still play an important role in the form of energy subsidies (i.e. US$ 90 billion in clean energy through the 2009 Recovery and Investment Act) and other types of tax cuts, loans and grants. San Diego is actively pursuing a local environmental policy and has developed a local climate action plan. It aims to go back to 1990 emission levels by 2020, and to reduce them to 80% below 1990 levels by 2050.



Local Government Role: The municipality makes active use of the cluster's expertise and the products and services offered by the cluster members. This is in line with the original thought of starting the cluster and confirms that a coordinated knowledge exchange between city, private sector and other stakeholders can create synergies. The cluster in fact acts as a match-maker for the city, and the city can use the cluster members as a resource for its policy implementation, i.e. when considering procurement options. Also, municipal support for the cluster comes in the form of non-financial commitments (such as networking activities) and funding for research and development programs.

Cluster Strategy: San Diego's local government sees a strong potential for the clean energy sector and wants to benefit from the global renewable energy boom. Given the cluster's strong links with the local government, it is insightful to look at the defined goals. According to its annual report 2011, the cluster strategy includes the branding of San Diego, influencing policy, attract innovation, bringing in capital from cleantech investors, and serving as a networking hub for the sector. All of these activities are designed to position the city as a prime business location for the growing industry. The local authorities are behind this cluster strategy, while at the same time pursuing a green political agenda closely associated with the economic opportunities cleantech solutions offer for a more sustainable city.



Job Creation: In a recent development, the French manufacturing firm Soitec decided to relocate its solar energy division to San Diego, creating 450 direct jobs. According to the cluster management, San Diego has the third largest concentration of clean jobs in the U.S. (22.862 in 2010, even though this includes 3.049 in the nuclear energy segment). In general terms, the cluster is much less upstream-oriented and includes many smaller and medium size companies in the technology development and service segment of the sector. The ambitious goals in terms of local renewable energy deployment can become a major driver for the San Diego cluster and have the potential to further strengthen the attractiveness of the region as a cleantech location. The high standard of educational institutions is also an important advantage for the San Diego area, particularly in the field of academic and technology research.

Outlook: San Diego already has a well-established reputation as an attractive cleantech location. With the expected growth of the global market for renewable energies, the cluster's active networking approach might result in a continuing increase of (inter)national investments. The key issue in the medium-term will be the overall policy context in the United States, which thus far has shown limited commitment to support renewable energy developments.

PIRACICABA, BRAZIL: Arranjo Produtivo Local do Álcool da Região do Piracicaba (APLA)

Geographic Location: Southeast, 230 km from coast

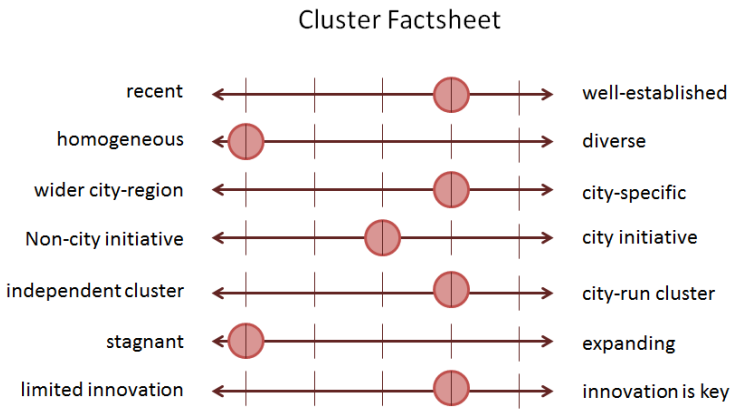
Population: 364.000

GDP/capita: US$ 14.305 (São Paulo State average)

Territory: 1.640 km2

Summary: The cluster has a narrow focus on the sugar industry and aims to facilitate the interaction between its members, to increase the value of the productive chains of renewable fuels and its partners, and to contribute to the sustainable development of the region.

Cluster History: Located at the heart of the Brazilian sugar industry region and with a strong track record in having an export-oriented manufacturing base, Piracicaba started to attract international visitors in the early 2000's. People were particularly interested in the mechanical industry and the large number of sugar and ethanol mills: the firms in Piracicaba produce some 502 million liters of ethanol per year. In addition, international interest for Brazilian know-how grew because the EU stopped the protectionist measures for its own sugar industry. When these visits started to become an increasingly logistical challenge, the municipality's trade department led an initiative to establish the APLA ethanol industry cluster in 2006. This in turn allowed the various local suppliers to the mechanical industry to coordinate their efforts.



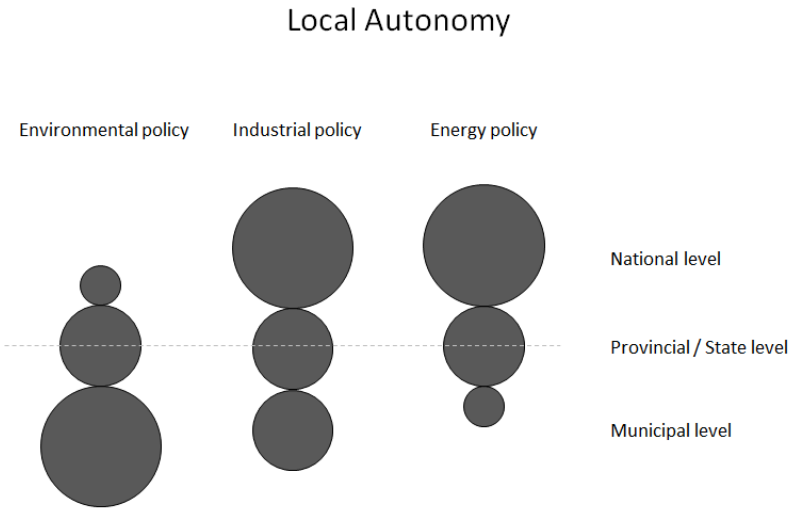
Cluster Factsheet: The cluster has a narrow focus on the sugar industry and aims to facilitate the interaction between the members of APLA, to increase the value of the productive chains of renewable fuels and its partners, and to contribute to the sustainable development of the region. Even though the latter reference to sustainable development remains rather unspecific, the cluster management aims to achieve concrete results in the form of industrial output of its members.

The APLA director works in close coordination with its members and other cluster-relevant organizations such as the Brazilian Support Service for Small Companies (SEBRAE), the national investment promotion agency APEX and the University of São Paulo's centenary Luiz de Queiroz Agricultural School (ESALQ). APLA is governed by a superior council, a strategic council and a technical council in which public and private organizations supervise the cluster's daily operations. The prefecture of Piracicaba is a member of APLA's technical council.

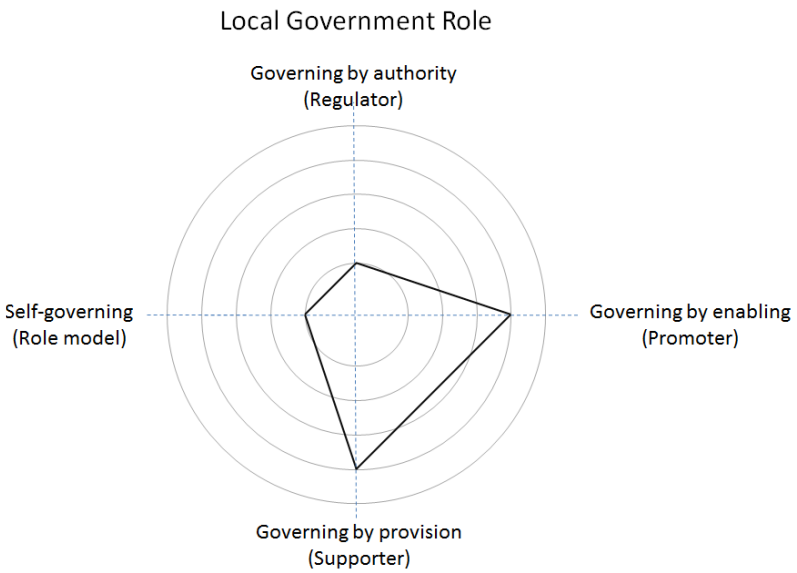
Cluster Membership: APLA members include a variety of companies along the value chain in the ethanol industry. In 2012, it counts 23 distilleries, 96 industries, 19 public or private entities and five related institutions. Upstream businesses such as sugar mills, distilling companies, as well as the manufacturers of parts, equipment and industrial plants are

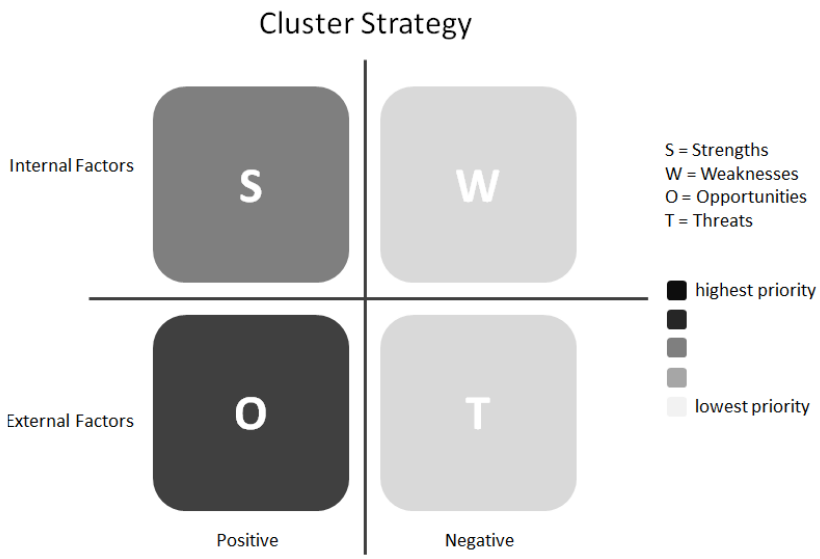
the most prominent participants in the cluster. Political organizations and public agencies make up a small portion of the membership. There are also various companies providing consultancy, monitoring and engineering services, however APLA does not have members from the finance or investment business sector. This relatively homogenous picture reflects the fact that the cluster was established to enhance the competitiveness of the sector, and to support the export of local products. A more recent spin-off initiated jointly by APLA and APEX is going in a slightly different direction: the "Sugarcane Bioenergy Solution" brings together stakeholders that are interested in promoting Brazilian technology in the sector. This is in line with APLA's work to support the establishment of the Piracicaba Technology. APLA's director Flavio Castelar points out: "[relying on] just a huge biofuels production and competitive costs is not enough effort".

Local Autonomy: Due to Brazil's decentralization efforts in the 1990's, municipalities have triple autonomy on political, administrative and financial levels. Piracicaba therefore has significant room to maneuver regarding its industrial and environmental policies. The city's economic development secretariat SEMDEC is an active player in improving the local industrial footprint. Energy provision in contrast is much more centralized and leaves limited freedom for municipal actors. However, local solutions such as allowing sugarcane-based electricity generation to be fed into the local grid are being applied. While Piracicaba designs its own policies in support of the local business strategy, industrial policy in the renewable energy sector is largely driven by a strong national pro-ethanol policy scheme, as well as the São Paolo State authorities. National regulations have led ethanol production to double since 2002, and already more than 50% of Brazilian cars have flex-fuel engines. Ethanol enjoys a similar priority on state level. In the case of São Paulo, where 60% of Brazil's sugarcane is grown, many supporting mechanisms exist, including lower tax rates for ethanol production and R&D programs.



Local Government Role: City officials are closely involved in the cluster and its daily management. Municipal officials are part of the team that runs the cluster initiative and have links to other tiers of government, such as the Brasilia-based APEX, which also covers 50% of the cluster funding. The other 50% stems from company contributions. Piracicaba has been active in promotion and marketing activities, and has stepped up municipal investments aimed at supporting the ethanol industry.





Cluster Strategy: The initial reason for the creation of the cluster lies in the municipality's strong ethanol industry profile. With one of the largest bioenergy business agglomerations in the country, the city attracted international interest, which required a coordinated effort for study tours and marketing events. This was seen as an opportunity. At the same time, the initiative clearly stated the need to increase the competitiveness of the ethanol industry.

The growing interest in Brazilian sugar, sugar-processing equipment and know-how provided an additional incentive for Piracicaba's local authorities to facilitate export growth for the city's businesses.

Job Creation: Piracicaba's ethanol cluster features a large number of manufacturing businesses and therefore has a large share of local employment in the sector. However, increasing mechanization gradually changed the labor market. The need for know-how in maintenance and mechanics partly replaced the need for manual labor. In the medium term this trend might lead to a shortage of trained personnel if there are not enough educational and recruitment programs. With a focus on innovation, the planned science park could play a role in nurturing a new generation of energy professionals.

Outlook: With the development of the technology park, Piracicaba could further consolidate its position in São Paulo state as a key location for ethanol production and, more importantly: technology innovation. Looking beyond Brazil, the future of Piracicaba's sugarcane industry will also depend on the international demand for ethanol, and the building of additional export infrastructure such as pipelines. For this to raise export figures, certifications are needed regarding the environmental benefits of ethanol use. Similarly, the link between ethanol production and green electricity might become an interesting addition to the city's green urban economy. But for this, the question remains whether APLA's members manage to increase their ethanol-based electricity generation capacity.

CASABLANCA, MOROCCO (PLANNED)

Geographic Location: Port city, 50kms south of Rabat

Population: 3.720.000

GDP/capita: US$ 4.800 (national average)

Territory: 324 km2

Summary: Casablanca's large industrial base would be the key characteristic for a potential renewable energy cluster. Feasibility studies show that the wind, solar PV and solar thermal sectors carry the greatest potential for Casablanca.

Cluster History: At the time of writing, preparations for the creation of a possible cluster initiative are under way. With a number of ambitious national policies in place to reach 42% of renewable energies in the overall energy mix, Casablanca has opted to develop a vision towards a greater renewable energy footprint for the local industry. With 39% of Morocco's total industrial activity in Greater Casablanca, the city has the benefit of a well-trained workforce in the engineering sector. The agency in charge of establishing a possible cluster is the so-called Regional Investment Center, which acts as a one-stop-shop for potential investors in the metropolitan region.

Cluster Factsheet: Casablanca's large industrial base would be the key characteristic for a renewable energy cluster. Feasibility studies show that the wind, solar PV and solar thermal sectors carry the greatest potential for Casablanca. Wind is an interesting option because of the city's track record in the aeronautic business sector; and local companies already produce a number of solar thermal components. Solar PV is much less developed, but the local electronics industry is well-established and could plug into the needs of a potential boom in photovoltaics. In addition, those international companies with major contracts with the Moroccan national government to install 2000MW of wind and 2000MW of solar power could be interested in being part of such a cluster. For local production, however, a key challenge would be to compete with international low-cost manufacturers, i.e. in Turkey or China.

Local Autonomy: A wave of decentralization in the 2000's has changed the way local politics is done in Morocco. Responsibilities are gradually shifting from the center to the regions, and to the municipalities. At the same time, these tasks often lie with delegated authorities that are subordinate to national institutions. Local (elected) officials still find themselves confronted with limited administrative and financial freedom. The regional authorities (the 'Walis') are appointed by the king. This means that environmental, industrial and energy politics are still largely influenced by the national level, even though decentralization is bringing policy-making closer to the citizens.

Local Government Role: The Regional Investment Center is (thus far) the sole initiator of the planned cluster. Local businesses only play a marginal role and would likely be taken aboard for such a public project; and the networking function of the local government would be of essence. Current plans consider various possibilities for local policies to support the success of such a cluster initiative. These include direct subsidies, tax credits, green energy certificates and VAT reductions. At the same time, it is unclear how such a

cluster would be structured within the local governance system, how independent it would be from existing institutions and where the budget would come from.

Cluster Strategy: Based on a 2007 feasibility study, Casablanca aims to build on its large industrial base. Given the ambitious renewable energy plans set out by the national government, much investment is expected all across Morocco. As a spin-off, many international companies, such as wind turbine and solar PV manufacturers could find potential production locations, in particular if local content policies are announced. This is an opportunity Casablanca does not want to miss.

Job Creation: Because of its industrial heritage, Casablanca has a significant potential to create jobs in the renewable energy sector. Future renewable energy deployment policies, whether national or local, would have a positive impact on the job potential, especially for the solar thermal and solar PV sector, where time-intensive installation is a major component. At the same time, much work is needed to develop additional training and education programs, as well as relevant research and development initiatives at the various higher learning institutions.

Outlook: Depending on the political will to fund the establishment of such a cluster, Casablanca could become an interesting location for the production of (sub-parts of) wind and solar equipment. However, national policies to stimulate local demand would be required if the businesses in the solar and wind sector are to benefit from such an effort.

SAN ANTONIO, UNITED STATES: Mission Verde Alliance

Geographic Location: 230kms from the Gulf of Mexico

Population: 1.521.000

GDP/capita: US$ 34.167 (2010)

Territory: 1.351 km2

Summary: The Mission Verde Alliance's objective is "to bring green technology and sustainable economy to the region" and leaves no doubt that there is still a lot of potential in relocating businesses to San Antonio. Main priorities are to attract new businesses to San Antonio, and create green jobs arcoss the municipality.

Cluster History: Founded in November 2011, the Mission Verde Alliance is a recent addition to the renewable energy cluster landscape. Its origins lie in a 2008 mayoral initiative and are defined as an "economic approach to sustainability" which did not have an exclusive focus on renewable energy, but also included energy efficiency and environmental conservation. The hope for an economic spin-off in the form of a green economy was the key notion for this initiative. While the cluster initiative has now started, it has not yet embarked on a membership strategy. At the time of writing, the alliance has a physical location and has been established as a one-stop center to coordinate sustainability efforts.

Cluster Factsheet: The cluster's objective is "to bring green technology and sustainable economy to the region" and makes it clear that there is still a lot of potential in attracting businesses that are not yet located in San Antonio. As part of this effort, one of its programs is directly aimed at green job creation, and includes a so-called green jobs leadership council with 15 members. The Mission Verde Alliance has set out a comprehensive strategy ranging from conservation measures to setting up a venture capital fund for multi-tech investments.

Local Autonomy: San Antonio's autonomy is determined by the State Constitution. In Texas, the granted autonomy for its cities leaves significant room to maneuver. San Antonio has the country's largest municipally-owned power company, CPS Energy. The city has created its own policies to promote sustainable energy and set renewables portfolio standards for the utility, without interference from the state. The state does not actively support the city's green economy ambitions and has thus far based its energy policies on conventional fuels.

Local Government Role: The San Antonio municipality sees the alliance and its office location as the central thread in the web of a new network of local clean energy professionals. In turn, the various city units are all encouraged to participate in the cluster activities; and municipal procurement of renewable energy is expected to stimulate further growth of economic development in the sector. The city-owned utility's own targets for 2020 include a 20% share of renewable resources (6% more than state level targets). In order to stimulate the local renewable energy business, feasibility studies looked at opportunities in the areas of energy storage, energy sector cyber security, solar hot water, solar PV and electric

vehicles. In the solar PV sector for example, concrete ideas to promote local economic development include the application for external solar grants, the national presentation of city examples of solar energy use, provision of training opportunities and reaching out to attract selected companies. The San Antonio Clean Energy Incubator is another initiative aimed at supporting innovative start-ups, which is a partnership between universities, research centers and civil-society organizations.

Cluster Strategy: The last two mayors of San Antonio have played a central role in the establishment of the alliance and view this initiative as a key element to the city's economic growth strategy. "Every once in a generation, there comes a fundamental economic shift that provides for terrific opportunities for cities that are willing to go out there and grab them. And today, that opportunity lies in our green economy". San Antonio is the fastest growing city in the state of Texas. The resulting challenges therefore include creating an attractive living environment for the city's vast population. In the context of the post-2008 financial crisis era, the initiative is also a decision to combat a feared-for economic downturn.

Job Creation: Traditionally a service, tourism, oil, gas and military economy, San Antonio is de-facto starting its renewable energy adventure from scratch. The potential benefits for job creation can be significant, if small businesses are able to benefit from the city's renewable energy deployment policies, and local authorities succeed in attracting larger companies to the area.

Outlook: The various initiatives throughout San Antonio are expected to consolidate further in the coming years. One of the major challenges in this will be to convince outsiders of San Antonio's green business profile and to build up a skilled workforce for the new sector.

4 Five Models for Municipal Engagement

Looking at the various ways cities have established renewable energy clusters (or have helped to do so), it is interesting to see that there are major differences in political starting points, planning and actual implementation and it is possible to distinguish between five city models of engagement. Each reflects a city's particular key characteristic in steering its local economy towards a greater share of renewable energy businesses.

Incubators

This model describes local governments, which are pursuing a strategy of creating a new industry sector in their municipality. San Antonio and Calgary fall into this category. In both cities, the local authorities have initiated concrete proposals to support the establishment of renewable energy companies or to 'recruit' them from elsewhere in order to increase the green economy footprint within the jurisdiction of the municipality. This 'building from scratch' needs very committed city leaders and creative, resourceful support on various fronts. All four local government roles discussed throughout this report are highly relevant for such a strategy.

Reformers

Baoding represents the second model. The reformer city finds the reason for a renewable energy cluster policy in the past. Industrial legacy without clear future prospects is an issue in many cities, and the green economy offers a window of opportunity to reform a city's economic profile. Such a restructuring process can be an advantage: in many cities that have a large industrial base there is ample capacity in terms of education, research and a technically savvy workforce. On the other hand, the lock-in effect of existing infrastructure should not be underestimated. It takes long-term investments, sound business plans and a lot of time to turn around industrial legacy. In the case of Baoding, the environmental catastrophe of the Baiyangdian Lake proved a catalyst and a similar 'trigger' might become the starting point of such initiatives elsewhere.

Multipliers

The multipliers are local governments that see a city cluster as a tool to strengthen the local business portfolio. Three out of five described city examples in this report can be considered as 'multipliers': Piracicaba, Hamburg and San Diego. All three cities already were a well-established office location for the renewable energy industry (this holds true to a lesser degree in San Diego, which saw the cluster initiative more as a follow-up project of the biotechnology sector). Piracicaba clearly saw its cluster as a means to build on existing strengths in the local ethanol industry, a strategy that is similar to Hamburg's idea that the municipality would be able to benefit from the already large number of wind energy companies. In all three city examples, the cluster in fact created a greater momentum that led to more economic development in the sector.

Executors

In the executor model the city has little autonomy vis-à-vis higher tiers of government and de facto serves as a local node of a broader (i.e. national) policy framework. The initiative power of the municipality can still be of significance, but a more centralized governance structure often means that there is a barrier to genuinely local, independent policy-making. In the case of Casablanca, for example, national policies have set a clear priority for renewable energy across all relevant authorities, including ministries, national agencies (such as the Moroccan Solar Energy Agency) and regional investment centers. Budgets for municipal action stem from the agencies that are responsible for economic development in the wider city-regions, and therefore do not have a purely local character. While autonomy might be a downside, executor type cities have the advantage of acting within a clear national policy framework and do not have to spend resources on advocacy activities in the capital.

Visionaries

The fifth model that we included in this list does not reflect any of the city examples presented in this report. Instead, the 'visionaries' describe a local government, which bases its cluster policy on a longer track record of environmental policies. In those cities, the municipality succeeded in implementing a green agenda and aims to strengthen the local entrepreneurial potential through establishing a local cluster. This is the case in cities like Copenhagen and Freiburg. Copenhagen was not included in this report because its cluster has a broader focus on cleantech, and not renewable energy. Freiburg was excluded because of its already well-established reputation for being a pioneer in renewable energy deployment and cutting edge residential developments such as in Vauban's low-energy community.

5 Recommendations for local governments

Some of the municipal experiences provide useful entry points for those city authorities who are interested in starting similar projects. While the local context needs to be taken account of, there are some issues worth keeping in mind when considering the best way to create a cluster in the renewable energy sector.

1) Invest in assessments

It is worth spending some time and resources in finding out where the potential lies for a local renewable energy industry. San Antonio is a good example of how market research has been conducted in the preparatory phase of a cluster initiative. It can help to establish a sufficiently large database on corporate strategies, market developments and macro-trends in relevant sectors. In turn, it is useful to benchmark the local situation with comparable experiences in other cities (even from other economic sectors). Casablanca has started its planning process with such an assessment.

2) Build on local strengths

A city always has a certain advantage vis-à-vis other business locations, be it on economic, geographic or other grounds. Local authorities can therefore design cluster policies in a way that these strengths are taken into account. In Hamburg for example, the wind energy business determined much of how the cluster was set up, and how its management works to promote the private sector's pro-wind attitude as the city's added value.

3) Work with what you have

Most cities are full of social networks; and these networks are full of committed people. When starting an initiative to establish a cluster, or a similar green economy project, local authorities can try to engage these existing structures within public, private or civil society organizations. Experience shows that personal commitment is a major driver of change. Renewable energy is a popular issue and there is a good chance that the best proponents for a city initiative are already active in this field. San Antonio is an interesting example where personal engagement from various stakeholders was brought together to establish the Mission Verde Alliance.

4) Address stakeholder's needs

Not everyone is waiting for a new structure to emerge as a cluster coordinating agency. Before deciding on the objective, design and governance structure of a possible cluster initiative, local authorities can identify the most urgent needs within the renewable energy community (if there is already one). This creates the necessary buy-in and helps to bring key stakeholders to the table from the start. In the case of Piracicaba, there was a strong interest

in further cooperation across the sugar industry; and Hamburg's wind energy entrepreneurs already had an interest in creating a platform.

5) Create mutual benefits

Closely related to the need to address stakeholders' interests is the idea to find win-win solutions for environment and industry. Economic growth is often incompatible with environmental policy, but does not have to be a zero-sum game. Local governments can demonstrate how a local green (energy) cluster can help achieve economic development while also fostering environmental protection and educational goals. In San Diego, the vision of a more sustainable city was the leading thought from the start of CleanTECH San Diego and continues to steer the cluster's work.

6) Dare to lead

It is critical that local leaders, be it the mayor, business leaders or the local trade promotion agency, formulate a clear vision for a planned cluster initiative. This can be bold and ambitious, because it should motivate people to act in its spirit. At the same time, realism is needed when detailing the concrete action plans. In Calgary, Baoding and San Antonio, local leadership was one of the most prominent features of the cluster initiative and had a major impact on the way the project was received by other stakeholders.

7) Think longer-term

While some municipalities have good experiences with keeping a close watch on cluster initiatives, it is worth looking into possibilities to create an independent structure and a sustainable business model, for example by collecting membership fees. As important as leadership and commitment are in setting up a cluster initiative, there is a danger of collapse if key advocates leave the scene. This is particularly the case in renewable energy, which is a relatively new sector and (still) dependent on political support. While none of the cities presented in this report have thus far encountered major problems because of discontinuity, leadership changes in San Diego and Baoding raise the question of how to make a cluster initiative a sustainable undertaking that is independent from only a few key individuals.

8) Encourage innovation

Research and development is expensive, and needs long-term commitment. Local authorities can play a crucial role in supporting various dimensions of the educational landscape, be it the promotion of vocational training centers, support for training colleges, provision of study grants or finance test laboratories. San Diego and Piracicaba are interesting examples of how local renewable energy clusters can be integrated in a wider agenda to support research and development.

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