The *Clean Energy Demo Zone* as a case of cooperation between the European Union and China

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Abstract

The *Europe-China Clean Energy Centre Project* (EC2) is implementing model of cooperation between the European Union and China in the field of clean energy through the creation of a *Demo Zone*. The *Demo Zone* is an urban area in a process of regeneration in which European policy experience and technological solutions related to clean energy are introduced, based on tools and methodologies successfully adopted in European demonstration projects.

Faced by the common challenges and in the search for shared growth opportunities, the EU 2020 growth strategy for a smart, sustainable and inclusive economy and the green and low-carbon transformation of the Chinese economy outlined in China's 12th Five Year Plan have laid a promising common ground for the emerging EU-China cooperation framework, supported by both shared political aspirations and concrete collaborative actions. In on-going and future policy-driven and action-oriented cooperation between Europe and China, energy security and sustainable urbanization are identified as two focal areas where both sides see common strategic interests as well as mutual benefits.

Given the challenges and opportunities inherent to the process of green transformation in China, and in particular in Western China, the clean energy *Demo Zone* that EC2 is developing in Urumqi, Xinjiang Region, represents a considerable potential for cooperation between Europe and China both at policy and technology/business level. The European urban demonstration projects have been chosen by EC2 as a reference background for innovative energy and environmental strategies in Chinese cities.

A *Demo Zone Toolkit* has been developed, *i.e.* a methodological set for public decision makers to govern urban projects, which have been tested in Europe with adaptations for the Chinese context. The key to this process is tackling the complexity of the urban demonstration setting using the right mix of innovative methods, which are well accepted by local stakeholders. Although the operation of the *Demo Zone* is still at an initial stage, the experience gained so far shows that this is a viable endeavour thanks to the strong support and commitment from both the Chinese and the European sides. This is facilitated by the role of EC2 as an effective and recognized platform for the dialogue between the Chinese and the European stakeholders, including public institutions, experts, research centres and businesses.

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Table of contents

Introduction

This paper illustrates a model of cooperation between the European Union and China in the field of clean energy that the *Europe-China Clean Energy Centre Project* (EC2) is implementing through the creation of a *Demo Zone*. The *Demo Zone* is an urban area in a process of regeneration in which European policy experience and technological solutions related to clean energy are introduced, based on tools and methodologies successfully adopted in European demonstration projects. The paper describes how sharing methods could impact on the Chinese approach on clean energy and low carbon development in an urban setting.

Section 1 sets the policy framework on which this model of cooperation is grounded. It describes EU-China dialogue on *Energy Security* and the *EU-China Partnership on Urbanization*. It then analyzes the Chinese "green economy transformation" launched by the 12th Five-Year-Plan. Focus is placed on energy priorities and targets as well as on the regional dimension of the future green development (in particular the *West China Strategy*, considering that the first EC2 *Demo Zone* is located in Urumqi, in the Xinjiang Uyghur Autonomous Region).

Section 2 summarizes the main objectives and achievements of EC2, a EU-funded project, aiming at increasing the introduction of clean energy technologies into China, through the support of technological cooperation as well as policy advice and capacity building to the Chinese Administration. It then illustrates *EURUMQI Demo Zone*, a pilot initiative that is being developed in Urumqi with the prospect of replication in other Chinese cities in their process of energy transformation and low carbon development.

Section 3 describes the European urban demonstration projects as a reference background for innovative energy and environmental strategies in China. It then illustrates the *Demo Zone Toolkit,* a methodological set for public decision makers to govern urban projects, which have been tested in EU demonstration projects with adaptations for the Chinese context. After setting the conceptual framework, the tools are described and conclusions are drawn from a preliminary "reality check" in China.

1. EU-China cooperation framework: turning common challenges into shared green growth opportunities

1.1 EU-China Cooperation on Energy Security and Partnership on Urbanization

To make economic and social development compatible with the preservation of the natural resources and environment will be one of the most crucial items on the policy agenda of the 21st century, not only strategically important for developed economies, but also particularly urgent for fast-growing emerging economies, like China. Faced by the common challenges and in the search for shared growth opportunities, the EU 2020 growth strategy for a smart, sustainable and inclusive economy and the green and low-carbon transformation of the Chinese economy outlined in China's *12th Five Year Plan* (FYP, 2011-2015), have laid a promising common ground for the emerging EU-China cooperation framework, supported by both shared political aspirations and concrete collaborative actions.

In on-going and future policy-driven and action-oriented EU-China cooperation, energy security and sustainable urbanization are identified as two focal areas where both sides see common strategic interests as well as mutual benefits in the bilateral cooperation. EU-China cooperation is fostered to enhance energy security through joint efforts to diversify sources of energy supply, strengthen the demand-side efficiency improvement, use of sustainable low carbon technologies as well as to enhance the dialogue on energy, environment and climate change related international and domestic policy experiences and best practices.

The *EU-China Joint Declaration on Energy Security*[1] and the *EU-China Joint Declaration on Urbanisation*[2] that were signed by the political leadership from both sides in May 2012 sent a strong message as well as outlined clear priorities for the future EU-China cooperation in the fields of energy and urbanisation, such as:

- Energy efficiency in industries: strengthen EU-China cooperation on advanced technologies and regulations to improve energy conservation and efficiency improvement in industrial processes;

[1] For more details see:
http://ec.europa.eu/energy/international/bilateral_cooperation/china/doc/20120503_eu_china_joint_declaration_energy_security_en.pdf

[2] For more details, see
http://ec.europa.eu/energy/international/bilateral_cooperation/china/doc/20120503_eu_china_joint_declaration_urbanisation_en.pdf

- Low carbon urban construction**:** strengthen exchange in the development of low carbon urban energy supply and demand management systems, including energy efficient buildings, clean and high-efficiency urban transportation and integration of renewable energies in urban settings;
- Renewable energy: comprehensive use of renewable energies, grid access and distributed renewable energy systems.

1.2 China's 12th Five-Year Plan for green transformation and its regional dimension

From a Chinese perspective, China has already embarked on the pathway towards a green development since the past decade. The on-going process of building a resource-saving and environmental-friendly society as well as the development of the circular economy and low-carbon economy has already laid down promising groundwork. The real issues now are how to accelerate and deepen China's green transformation, given the scale and the complexity of the challenges that China faces. Therefore, the policy message from China's 12th Five-Year Plan (FYP, 2011-2015) was resolute and unambiguous: China needs to accelerate the transformation of its mode of economic development, moving from an unbalanced, uncoordinated and unsustainable development towards a green, competitive and inclusive economy.

In the process of realising the green transformation with domestic efforts as well as through international cooperation, the regional dimension will be key for making fundamental and real changes on the ground. It is of particular importance for China given the sheer size of the country as well as the large diversity across regions. At the heart of a green regional development agenda is a differentiated approach, taking into account region-specific development needs and constraints, and more importantly, identifying and creating context-specific green development enablers and opportunities. In other words, a "green paradigm shift" in national and regional policy making implies a diversified and enhanced development strategy, aiming to bring a transformation of both mind-set and practice.

Western China is important for China's green development at both the regional and national level because of its multiple strategic importance. The resource richness and ecological significance, fragility and diversity of Western China have been well documented. This region provides a large amount of resources and essential ecosystem services that have fuelled social and economic growth in the rest of China as well as being essential elements of the global environment. Driven by the large regional and national demand for energy, raw material as well as related infrastructure development, Western regions has outpaced Eastern regions on GDP growth in the 11th FYP period (2006-2010) and will mostly do it again in the 12th FYP (2011-2015) by 1-2%.[3] However, Western China has paid a high price, in terms of both sustainability and equality, for China's rapid economic growth characterized by high resource-intensity and low eco- and economic efficiency in the past decades.

Despite ambitious government interventions, in particular the first phase of Western Development Strategy (WRDP, adopted since 2001 for the period of 2001-2010) and significant progress made in areas such as infrastructure and poverty alleviation, Western China is still suffering from the entwined environment-climate-poverty problems and is heavily affected by the unsustainable and extensive development mode. For instance:

- While the western region has in general experienced a higher economic growth, in particular during the 11th FYP period, the growth mode is highly unsustainable – heavy reliance on capital investments and, to an increasing extent, on energy intensive industries, partly as a result of the transfer of production bases from the coastal and eastern regions;
- While the WRDP was intended to address economic, regional, ecological and security concerns, the embedded trade-offs and conflicts between different policy priorities – e.g. achieving economic growth, enhancing environmental protection and securing national energy and resource security – proved to be difficult to overcome and have prevented the western region from fully realising its development potentials;
- Development has so far relied disproportionately on the support of the central government – how to generate self-sustaining development and break the vicious cycle of "poverty-environment deterioration" remains a challenge;
- Many regional projects under the WRDP, e.g. energy projects, were designed to achieve national, rather than regional goals. Consequently, while the WRDP has benefited the whole country (as a net exporter of raw material and energy), the gap between the eastern and the western regions is still widening.

[3] Source: McKinsey Insight China – Macro model update, March 2011.

Therefore, the 12th FYP period signifies a critical crossroad/turning point for the on-going Western Development Strategy[4] – having accomplished the "Foundation-Laying Phase (2001-2010)" and entering the second "Growth Acceleration Phase (2011-2030)". A business-as-usual approach or an earnest attempt to catch up through resource-intensive and heavy polluting industrialisation will not be an option in the face of natural resource degradation, biodiversity loss and the need to greatly improve the livelihood of a large number of poor people. To achieve stability, sustainability and equality in this region and for China as a whole, it is of great importance and urgency to re-think, redirect and revitalise regional development to be in line with a green development roadmap/pathway.

The *Guideline for the Western China Development in the 12th FYP* was approved by the State Council in January 2012. Having recognised Western China as the "short plate" (短板) in China's regional development and a key component of an all-round well-off society, the following key tasks have been identified for the Western Development Strategy in the 12th FYP period:[5]

- Clarify the Main Functional Zones – with targeted and differentiated guidelines in key economic development zones, main agricultural production zones, key ecological protection zones, resource abundant zones and severe poverty zones;
- Continue with the priority given to infrastructure, with a particular emphasis on transport and water;
- Enhance ecological restoration and environmental protection, and to reverse the trend of degradation and deterioration at the source;
- Accelerate the development of competitive industries and establish manufacturing bases for energy, resource processing, equipment manufacturing and other emerging strategic industries;
- Accelerate the development of modern agricultural practices and agricultural processing systems with regional/local characteristic; and to diversify and broaden income sources of farmers;
- Foster the development of medium- and small-sized cities and townships with local characteristics, and improve the level and quality of urbanization;
- Prioritise the development of education and invest in job creation; further improve the equalization of public service provision; enhance S&T and innovation capacity and promote an "innovation-oriented region";
- Enhance economic openness towards both domestic and foreign actors; and enhance the incentives and dynamics of economic development.

For the first time, "ecological security" strategy was put forward in China's 12th FYP. The Western region, which accounts for 85% of China's national natural reserve areas and 70% of the state-level protected ecosystem and species, will be the centre of this national strategy. In addition to specific energy-saving and emissions reduction targets (see Table below), a number of circular economy and low-carbon pilots will also be implemented in different regions and with various scales in Western China.

- Circular economy pilot areas: totally in 12 cities of Western China;
- Circular economy pilot sector: iron & steel, non-ferrous metal, coal, power, chemical, construction materials, light industry, manufacturing, agricultural product processing etc.
- Circular economy pilot industrial parks: 12 parks
- Low-carbon province and cities.

Table Energy-saving and emissions reduction targets for Western China in the 12th FYP

Target	Specification
Energy and climate	Energy consumption per unit GDP reduced by 15% by 2015 (excluding Tibet).
Environmental protection	COD and SO_2 emissions reduced by 4.5% and 3.5% by 2015, respectively. NH3-N (ammonia nitrogen) and NOx emissions reduced by 6.8% and 3.4% by 2015, respectively.

[4] The Western Regional Development Strategy was proposed as a three-step strategy: 1) Foundation-Laying Phase 2001-2010, 2) Growth Acceleration Phase 2011-2030, and 3) All-Round Modernisation Phase 2031-2050.

[5] Source: http://finance.sina.com.cn/g/20120110/044411163771.shtml.

Water resources	Water consumption per unit of value-added industrial output reduced by 30% by 2015.
Ecosystem restoration	Forest coverage to reach 19% of the landmass and forest stock to be increased by 330 million M^3 by 2015. Grassland ecological deterioration trend halted, soil erosion area significantly reduced;
Urbanisation	Growth rate for urban and rural residents higher than national average; urbanisation rate over 45%; urban economic house coverage over 20%; registered urban unemployment rate controlled under 5%; poverty population significantly reduced.

Source: 12th Five-Year Plan for Western China Development, NDRC, 2012.

In comparison to previous policy focus during the first phase of the WRDP, the underlying policy messages from the new guideline in the 12th FYP reflect a stronger and clearer recognition of the region-specific development needs and potentials. This is of particular importance for Western China, not only because of the disparities and differences between Western and Eastern China, but also the rich intra-regional variation *within* Western China itself, in terms of endowment, development level and potentials. At the same time, in the face of new challenges, in particular in terms of climate change and a greater need for social cohesion and stability, there are indeed potentially critical and inherently difficult issues under the new WRDP strategy. To deal with the challenges as well as reap new opportunities, a green regional development in Western China involves various *capacities, structural and institutional issues:*

- As a matter of fact, the Western region has already outpaced the Eastern region on GDP growth. The key question, in a green economy context, is how the transformation of growth pattern, or more explicitly the quality and the efficiency of economic growth, will be improved without affecting continuous and rapid GDP growth in Western China.
- As a result of the black/brown growth model, the pattern of "low-income and low emission" is no longer entirely true. Instead, poor provinces in the Western region have the highest carbon footprint, in terms of both per capita level and intensity, i.e. CO2 to GDP ratio. Consequently, a critical question is how to timely break the low-income, high-emission and high-pollution lock-in and to pursue a green and low-carbon leapfrogging in Western China?
- While recognising the conventional "public investment-driven" and "fiscal transfer-supported" strategy alone was not, and will not be, sufficient to create the incentives and the dynamics for a vigorous and sustainable regional development, how can the Western region use market forces/mechanisms and diversify financial resources based on Public-Private Partnership (PPP) to achieve a green regional development?
- To generate a fundamental and effective shift in mind-set and behaviour, both structural barriers and drivers for a green transformation at the regional level need to be fully recognised and understood. This will in turn involve making changes and improvements in key framework conditions, in terms of both national and regional policy framework and decision-making process. The on-going policy debates and reforms concerning central-regional and inter-regional relations needs to take the green regional development dimension seriously. For Western China, improvements in the institutional set-up for systems of responsibility and accountability, the approach to combine government support with market mechanisms as well as the on-going fiscal and taxation reforms can have a profound impact on its green development.

Given the above challenges and opportunities inherent to the process of green transformation in China, and in particular in Western China, the clean energy *Demo Zone* that the *Europe-China Clean Energy Centre* is developing in Urumqi (Xingjian Region) represents a huge potential for cooperation between Europe and China both at policy and technology/business level.

2. The Europe-China Clean Energy Centre (EC2): a vehicle for cooperation between the EU and China

2.1 EC2: the origins

The opportunity to establish a *Europe-China Clean Energy Centre* was recognised in the joint statement of the 10th China-EU Summit of December 2007: "The two sides maintained that the energy issue is a global issue which is closely related to the economical and social development of all nations. Both China and the EU recognised the importance of enhancing bilateral communication and cooperation on this issue, and agreed to take effective measures and continue to promote their mutually beneficial and practical cooperation in the energy field (…). Leaders endorsed cooperation in establishing a China-EU Clean Energy Centre. The two sides will contribute to conduct consultations in this regard with a view to reaching agreement and opening the Centre"[6].

European strategic position *vis-à-vis* China, reflected in *China Strategy Paper 2007-2013* and the *China Multi-annual Indicative Programme* (MIP 2007-2010)[7], sets as a priority to "assist China in tackling global concerns and challenges over climate change, environment and energy" and more specifically foresee to "provide technical assistance to promote energy sector reforms, energy efficiency, energy savings and the use of renewable and clean energy and energy technologies…".

From the Chinese side, in December 2007, the State Council of China released the *White Paper on China's Energy Situation and Policies,* stating that international cooperation shall be conducted in fields such as "*energy development and utilization*" and "*research and promotion of advanced technologies*"[8].

In 2009, the European Commission and the Government of the People's Republic of China agreed to support the set up of a *Europe-China Clean Energy Centre* (EC2) and signed a Financing Agreement to this effect (March 2009)[9]. EC2 project implementation started in March 2010 by a partnership of Chinese and European organisations[10]. The project phase will end in March 2015; however it is envisaged that EC2 will become an autonomous entity and will continue to operate further.

The EC2 Project aims at "an increased use of clean energies through improved access to international, and most particularly European, policy, regulatory framework and technology experiences and best practices"[11]. This will contribute "to support China in its efforts to shape a more sustainable, environment-friendly and efficient energy sector"[12]. EC2 has three lines of activities: support to technological cooperation, policy advice and awareness raising. The main beneficiaries of EC2 project are Chinese central and local governmental institutions and European and Chinese businesses.

2.2 EC2's strategy: the clean energy *Demo Zone*

The strategic orientation followed by EC2 to facilitate the technological cooperation on clean energy and the exchange of good practices between the EU and China consists in focusing on an urban demonstration site (*Demo Zone*) in which integrated technology and policy solutions are adopted.

Demo zones can be defined as physical areas of cities, able to achieve efficiency and cost savings as well as strategic solutions otherwise either out of reach or too technologically challenging. The Demo Zone concept covers activities related to energy efficiency, renewable energies, smart grids, low-carbon districts and smart community concepts, using a holistic approach.

To test the approach, EC2 was assigned the challenge of drawing up a development strategy for the city of Urumqi, the capital of Xinjiang Autonomous Region in Western China. The city has embarked on an ambitious plan to reshape the structure of its industry, transform energy development, combat air pollution and reduce GHG emissions. Some 2,000 years ago, the city location just off the main silk routes helped promoting economic and cultural exchanges between Europe and Asia. Today, its rapid industrialization and urbanization have given it a leading position among

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[6] 10th China-EU Summit, Beijing, 28 November 2007, *Joint Statement* (16070/07 - Presse 279)

[7] http://eeas.europa.eu/sp/index_en.htm

[8] http://www.china.org.cn/english/environment/236955.htm

[9] *Financing Agreement between the European Community and the People's Republic of China, Europe-China Clean Energy Centre* (EC2), DCI-ASIE/2008/19218.

[10] Politecnico di Torino (I); University of Calabria (I); The Euro-Mediterranean Centre for Climate Change (I); Chalmers University of Technology (SE), Commissariat à l'Énergie Atomique (F); Regional Environmental Center for Central and Eastern Europe (H); Chinese Academy of Social Sciences (CN); Energy Research Institute of the National Development and Reform Commission (CN); Tsinghua Unirversity (CN).

[11] European Commission, The Europe China Clean Energy Centre, *Guidelines for Applicants* (2009).

[12] European Commission, The Europe China Clean Energy Centre, *Guidelines for Applicants* (2009).

the five capital cities of Western China, with the inevitable result that it is one of the most polluted cities in China and in the world. Urumqi needs to have a new green and low-carbon growth model for its on-going and future economic development. To achieve this, it requires a comprehensive master plan with a fresh vision, new and long term targets and innovative concepts.

EC2 is providing guidance to the city of Urumqi on innovative and low carbon urban planning. The identification of integrated demonstration actions is based on the *Energy Conservation and Emission Reduction Plan* and the *Circular Economy Plan* that the City of Urumqi has elaborated within the framework of China's 12th Five Year Plan. The local commitment of attaining the targets set in the 12th Five Year Plan at the city level triggers a considerable financial flow from the central government to local projects. EC2 facilitates the introduction of successful experiences and technologies in collaboration with EU cities and industries, based on a method and a dissemination mode for replication in other cities in Western China.

Given its intrinsic complexity, the Urumqi demo zone challenges could only be met with a strong methodological background, which has been translated into the elaboration of a *Demo Zone Toolkit*. It incorporates methods for governing urban projects tested in EU Demonstration Projects with adaptations to the Chinese context. Methods are made available to city managers to provide practical support and a structured framework for better planning.

The launch of *EURUMQI Demo Zone* initiative (Energy & Urban Regeneration Using Methods Quality Innovation) took place in May 2012 using an innovative method for Urumqi, a "Vision Workshop", in which representatives from the Chinese central government administration, the city of Urumqi, the EU Delegation to China as well as European and Chinese experts and business representatives gathered to reach a common understanding on the visions for the future of the city and on low carbon development and energy priorities. The presence of European experts and the use of interactive methods allowed participants to openly share ideas, express desires and concerns even within a heterogeneous group in terms of administration layers and geographical areas.

3. Demonstration projects: conceptual framework and its implementation approach in China

3.1 Demonstration projects as vehicles for sustainability

Urban Pilot Projects, in Europe, focus on "sustainability" addressed on several levels: a new way, not exclusively technical, to deal with the project, multi-disciplinary, multi-actor. Urban Demonstration Projects, such as *CONCERTO*[13], are major tactical projects in the complexity of the city. The integrated management of these projects needs a huge team effort that should last even ten years, all at high intensity. The cross-fertilization of experiences between local leaders, professionals, citizens and industries is a strong point of the integrated methodology. European cities capitalize on each other's experiences, being able to share methods, procedures and results associated with the initiatives of each city. Built-in demonstration projects, a large number of phases to allow cross-cutting working groups in different cities to join the development of joint activities, are carried out homogeneously and are useful to compare experiences and to adopt the patterns of success.

Urban Demonstration Projects show that innovation occurs when a process reaches a critical mass capable of overcoming the inertia of the "orthodox system" and, only by insisting on new and innovative methods and processes, cities can:

- strengthen and empower the players who live and work locally;

- strengthen the concept of "partnership" and cooperation on specific targets;

- create discontinuities in order to implement more ambitious programmes compared with the current practice.

Cities both in China and Europe have to manage complex problems of urban transformation, no longer segmented into single approaches or technical solutions. In such a context, Urban Demonstration Projects help cities by representing a continuous reference for innovative energy and environmental strategies.

China currently has 12 cities with more than 5 million inhabitants and has about 600 million inhabitants living in urbanized areas/environments. By 2030 the urban population will reach 1 billion[14]. A massive migration to cities, never been experienced in any previous period of human history, is already in place and will continue for years. In China it is highly recognised that environmental degradation as well as shortages of water and energy resources are increasing risks both in the current stage and in the long run, in case Chinese do not know how to design new cities

[13] CONCERTO is a European Commission initiative within the *European Research Framework Programme* (FP6 and FP7)

[14] For more details, see "Preparing for China's urban billion", Mckinsey Global Institute, 2009. http://www.mckinsey.com/insights/urbanization/preparing_for_urban_billion_in_China.

and urban recoveries in an efficient and sustainable way. It is also clear that if the environment fails, both the economy will fail. The so-called "sustainable" urban technologies are the most interesting for Europe, but even more for China, because of the huge transformation occurring. China could become the largest market of European urban technologies: energy, water, environmental control, mobility and info-mobility, smart building, and their expertise.

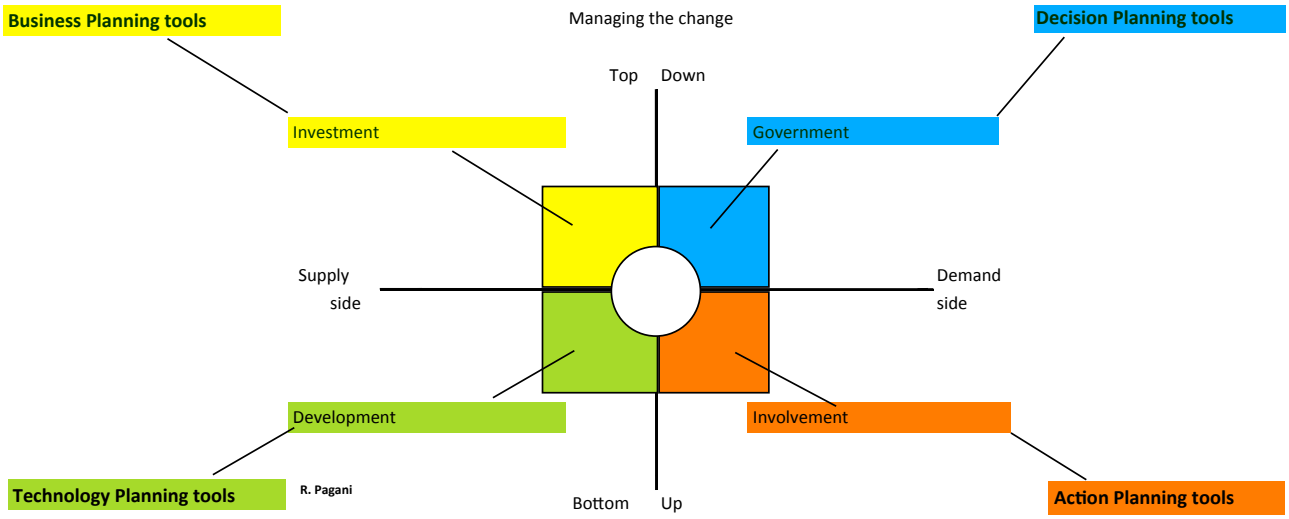
The risk for urban contexts consists in the so-called “extensive sustainability” that is being too much focused on the supply side of energy, while insufficient attention/emphasis is given to the management of the demand side of energy. Every city, every industry, every manufacturer wants to be somehow sustainable. However it is not sufficient to set up some solar collectors or equivalent solutions to make a sustainable building; similarly, a sustainable district is not the simple combination of two or three sustainable buildings, and a sustainable city is not made by two or three sustainable districts. This risk and limitation is equivalent both in China and in Europe.

One of the reasons why European cities can be seen as “show cases” in the Chinese context relies on the value of “durable permanence” which is somehow part of the long duration of the building construction in Europe. French language does not have the world “sustainable”. French translates it into “durable” and this gives one of the main concept of sustainability, which should also play a role in China. Having the condition of “durability” as one of the main principles in developing projects, sustainability could be enhanced due to the intrinsic value of duration, which implies an efficient utilization of resources and a reduction of energy consumption linked to the durable and high-standard permanence in shape of any construction.

3.2 The *Demo Zone Toolkit*

The *Demo Zone Toolkit* aims at providing the public decision makers with a methodology to comply with sustainable urban projects. It incorporates a number of methodologies for the guidance of complex and integrated projects that have been proven to be successful in Europe.

The structure of the Toolkit is based on an interpretation diagram for describing urban policies and sustainable decision-making (see figure below).



It can be summarised into four fundamental approaches:

Top-down approach - Related mainly to the activity of governments and/or institutions when introducing new regulations, as well as when reducing regulatory and procedural impediments

Bottom-up approach - Organising the needs of a community and preparing the policies that comply with these needs

Demand-side approach - Concerning the end-uses of citizens and their needs: mobility, housing, quality of life, economic opportunities, healthy environment, and so on

Supply-side approach - Refers to the capability of the market to organise the production of goods, services, and technologies, which respond to consumers' need.

These four approaches create different urban policy consequences.

One approach is neither more nor less important than the other, but all can be equally significant and effective as part of coordinated and integrated implementation, when pursuing objectives of a better urban quality.

In practice, the urban policies are not exclusively "top down", or "bottom up", or only "supply-side" or "demand-side". Usually policies are a combination of the four approaches and can be placed in a Cartesian diagram, which refers to the supply ↔ demand on the X axis and the top-down ↔ bottom-up on the Y axis (see figure). This conceptual framework gives the innovative organisation of the project. The "urban strategies" diagram is:

"Top-down / Demand-side" This is the city and institution area when planning or deciding, in the interests of the general public - the domain of "Government"

"Bottom-up / Demand side" area is considered the domain of "Involvement" and partnership, where stakeholders or citizens get involved and participate in decision making processes

"Bottom-up – Supply side" area is the domain of "Development" of best practices, which supplies integrated responses and methodologies to urban problems with the involvement of professionals and educationalists

"Top down – Supply side" area is the domain of "Investment" in urban technologies and marketing of them. This involves the supply of technical solutions and industrial products to the sustainable city concept.

Based on such a decisional mapping, urban demonstration projects should never focus on just one approach, with only one although relevant player, but shall involve the participation of multiple stakeholders to address economic, environmental and social issues in urban decision making and longer lasting and thus more sustainable solutions to the urban problems.

Demonstration Projects are processes that take place and tend to persist in the urban context. They consist of a mix of technical and non-technical interventions, pervasive enough to involve all aspects of the decision process. The *Demo Zone Toolkit* helps in finding the most appropriate methodology for tackling any specific problem, in a certain step of the process.

Many tools are normally used in Europe in demonstration and pilot projects to facilitate decision-making and design processes. Based on the previous conceptual framework, only a limited number of tools have entered the toolkit, after a careful selection among the most recurrent, giving to them a categorization and structure.

The list of tools follows the previous organization into four sectors:

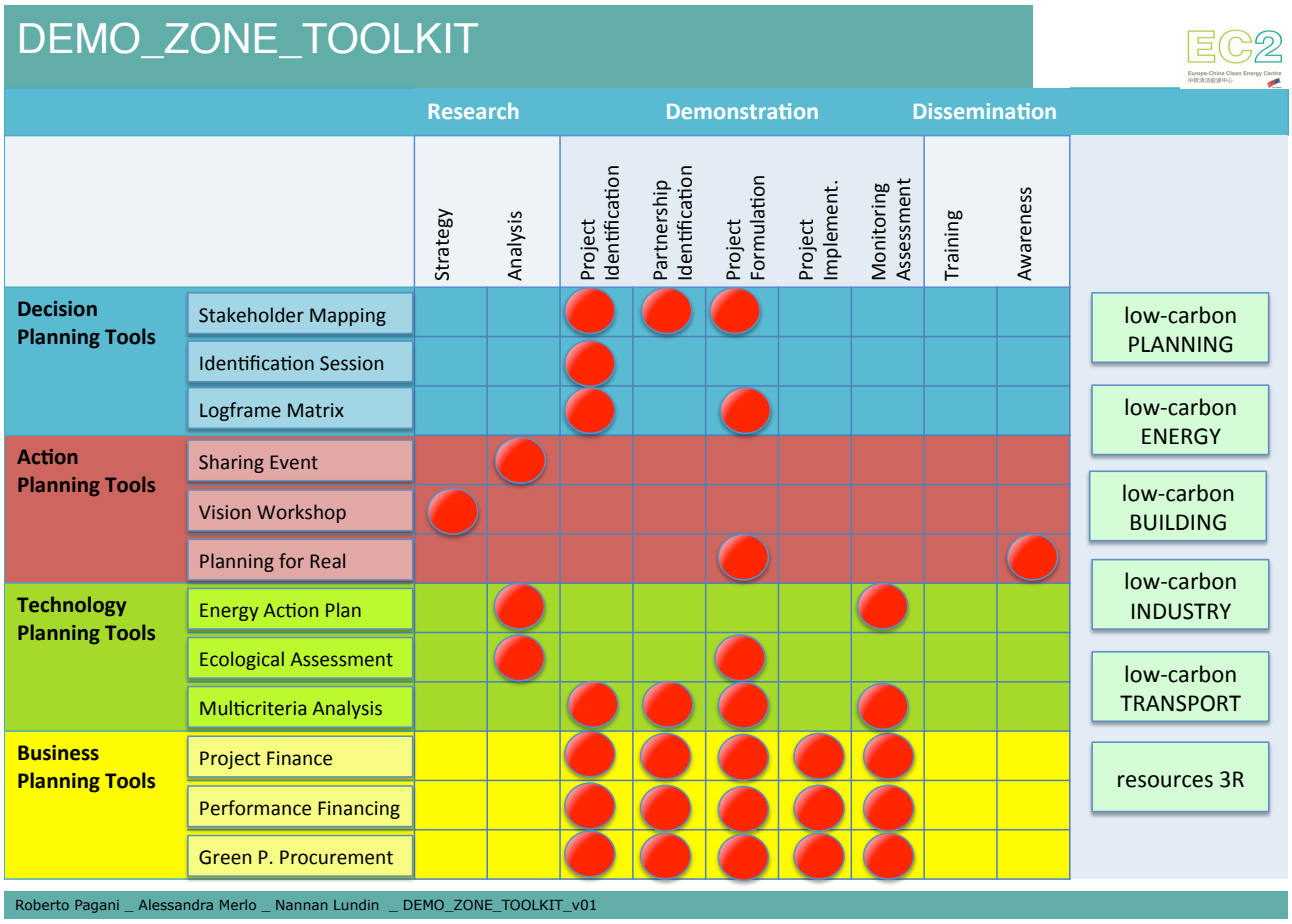
- GOVERNMENT: Decision Planning Tools
- INVOLVEMENT: Action Planning Tools
- DEVELOPMENT: Technology Planning Tools
- INVESTMENT: Business Planning Tools

Before introducing the tools we have to explain the "matrix" on which the toolkit is shaped. The matrix consists of the tools categorisation, on vertical, and the demonstration phases in horizontal. Each of the previous tool categories includes 3 fundamental and well-grounded tools that will be later commented.

The demo phases include the three main steps of any demonstration project, as recognised in EU project framework: Research, Demonstration, Dissemination, as well as the sub-steps of each of the previous macro-phases.

Based on this categorisation of tools across various steps of demonstration processes, a matrix of preferential applications has been compiled, to guide users to better understand the comprehensiveness of the Toolkit.

We need to remark that there are not strict rules of adoption of any specific tool in any specific phase. In a single EU Integrated Demonstration Project not all of these tools are used at once. We can draw profiles of different celebrated demonstration projects, by tracing the tools that were used, at different steps, for improving decision-making and provide innovative solutions. Only few of these tools were probably fully implemented in a single project, just to avoid redundancy. However, the list of the potential applications is highlighted by red-buttons on the matrix.



This toolbox incorporates methods for governing urban projects tested in EU Demonstration Projects with adaptations to the Chinese context. Methods are made available to city managers to provide practical support and a structured framework for better planning. They help in cross-fertilisation among city decision makers, experts, professionals and developers.

The elaboration of the *Toolkit* has been guided by a main concern of adaptability to the Chinese context. A number of tools have already been tested in the framework of the *EURUMQI Demo Zone* initiative (namely the "Vision Workshop", as highlighted section § 3.2, and the "Sharing Event"). Furthermore, the Toolkit has been submitted to a "reality check" in a Review Session in Beijing attended by representatives of Chinese central and local governmental institutions, NGOs, EU Member States, business community members, and experts[15]. The conclusions of such review are reported in the below sections dedicated to the description of the tools.

3.3 A_Government: Decision Planning Tools

The aim of Decision Planning Tools is to "govern" sustainable urban transformations from conception to implementation and management of transformations.

The Decision Planning Tools included in the Demo Zone Toolkit are based on the *Logical Framework Approach* (LFA), a planning methodology for public programmes and projects widely used by several national and international organisations around the world.

This approach was first adopted in the context of external development programmes by USAID in the early 1970s, based on private sector "management by objectives" principles. The European Commission adopted the LFA in the early 1990s as part of the *Project Cycle Management* of European development cooperation. Similar approaches based on the logical framework method are followed by development agencies such as the World Bank, the Asian Development Bank, GiZ, DANIDA, etc.· in their partner countries, including China.

The LFA is particularly useful to design any kind of public interventions whatever its degree of complexity (from small projects to large programmes), its nature (tangible or intangible) and scope (sector-related, regional, local). The use of this method enables the identification of a series of means-ends links (the objectives hierarchy) derived from a

[15] For a brief summary of the event see: http://www.ec2.org.cn/en/news/ec2-demo-zone-toolkit-review-session-held-beijing.

systematic cause-effect analysis. It provides an overview of the project goals - framing them within the relevant policy objectives - the means to achieve them and the necessary resources. It includes the assumptions on which the project is based enabling the adoption of risk management strategies, and provides the information to measure the results for monitoring and evaluation purposes. Aspects related to the sustainability of the project are incorporated in the design since the beginning so as to make the flow of benefits deriving from the public intervention last over time after the investment phase.

The LFA assumes a good knowledge of the context in which the project is designed and implemented and requires practitioners to focus on the real needs of the beneficiaries. Stakeholders' consultation and problem analysis based on their perceptions is one of the key aspects of this approach. The method has a strong potential to help all those involved in a project to exchange their view and reach a consensus about what is valuable and feasible. However this can happen only if real consultation and negotiation are accepted.

DECISION PLANNING TOOLBOX

A1_Stakeholder Mapping Tool

The *Stakeholder Mapping* is a method to analyse the stakeholders of a project and visualize the relationships among them. It provides a picture of the individuals, groups of people, institutions, companies, having a link with the project (either as beneficiaries, implementers, facilitators or adversaries) and helps establishing the framework within which the stakeholders' participation may take place at project planning and implementation stage.

The mapping of the stakeholders is based on the premise that different groups and institutions have different interests, motivations and capacities in relation to the relevant context. These need to be identified and understood in project design, in order to maximize the social, economic and institutional benefits, and to minimize negative impacts.

A2_Identification Session Tool

The Identification Session is a participatory group event in which stakeholders' representatives analyse a reference context (a city, a neighbourhood, a demonstration area), identify issues and reach a consensus on the course of action to be followed. It is a tool to identify public projects and programmes based on a thorough problem analysis.

A project is a vehicle to innovate, an effort to transform a negative situation into a positive one. To make this transformation possible, it is crucial to have a clear picture of the starting point and to know the problems to address through the intervention. The exercise consists in depicting the initial negative situation (problem analysis), to transform it into a positive situation (objectives analysis), and to identify the lines of action to be pursued.

A proper consultation of stakeholders during the Session, complemented with a stakeholder analysis, helps to set priorities, checking how realistic the achievement of some objectives might be and identifying additional means that might be needed to achieve desired ends.

A3_Logframe Matrix Tool

Logframe Matrix is the summary of the essential elements of a complex project (hierarchy of objectives; indicators; sources of verification; external factors/risks). It allows information to be analysed and organized in a structured manner to guide decision makers understanding the project rationale, its objectives and the means by which they will be achieved. It is used for project design as well as for management and evaluation. It provides the basis on which activities, resource requirements and costs are determined, and can be split among different partners. The completion of the matrix should follow a process of analysis of the stakeholders and of the problems (as outlined above).

Reality check in China

The Decision Planning tools based on the *Logical Framework Approach* have a varied track record of application in China in the framework of development cooperation projects (by the European Commission, the World Bank, the Asian Development Bank, etc.). The problem analysis approach is already used in some urban regeneration projects in China and similar tools as the *Logframe Matrix* are internally used by Chinese municipalities.

The lessons learned from a reality check in China highlights that a systematic use of stakeholders' analysis can help expanding the project planning scope, by showing the importance of other relevant entities that could be included in programme. The stakeholder analysis enables a more effective communication with key actors and the prioritization of their needs. Moreover, it is key to identify the right interlocutor in each stakeholder group. On the other hand, engaging stakeholders very late in the process could result in poor engagement or it could constitute a barrier to the project.

It has also been observed that the analysis of the stakeholders is very difficult in those settings where there is not a participative culture, there is too little or no clear information or conflict is present within an interest groups or organization. The poor facilitation in the stakeholders' consultation process is recognized as being a major drawback. Very often the most effective way to obtain information from stakeholders is through informal channels.

There is a better chance of success in solving critical issues if there is a public participation in identifying such issues (as it is done by Beijing municipality when compiling the "annual list of critical issues"). Starting project design from problem analysis rather than from objective setting, as it usually happens, is more effective, as it enables finding the real roots, the target audience, and the achievable objectives and feasible solutions. The identification session method is appropriate when there are technical issues, which could be solved with technical solution; its application is more difficult when other types of issue have to be solved. The most crucial aspect is setting appropriate indicators. There is a strong need to improve the quality of the indicators, so as to improve the measurability of results and objectives.

3.4 B_Involvement: Action Planning Tools

This toolbox provides training to city planners and urban managers, from the very beginning, by means of workshops and participatory methods that belong to the Action Planning Tools. Action Planning Tools help local administration to understand and to experience new processes of governance, recognizing their potentiality and sustainability in economic, environmental, social and cultural terms.

The key and common elements of Action Planning Tools are intense community-based or stakeholder-based workshops, carried out over a period of one to five days, depending on the specific goals of the workshop: sharing, visioning, designing. The workshop output is basically a development plan, which includes a list of strategies, options, and prioritized opportunities for dealing with the problems, and a work programme describing who, when and what is to be done. Methods are based on equal relation between the professional technical inputs and the community.

ACTION PLANNING TOOLBOX

B1_Sharing Event Tool

The aim of a *Sharing Event* is to exchange experiences and knowledge belonging to different contexts (e.g. China and the EU) that can influence or upgrade existing practices or originate new ones. The event is centered on a topic or an issue, which is presented from different perspectives (the Chinese and the European). A discussion is then conducted around a number of elements characterizing the issue (*key words*). For each key word two questions are raised: *"What does not work?"* (weaknesses, risks, unsuccessful aspects, barriers) and "*What works?" (strengths,* factors of success, good practice*s).*

This method has proved to be very effective in terms active participation and comprehensiveness of the conclusions. The participants are systematically invited to reflect on their experience and to express themselves writing down on cards, which are then clustered topic wise to facilitate the exchange. Focusing firstly on what does not work enables a discussion on how to avoid mistakes that others have already made.

B2_Vision Workshop Tool

The Vision Workshop is an instrument for increasing the participation in the choices associated with scientific and technological development. It allows stakeholders to exchange information and to discuss the central themes and processes that govern technological development and the impact of technology on society. Directing the discussion in such a way as to stimulate the capacity for planning and identifying solutions to existing problems. The Vision or Scenario Workshop aims at encouraging public debate, to create a balanced relationship between society, technology and environment and to ensure sustainable development according to the wishes and needs of local communities.

B3_Planning for Real Tool

It allows people to produce plans of actions at structured sessions at which all those affected work creatively together. Planning for Real helps in developing design ideas on urban regeneration bringing people on site and helps their

creativity to shape the urban transformation. Method for community involvement in planning and development which uses simple models as a focus for people to put forward and prioritize ideas on how their area can be improved.

Planning for Real, also known as Community Planning, is a highly visible hands-on tool which people of all abilities and backgrounds find easy and enjoyable to engage in.

Reality check in China

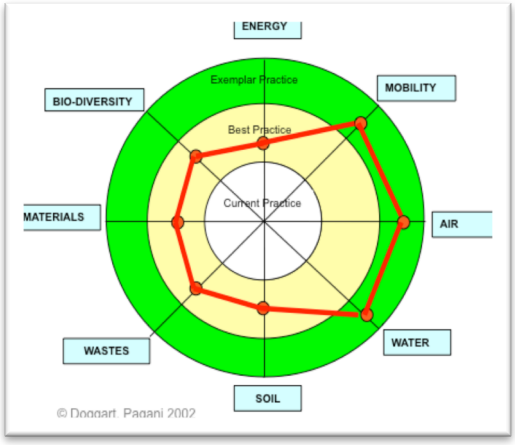
Having submitted the Action Planning toolkit to the quality check of Chinese experts and governmental stakeholders, it appears that there are no specific obstacles in applying the EU experience into the Chinese context. The "Sharing event" method, for example, is extensively applied in China, though it is called "investigation". When policy investigation are made, in some Chinese regions on the 12thFive Year Plan on Energy Conservation and Emission Reduction, before making any in-depth analysis, meetings with key stakeholders and government officials are organized to collect their previous experiences. Local meetings for promoting awareness were experienced to be indeed useful (classrooms and micro-blogs were more useful than roundtables).

The vision workshop is an interesting approach, especially for local participants. In the already experienced events, participants found it was interesting that they were encouraged to express their views and suggestions for future developments. Still, there is a need for adaptation: after asking them a feedback, they replied (besides being satisfied) that there was a distance between what had been discussed and what could be implemented in their daily work. Furthermore, when they were asked to vote for priorities, there was a clear reluctance to show their preferences and anonymous vote might be more appropriate in China. For Chinese experts there should be more of these opportunities for identifying local authorities demand and bottlenecks.

The action driven methods, such as "Planning for Real", are recognised as very useful in China, where the top down approach is prevalent. Working with local communities is felt as important, but at a later stage of project development in the form of a "consultation". In initial steps, a working framework needs to be developed.

Community planning methods should take into consideration the degree of development of cities in which this action is planned. It is recognised that in more international cities such as Shanghai or Beijing community involvement is easier than in more traditional cities or in small towns.

3.5 C_Development: Technology Planning Tools



There are many various kinds of Technology Planning Tools, in all sectors of technological decisions: building, industrial, transportation, energy, materials, equipment, etc.

Each sector and technological field has its own set of tools, from planning to design and implementation. We have to categorize and select those tools among many that are widely applied in energy demonstration projects, and contributing to the environmental quality of urban areas,

The Toolbox helps to improve the planning and design phase of urban regeneration processes, starting from the energy balance on the city/district scale, the ecology assessment at the district/building level, and ending with a multi-purpose tools for selection of best technological solutions, such as the "multi-criteria analysis" tool.

Tools can qualify and quantify the effectiveness of energy solutions; assess the environmental quality of selected eco-technologies; demonstrate the cost effectiveness, practical application of integrated, innovative technologies in urban regeneration.

TECHNOLOGY PLANNING TOOLBOX

C1_Energy Balance Tool

The Energy Balance Tool aims at answering to the need for energy planning at the urban level, in order to support the evaluation and monitoring of the effects of cities' development from the energy point of view. The specific objective of the tool is the organization of an information system on energy able to give a picture of the relationship between the energy flows entering in the urban system and the final demand of the different sectors (building, transportation and industry), and the related amount of pollutant emissions, evaluated in a simplified way.

C2_Ecological Assessment Tool

The Ecological Assessment Tool represents the indicators of environmental sustainability of an urban area, in order to check the potential improvements of ecological projects. The "Site Footprint" is based on an innovative assessment method, easy to predict and largely replicable. Based on estimating the level of performance for 8 different indicators: energy, mobility, air, water, waste, soil, materials and biodiversity. These indicators are categorised into three different levels: current practice, good practice, exemplar practice.

C3_Multi-criteria Analysis Tool

Multi-criteria analysis is undertaken to make a comparative assessment between alternative projects or heterogeneous solutions. This tool can be of high importance in taking decisions, when the choices are driven by a multiple factors (technological as well as economic, environmental and social). It helps tackling in the decision-making process complex problems including qualitative and quantitative aspects.

Reality check in China

The Chinese Government, National Energy Administration, has been involved in the development of the *Toolkit* and committed to help Local Municipalities for more effective technological decision-making. In the Chinese experience, pre-feasibility and feasibility studies are fundamental steps for actions and these tools are preliminary decision-planning tools, to be adopted by Chinese procedures to better formulate pre-feasibilities. They need to find appropriate funding to be incorporated into municipal planning schemes.

"Energy Action Plans" methodologies are standardised in Europe and could be also in China, with common templates and comparable results. These methods are devoted to cities, although are used by energy and technology planners to satisfy cities' requirements.

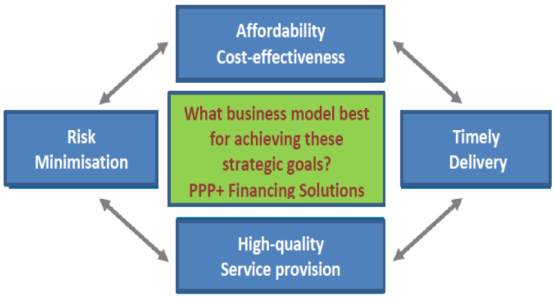
The "Ecological Assessment Tool", a tool used at the district level, can be adopted to assess design choices in a preliminary design step. The degree of acceptance by municipalities is felt to be high, since with these tools city decision makers can proof whether their planning is ecologically friendly and compatible or not, by harmonizing the

eight aspects of the ecological assessment, discussing and deciding for improvements. It can facilitate different visions of the city's decision makers to focus on their ambitions and it is a powerful tool for planning (water, transport, etc).

"Multi-criteria Analysis" is a widely known tool and well experienced in China when comparing planning proposals. However, local authorities in China could better exploit this tool and planners should extensively apply it to show their project potentiality. This tool can be considered a focal point for a technological decision making process.

3.6 D_Investment: Business Planning Tools

This toolbox provides the description of three main business models based on the *Public Private Partnership* (PPP) concept.



While recognizing the limitation of overreliance on public grants and public investments alone for promoting development in less developed regions, such as Western China, how to diversify financing sources as well as how to create an efficient PPP based approach for its green transformation remain key challenges for many regional and local decision-makers. Against this backdrop, the overall objectives of developing the green and low-carbon business planning tools are to:

- Help local decision-makers and technical staff to set up and understand the strategic goals of their green and low-carbon business development plan in a regional/local context (see Figure);
- Help local decision-makers and technical staff to obtain hands-on tools and skills for creating PPP-based financing mechanisms for their regional/local sustainable energy- and environment infrastructure development;
- Identifying capacity building needs related to PPP and green and low-carbon business development;
- Identify international cooperation opportunities to unleash both leapfrogging green growth potentials in less developed regions in China as well as to achieve win-win collaboration between the EU and China.

The low-carbon and green business model toolkit is developed by choosing three PPP-based tools, for leveraging financial resources for low-carbon and green investments, as well as for increasing the efficiency of investments:

- Project Financing – structural solutions for project risk sharing
- Performance Financing – Regulation driven green market creation
- Green Public Procurement – Demand-side management / Market-creating mechanism

BUSINESS PLANNING TOOLBOX

D1_Project Finance

Faced by the liquidity constraint of the financial sector on the one hand and the large number of projects (energy, social and environmental infrastructure) on the other hand, project financing is becoming an increasingly important part of structural solutions for credit enhancement and risk mitigation.

Simply put, project finance involves non-recourse debt and equity from one or more sponsoring firms. Debt is borrowed for a specific project and the amount of debt made available will be linked to the revenue that the project will generate over a period of time as this is the means to pay back the debt. This amount is then adjusted to reflect inherent risks involved in the project.

D2_Performance-Based Financing

Performance-based financing is heavily relying on governments' green policies and regulations to generate demand for products and services associated with improvement in energy- and environmental performance, for instance, in building energy savings. Energy Service Company (ESCO) is a new business concept and a typical example of performance-based financing vehicle for promoting end-user/demand-side energy management.

D3_Green Public Procurement (GPP)

Green Public Procurement (GPP) involves environmental standards in the public procurement process, so the procurement process can be a powerful "market-creation" tool to stimulate uses of environment-friendly and resource-efficient products and services. The key principles for GPP include:

- Best value for money – against lowest price (alone)
- Fair and open competition
- Transparency and predictability
- Support for life-cycle based cost and environmental impact assessments

Reality check in China

Exporting existing models is very difficult because the supply side (technology and salutation suppliers) and the demand side (project developer and the local authorities) do not necessarily meet, or they meet spontaneously. In particular, the previous experience of Europe-China bilateral projects show substantial complications:

- Within project consortia it is usually a challenge to find the right balance, since the supply side of "sustainable urban development solutions" is often fragmented and it is difficult to achieve the degree of coordination and integration, which is necessary for the delivery of "durable and high-standard" performance;
- To deliver sustainable urban solutions, it is not only about technological solutions, but also requires the support and commitment from the financial institutions and the local government. However, so far, both green finance and green public procurement are still in a premature stage of development on the ground;
- To make international co-operation work in the sustainable urban development context, openness and transparency are necessary framework conditions for attracting foreign investments and foreign technologies. How to improve the market conditions for green business development as well as how to set up necessary financial infrastructure for green investments will need to be the key elements when implementing the business planning tools as well as for future capacity building for green regional development in China.

Concerning Project Finance, public grant and private capital need to be brought on the same platform. A EU-China structure could serve this scope and a "small stage" with relevant partners – each playing its role – might be ideal. China is currently experiencing a boom in urbanisation and reducing energy consumption is the new goal for cities, but it is very difficult and time consuming to elaborate and approve new policies: that is why China needs to focus on business and industry. Hence a Green Investment Bank can be an option. Business engagement is crucial not only for bilateral cooperation projects, but also for an effective implementing of various public policies related to green and low carbon development. The incentive mechanisms should be further investigated, namely how to encourage enterprises to be active in enhanced actions for energy conservation and emission reduction enhancement.

Concerning the Performance Financing Tool, this has been tested already in China; however, during the 11th Five Year Plan, ESCOs faced a lot of challenges due to either a low engagement of the business sector and insufficient policy incentives. In addition, there is need of a legislative framework in place. Therefore, ESCOs are interesting, but still challenging (e.g. related to energy prices, energy saving, energy incentives). To realise the great energy-saving potentials, barriers to ESCO development, such as misaligned incentives between developers, building and end-users as well regulatory and enforcement weakness in the Chinese market will need to be taken seriously and removed. Regarding Green Public Procurement, it can indeed be a useful tool for creating demand for green goods and services, i.e. both of cost effectiveness and high environmental performance. In Europe, the public procurement market is significant (e.g. estimated to reach approximately 2 trillion euros annually, equivalent to around 17% of the EU's gross domestic product) and rich experience in green public procurement has been accumulated among many EU member states. In China, the public procurement is also gaining increasing importance; however lack experience, particularly in the field of green public procurement. Therefore, green public procurement should/can be an important focal point for the EU-China cooperation in the framework of *Clean Energy and Circular Economy Demo-Zone.*

4. Conclusions

The process of green transformation and "ecological security" that China is pursuing represents a challenge but also a great opportunity for cooperation between Europe and China at both the policy and the technological levels.

The clean energy *Demo Zone* that the *Europe-China Clean Energy Centre* is developing in Urumqi (Xingjian Region) has a strong potential to demonstrate how a process of clean energy and low carbon transformation in a Chinese city can reach ambitious targets using the appropriate mix of public intervention tools and methodologies as well as market-based mechanisms that have proved to be successful in Europe over the last thirty years.

In other words, the *Demo Zone* stands as a laboratory where joint European and Chinese efforts to reach mutual benefits – in forms of environmental improvement, resource efficiency enhancement and business development are tested. This experiment is perceived by both the European and Chinese sides (at central and local level) to be a win-win strategy, bringing advantages for both the local community and investors, and a demonstration reference for other Chinese cities.

The key to this process is tackling the complexity of the urban demonstration setting using the right mix of innovative methods, which are adapted to the Chinese context and are well accepted by local stakeholders. Although the operation of the *Demo Zone* is still at an initial stage, the experience gained so far shows that this is a viable endeavour thanks to the strong support and commitment from both the Chinese and the European sides. This is facilitated by the role of EC2 as an effective and recognized platform for the dialogue between the Chinese and the European stakeholders, including public institutions, experts, research centres and businesses.