

PM

2014:02



# **Sustainable city** development and **clean-tech** in China

Experiences from two case studies

**This report analyses the effect** of Swedish sustainable city export promotion activities towards China. Few Swedish companies have in fact been involved in business activities and the report discusses various ways to improve the effectiveness of promotion instruments.

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## Förord

Regeringens miljöteknikstrategi ska främja export av svensk miljöteknik. En rad myndigheter har fått särskilda uppdrag att stödja både företag och andra aktörer som på olika sätt kan bidra till att uppnå detta. Tillväxtanalys har bland annat uppdraget att bidra till strategins måluppfyllnad genom att ta fram underlag som ökar kunskapen om utvecklingen i andra länder vad gäller utvecklingen av miljöteknik och politik för att främja miljöteknikföretag.

Denna rapport syftar till att öka kunskapen om svensk export av hållbar stadsutveckling och miljöteknik till kinesiska ekostadsprojekt genom att beskriva och analysera två ekostäder under uppbyggnad, Tangshan Bay Eco-City och Sino-Swedish Low-Carbon Eco-City i Wuxi.

I rapporten presenteras en analys av den övergripande potentialen för svensk export av hållbar stadsutveckling och miljöteknik till kinesiska ekostäder följt av en presentation och analys av ekostadsprojekten i Tangshan och Wuxi. Rapporten svarar på vilka slutsatser som kan dras genom analys av projekten, och presenterar i en SWOT-analys styrkor och svagheter i den svenska exporten till denna typ av ekostadsprojekt. I det avslutande avsnittet diskuteras de möjligheter och hotbilder som bör beaktas för den fortsatta utvecklingen av den svenska miljöteknikstrategin.

Rapporten har författats av Louise Granath, student vid Fudan University i Shanghai, på uppdrag av Christer Ljungwall, chef för Tillväxtanalys kontor i Peking. Tillväxtanalys vill rikta ett stort tack till alla de företag och personer som ställt upp på intervjuer, delat material och kommit med värdefulla synpunkter och inspel. Särskilt tack riktas till Anna Hult vid institutionen för Urbana och Regionala Studier, KTH, som givit värdefulla kommentarer och synpunkter på rapporten i sin helhet.

Stockholm, februari 2014

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## Summary

China is one of the high priority countries in the Swedish Government's internationalisation strategy, particularly in the fields of the environment and energy. Several Swedish official bodies have been tasked with supporting research and development activities, and with exporting Swedish environmental technology to China. Two special functions have been set up to coordinate this work – Centec at the embassy in Beijing and the International Environmental Technology Office (IMT) in Stockholm.

These represent substantial investments in time and money. For example, Vinnova (Sweden's Innovation Agency) and the Energy Agency are investing in a 3-year project in 2013-2016, with SEK 40 million to support the development of strategic research and innovation collaborations on environmental projects between Sweden and China.

It is essential that this and other investments are based on well-founded considerations and detailed analyses of circumstances in China if the investments are to provide long-term returns for Sweden. Growth Analysis has been tasked by the government to produce documentation that increases people's understanding of developments in China and the significance of such developments for Sweden.

This report is intended to contribute to this process by utilising experience from two Chinese eco-city projects with Swedish participation – Tangshan Bay Eco-City and the Sino-Swedish Low Carbon Eco-City in Wuxi – in order to discuss which specific success factors or obstacles for this type of project can be identified.

However, what the report demonstrates is that so far not enough has been done to realise the high ambitions attached to these investments in China. The experience to date just about the export of Swedish solutions for sustainable cities can be summarised in a few key points:

- Very few Swedish companies have been successfully involved in the construction of Chinese eco-cities. In the implementation phase, Swedish companies participating in the process have often been deselected in favour of cheaper Chinese or other foreign alternatives. Those who have been successful have been primarily service companies who have contributed skills in design, planning and project management.
- The challenges faced in involving Swedish companies have proved to be considerable, and competing with other countries is hard. The Chinese side often demands subsidies and other forms of financial support from official bodies in order to push down prices. Details which still require confirmation (work that Growth Analysis and others have already commenced), indicate that Sweden's support is relatively small-scale, which in turn is a competitive disadvantage for Swedish companies.
- At the political level there is a lack of continuity, largely because of job reshuffles by politicians and poor project management on the Chinese side – an aggravating factor. Much effort needs to be expended continuously on maintaining a happy collaborative climate and good relationships with our Chinese opposite numbers. This requires extensive resources and a farsighted approach in the Swedish promotional activities.

Sweden still has an excellent reputation and good relationships with the Chinese authorities. Deriving benefit from these two factors lies at the heart of our efforts to develop future strategies and collaborative projects.

## **The way forward – a policy discussion**

Against the background of the priorities in the Government's environmental technology strategy, the main objective for official bodies and Swedish companies is to bridge the gaps between the marketing of Swedish sustainable city development, environmental engineering and business opportunities that lead to clear contracts, and also to ensure that those contracts entered into, are complied with by the Chinese counterparties. The Swedish presence in China helps to create the right preconditions for this – but there is good reason to consider in what ways ongoing and planned initiatives might have greater effect.

There are two key questions in this connection, summarised below.

### **What are the objectives and focus for collaborating with China?**

Currently several objectives have been defined for the Government's initiatives for greater collaboration with China in the areas of the environment and energy. Overall, it is all about the exchange of know-how and experience that may influence China's development in a more environmentally sustainable direction which in the long run can create opportunities for increased exports to China of Swedish environmental technology. There are contracts about collaboration both in pure environmental management, research and engineering or the implementation of solutions to specific problems. The focus for this report is the latter, even if there are obviously connections between the various areas (with the potential for strengthened connections and synergy effects).

Formulating the top-level objectives is obviously the Government's task, but arising from this report there are two questions which may be relevant to bear in mind when the objectives and focus for the future are discussed.

- Is it possible to formulate clearer objectives both at an over-arching top level and for specific projects? Previous experience shows that specific goals and thorough following-up increases the opportunities for Swedish companies to obtain contracts and the chances that projects will deliver the intended results. There are good examples of companies, including the architectural practice Tengbom, who have insisted on clear result indicators being included in the legislative-packages which circumscribe the project. Later this prevents the Chinese counterparty from backing out of the project's explicit environmental ambitions and from selecting cheaper solutions with inferior performance – something that unfortunately happens all too often.
- Would it be possible to limit the initiatives in some dimension, thereby concentrating resources in a smaller number of projects? For example, we might consider imposing limits relating to the geographic region, or procedures in the Chinese system in which Government initiative from the Swedish side could do the most good and also imposing limits relating to technical or problem areas.

### **How can the objectives be achieved, and what is the Government's role?**

In previous analyses, Tillväxtanalys has shown that it is hard to quantify any general positive effects from Government initiatives for promoting exports, and the effects which can be measured are not particularly great.<sup>1</sup> The question being put is whether it is possible to achieve a greater effect by designing the support efforts differently? No definitive answer is provided, but based on the case studies which have been analysed, some factors with the potential to contribute to this have been identified.

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<sup>1</sup> For example, see Tillväxtanalys's Report 2009:05 Export promotion – a cornerstone in a future internationalisation strategy?



One recurring observation is that Sweden could do more in offering package and system solutions rather than focusing on specific technologies or products. This approach is already established and has been manifested in the Symbio City concept. But experience shows that in practice the message is still broken down into components rather than into coherent system – solutions. One proposal put forward is to set up consortiums or other forms of close collaboration, consisting of several small companies who together can deliver more wide-ranging solutions. This might enable official bodies to play a role by setting up meeting places and other platforms for collaboration between companies, also to provide advice and other support in the early stages.

Another important factor is to identify projects that have particularly good potential to actually be implemented to plan and which suit the solutions and companies available in Sweden. But there are strong indications that the most ambitious and comprehensive high profile projects described in this report do not in fact do so. Instead, more suitable candidates that better match the Swedish companies' profiles and capacities can be found at local level and in progressive smaller cities.

Furthermore there are many indications that even more effort should be devoted to building long-term relationships and to deriving benefits from Sweden's good reputation. In this, government bodies can play an important role by producing better decision-making documentation, investing in long-term business relationships, with a build-up of capacity on the Chinese side, and by devoting effort to clarifying and formalising the objectives that create better business opportunities for the Swedish companies.

Finally, the initiatives being developed to strengthen the know-how and trading relationships with China should be set in a wider policy perspective. What matters is how these initiatives relate to equivalent initiatives in other countries, and how the internationalisation initiatives relate to initiatives for greater research, innovation and business trends generally in Sweden. In view of these dimensions, it is important not only to try to optimise the system as a whole in order to increase the total cost efficiency, but also to analyse the various initiatives one at a time. The Government, with its analytical and promotional agencies, has an important task in producing the required knowledge materials in the form of evaluations and strategic analyses, as well as setting the necessary priorities based on the results that have emerged.

## Sammanfattning

Kina är ett av de prioriterade länderna inom den svenska regeringens internationaliseringsarbete, i synnerhet på miljö- och energiområdet. Ett flertal svenska myndigheter har uppdrag att stödja forsknings- och utvecklingssamarbete med samt export av svensk miljöteknik till Kina. Två särskilda funktioner har upprättats för att samordna detta arbete, Centec vid ambassaden i Peking och det internationella miljöteknikkontoret (IMT) i Stockholm.

Dessa investeringar i tid och pengar är betydande. Exempelvis satsar Vinnova och Energimyndigheten i ett treårigt projekt, 2013–2016, tillsammans 40 miljoner på att stödja utveckla strategiska forsknings- och innovationssamarbeten mellan Sverige och Kina inom miljöområdet.

Att denna och andra insatser bygger på välgrundade överväganden och noggranna analyser av förutsättningarna i Kina är avgörande för att investeringarna ska ge avkastning för Sverige på sikt. Tillväxtanalys har regeringens uppdrag att ta fram underlag som ökar förståelsen för utvecklingen i Kina och betydelsen av denna utveckling för Sverige.

Den här rapporten syftar till att bidra till detta genom att, baserat på erfarenheter från två kinesiska ekostadsprojekt med svenskt deltagande – Tangshan Bay Eco-City och Sino-Swedish Low-Carbon Eco-City i Wuxi – diskutera vilka konkreta framgångsfaktorer respektive hinder för denna typ av projekt som går att identifiera.

Vad rapporten visar är dock att det hittills inte varit tillräckligt för att förverkliga de höga ambitioner som fästs vid kinasatsningarna. Erfarenheterna så här långt vad gäller just export av svenska lösningar för hållbara städer kan sammanfattas i några huvudpunkter:

- Få svenska företag har involverats framgångsrikt i byggandet av kinesiska eko-städer. I implementeringsfasen har de svenska företag som deltagit i processen ofta valts bort till förmån för billigare kinesiska eller andra utländska alternativ. De som har lyckats är i huvudsak tjänsteföretag som bidragit med kompetens inom design, planering och projektering.
- Utmaningarna det innebär att involvera svenska företag har visat sig vara betydande och konkurrensen med andra länder är hård. Den kinesiska sidan kräver ofta subventioner och andra former av ekonomiskt stöd från offentliga aktörer för att pressa priserna nedåt. Uppgifter, som dock behöver beläggas ytterligare (ett arbete som Tillväxtanalys och andra också påbörjat), tyder på att de svenska stöden är jämförelsevis små vilket i så fall innebär en konkurrensnackdel för svenska företag.
- På det politiska planet är även bristfällande kontinuitet, till stor del på grund av skifte av politiskt ansvariga och projektledning på den kinesiska sidan, en försvårande faktor. Stor möda måste kontinuerligt läggas vid att upprätthålla ett gott samarbetsklimat och en god relation med den kinesiska motparten. Detta kräver omfattande resurser och långsiktighet i det svenska främjararbetet.

Sverige har fortfarande ett mycket gott rykte och goda relationer med kinesiska myndigheter. Att dra nytta av dessa båda faktorer är centralt i arbetet med att utforma framtida strategier och samarbetsprojekt.

## Vägen framåt – en policydiskussion

Mot bakgrund av prioriteringarna i Regeringens miljöteknikstrategi är den främsta målsättningen för såväl offentliga aktörer som för svenska företag är att överbrygga gapet mellan marknadsföring av svensk hållbar stadsutveckling och miljöteknik och affärsmöjligheter som leder till tydliga avtal, samt att säkerställa att de avtal som ingås också följs av den kinesiska motparten. Den svenska närvaron i Kina bidrar till att skapa förutsättningar för detta men det finns anledning att reflektera över hur pågående och planerade insatser skulle kunna ge större effekt.

Två frågeställningar är centrala i detta sammanhang, vilka sammanfattas nedan.

### Vad är målsättning och fokus för samarbetet med Kina?

Det finns i dagsläget ett flertal uppsatta målsättningar med de statliga insatserna för stärkt samarbete med Kina inom miljö- och energiområdet. Övergripande handlar det om kunskaps- och erfarenhetsutbyte som kan påverka Kinas utveckling i en mer miljömässigt hållbar riktning, vilket i förlängningen kan skapa möjligheter till ökad export till Kina av svensk miljöteknik. Avtal om samarbete finns inom både ren miljöförvaltning, forskning och teknik eller implementering av lösningar på konkreta problem. Fokus för denna rapport är det senare, även om det naturligtvis finns koppling mellan de olika områdena (och potential till förstärkta kopplingar och synergieffekter).

Att formulera de övergripande målsättningarna är naturligtvis regeringens uppgift men det finns utifrån denna rapport två frågor som kan vara relevanta att beakta när målsättningar och fokus för framtiden diskuteras.

- Går det att formulera tydligare målsättningar, både på ett övergripande plan och för specifika projekt? Tidigare erfarenheter visar att konkreta mål och noggrann uppföljning ökar möjligheterna för svenska företag att både erhålla kontrakt och att projekt ger avsedda resultat. Det finns goda exempel på företag, däribland arkitektkontoret Tengbom, som insisterat på att tydliga resultatindikatorer ska ingå i de lagstiftningspaket som kringgärdar projekten. Detta hindrar senare den kinesiska motparten att backa från projektets uttalade miljöambitioner och välja billigare lösningar med sämre prestanda – vilket annars tyvärr ofta sker.
- Går det att avgränsa satsningarna i någon dimension för att därigenom koncentrera resurserna inom färre antal insatser? Till exempel kan man tänka sig att avgränsa med avseende på geografisk region, processer i det kinesiska systemet där statliga insatser från svensk sida skulle kunna göra störst nytta samt avgränsningar avseende teknik- eller problemområde.

### Hur kan målsättningarna nås och vilken är statens roll?

Tillväxtanalys har i tidigare analyser visat att några generella positiva effekter av statliga insatser för exportfrämjande är svåra att kvantifiera och de effekter som kan mätas inte är särskilt stora.<sup>2</sup> Frågan som ställs här är om det går att, genom en annorlunda utformning av stödinsatserna, uppnå en större effekt? Något definitivt svar ges inte men utifrån de fallstudier som analyserats har några faktorer med möjlig potential att bidra till detta identifierats.

<sup>2</sup> Se till exempel Tillväxtanalys Rapport 2009:05 Exportfrämjande - en hörnsten i en framtida internationaliseringsstrategi?

En återkommande observation är att Sverige kan göra mer för att erbjuda paket- och systemlösningar snarare än att fokusera på specifika tekniker eller produkter. Detta synsätt är redan etablerat och minifesteras av Symbio City-konceptet men erfarenheten visar att budskapet ofta i praktiken ändå bryts ner i komponenter snarare än samanhållna systemlösningar. Ett förslag som lyfts fram är att bygga konsortier, eller andra former av starkare samarbete, av flera mindre företag som tillsammans kan leverera bredare lösningar. Här kan offentliga aktörer möjligen spela en roll genom att skapa mötesplatser och andra plattformar för samarbete mellan företag, ge rådgivning samt andra stöd i tidiga skeden.

Ytterligare en framgångsfaktor är att identifiera projekt som har särskilt hög potential att faktiskt genomföras enligt plan och som passar de lösningar och företag som finns i Sverige. Mycket talar för att de mycket ambitiösa och omfattande profilprojekt som beskrivs i denna rapport inte gör det. Istället kan troligen mer lämpliga kandidater, som bättre matchar de svenska företagens profil och kapacitet, hittas på lokal nivå och i framstegsvänliga mindre städer.

Mycket tyder vidare på att ännu mer kraft bör läggas på att bygga långsiktiga relationer och dra nytta av det goda rykte som Sverige har. Statliga aktörer kan här spela en viktig roll genom att ta fram bättre beslutsunderlag, investera i långsiktiga relationer och kapacitetsuppbyggande på den kinesiska sidan samt genom att arbeta för att förtydliga och formalisera målsättningar som skapa bättre affärsmöjligheter för de svenska företagen.

Slutligen bör de insatser som sker för att stärka kunskaps- och handelsrelationerna med Kina sättas in i ett bredare policyperspektiv. Det gäller både hur dess insatser förhåller sig till motsvarande satsningar i andra länder och hur insatserna för internationalisering förhåller sig till insatser för stärkt forskning, innovation och näringslivsutveckling i Sverige generellt. Avseende båda dessa dimensioner är det viktigt att både försöka optimera systemet som helhet för att öka den totala kostnadseffektiviteten och att analysera de olika insatserna var för sig. Regeringen och dess analys- och främjandemyndigheter har här en viktig uppgift i att ta fram de nödvändiga kunskapsunderlagen i form av utvärderingar och strategiska analyser samt i att göra de nödvändiga prioriteringarna utifrån de resultat som framkommer.

# 1 Background: China's need for sustainable city development

## 1.1 China's economic development and environmental issues

Chinese economic growth over the past 30 years has been a phenomenon never previously seen. According to figures from the World Bank, China's average GDP growth between 2000 and 2012 was approximately 10 percent<sup>3</sup>. In 2011 the International Monetary Fund (IMF) pointed out China as likely to surpass the USA and become the world's largest economy in real terms by 2016<sup>4</sup>. The Chinese economic miracle has been an effective tool for poverty reduction and has lifted millions of people out of poverty in China, but economic growth has also had a high price. In addition to reducing poverty, China's economic development has given rise to a number of environment-related issues with increased energy demand, higher consumption, resource depletion, growing air and water pollution, higher CO<sub>2</sub> emissions, etc.

A World Bank report from 2006 concluded that 16 out of the 20 most polluted cities in the world are Chinese. Air pollution is a growing problem everywhere in China; the situation is most serious in northern China, where air pollution reduces life expectancy by approximately 5.5 years compared to life expectancy in the southern part of China<sup>5</sup>. The severe air pollution in China is partly due to the energy mix. China is the world's largest emitter of CO<sub>2</sub> (in absolute terms); of the total energy consumed, coal is estimated to represent 66.4 percent. China has pledged to reduce its greenhouse gas emissions although Chinese energy consumption rose by 3.9 percent and coal consumption by 2.5 percent in 2012<sup>6</sup>. China's energy demand will probably peak between 2030 and 2035. Studies by the U.S. Energy Information Administration (EIA) and ExxonMobil show that by then, CO<sub>2</sub> emissions could equal the level of the United States and the EU together and be nearly double the current level of CO<sub>2</sub> emissions. According to the Chinese government's official estimate in 2006, environmental damage costs 10 percent of China's annual GDP<sup>7</sup>.

There is an increasing awareness of environmental problems among Chinese government officials, at the same time as the Chinese media are reporting more frequently about environmental problems, which further increases public pressure on the government to prioritize environmental issues. But even though the central government is beginning to put environmental issues on the agenda, this does not mean that the local governments, still with economic growth as their number one priority, have any intention of complying with environmental laws and goals.

## 1.2 The Chinese solutions

Evidence of the government's attention to environmental problems can be found if we look at China's latest two five-year plans. Five-year plans have been issued by the government since 1953 to serve as a platform for economic and social goals for the period in question.

<sup>3</sup><http://databank.worldbank.org/data/views/reports/tableview.aspx?isshared=true&ispopular=country&pid=1>

<sup>4</sup>(2011), RT News (Video Online) *IMF: China to Surpass US in 2016*.

<http://www.youtube.com/watch?v=BLOYMZIBePA>

<sup>5</sup> [www.guardian.co.uk/environment/2013/jul/08/northern-china-air-pollution-life-expectancy](http://www.guardian.co.uk/environment/2013/jul/08/northern-china-air-pollution-life-expectancy)

<sup>6</sup> <http://phys.org/news/2013-02-china-energy-consumption.html>

<sup>7</sup> (2013), Wayne M. Morrison, *China's Economic Rise: History, Trends, Challenges, and Implications for the United States*

The 12<sup>th</sup> five-year plan was approved in 2011 and covers the years from 2011 to 2015. Two of its key themes are sustainable growth and environmental protection. It is also stated that seven priority industries will be developed, among them energy savings and environmental protection, new energy, and clean-tech vehicles. The 12<sup>th</sup> five-year plan also points out a number of key targets for the period. The non-economic key targets include a number of environment-related targets. By the end of 2015, China aims to increase non-fossil fuel use to 11.4 percent, reduce energy use per unit of GDP by 16 percent and reduce CO<sub>2</sub> emissions per unit of GDP by 17 percent. As a direct result of these priorities and environmental targets, more investments and incentives are being channelled to more sustainable sectors in the Chinese economy<sup>8</sup>.

One direct result of the emphasis on energy reduction and green technology in the 11<sup>th</sup> five-year plan (2006–2010), and especially in the 12<sup>th</sup> five-year plan, is an increased demand for foreign technology and clean-tech solutions. As China does not have the important technology and know-how, the country will continue to seek partnerships with foreign companies<sup>9</sup> and governments. The 12<sup>th</sup> five-year plan states that China shall actively expand imports of advanced technology, key components, domestically rare resources and energy-conservation and environmental protective products<sup>10</sup>.

Since the new leadership of the Communist party was elected in 2012, there has been an increase in the central government's attention to environmental issues and environmental experts around the world are highlighting how China is on its way to take over the global leadership position on climate policy<sup>11</sup>.

### 1.3 Chinese urbanization

By the end of 2012 the urban population in China accounted for about 52.8 percent of the total population, meaning that more people are now living in China's cities than in its countryside<sup>12</sup>. In recent years China has experienced a rapid urbanization growth rate, too fast to be considered economically, socially or environmentally sustainable.

According to figures from McKinsey Global Institute, the urban population in China will grow by 350 million by the end of 2025, whereof 70 percent due to migration. 350 million is more than the current population of the USA (2013). By 2025, 221 Chinese cities will have a population exceeding one million inhabitants and by 2030 the Chinese urban population is expected to exceed one billion<sup>13</sup>. Consumption is mainly an urban affair; urban populations consume both more energy and more resources than their rural counterparts. In 2010, Chinese cities consumed about 75 percent of China's total energy; by 2030 this proportion will have risen to 83 percent<sup>14</sup>.

Another environmental issue in cities with more than one million inhabitants is "urban heat islands". The average temperature inside a city with a million inhabitants is about 13 degrees higher than outside the city, and the afternoon temperature in the city compared to outside can sometimes differ as much as 12 degrees. This gives rise to both increasing energy consumption and air and water pollution. There is no doubt that Chinese urbaniza-

<sup>8</sup> <http://www.kpmg.com/cn/en/IssuesAndInsights/ArticlesPublications/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf>

<sup>9</sup> <http://www.apcoworldwide.com/content/viewpoints/newsletters/2011-spring/articles/china.aspx>

<sup>10</sup> [http://cbi.typepad.com/china\\_direct/2011/05/chinas-twelfth-five-new-plan-the-full-english-version.html](http://cbi.typepad.com/china_direct/2011/05/chinas-twelfth-five-new-plan-the-full-english-version.html)

<sup>11</sup> <http://www.independent.co.uk/environment/climate-change/china-agrees-to-impose-carbon-targets-by-2016-8626101.html>

<sup>12</sup> [http://www.china.org.cn/top10/2013-03/12/content\\_28216370.htm](http://www.china.org.cn/top10/2013-03/12/content_28216370.htm)

<sup>13</sup> (2009), McKinsey Global Institute, Preparing for China's Urban billion

<sup>14</sup> (2010), The Climate Group, China Clean Revolution Report III: Low Carbon Development in Cities

tion will continue to bring along issues like increased demand for social services as well as demand and supply pressure on land, water, energy and environment.

Cities have an enormous environmental footprint due to their economic “weight” and the volume of resources consumed by its inhabitants. From an environmental point of view, this not only makes cities a cause of environmental problems, but also the key to a more sustainable development.

#### **1.4 The objectives of building eco-cities**

Cities are a central part of the Chinese environmental challenges; to be able to reach the enunciated Chinese environmental goals as well as stated targets in the 12<sup>th</sup> five-year plan, sustainable city development and urban green technologies are keys to address these issues. As a result, the Chinese government uses a strategy of promoting low-carbon pilot projects in selected provinces and cities<sup>15</sup>. There are currently about 20 eco-city projects being planned or under construction in China, most of which are international joint projects with a great deal of foreign involvement. The projects are often dependent on cooperation with foreign governments and companies regarding design, technology and financial support<sup>16</sup>.

There are various aspects of sustainable city development, covering everything from architecture, transport, logistics, water, energy and CO<sub>2</sub> emissions. In order to handle the migration from rural to urban areas and at the same time be able to reach the environmental goals, the new cities need sophisticated, green systems. The strategy with eco-city projects therefore also depends on foreign cooperation as China does not have the sustainable models and advanced technology “in-house” yet<sup>17</sup>. The ambition is to cooperate with foreign governments, companies and universities to be able to absorb sustainable models, technology and know-how although international cooperation and knowledge have not been a solid solution for success so far for the Chinese eco-city projects. Some progress has been made but at the same time some projects also fail before implementation while others suffer from periodic delays<sup>18</sup>.

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<sup>15</sup> (2012), The National Development and Reform Commission, China's Policies and Actions for Addressing Climate Change

<sup>16</sup> (2012), Ying Yin and Xiaoxing Feng, *A Comparative study with Swedish and China's Eco-Cities – From planning to implementation, taking the Hammarby Sjöstad, Sweden, and Wuxi Sino-Swedish Eco-City, China, as cases*

<sup>17</sup> Jan Stael von Holstein, Professor and Board Advisor at Tongji University, College of Design and Innovation

<sup>18</sup> (2012), Ying Yin and Xiaoxing Feng, *A Comparative study with Swedish and China's Eco-Cities – From planning to implementation, taking the Hammarby Sjöstad, Sweden, and Wuxi Sino-Swedish Eco-City, China, as cases*

## **2 Swedish exports of sustainable city development and green technology**

### **2.1 Symbio City**

Internationally, Sweden has a very good reputation regarding environmental issues and their solutions. Sweden is seen as one of the pioneers in both sustainable city development and green technology. Symbio City Sustainability by Sweden is a concept that presents the Swedish conceptual framework of and holistic thinking behind sustainable urban development with an integrated and multidisciplinary sector approach including all dimensions of sustainability. It provides general guidelines and methods as to how to support sustainable urban development processes. A Symbio City supports and maintains itself in a closed circle to create synergies from combining all urban functions. A minimum of 'outside' resources should be used; instead, resources within the city should be used as in a loop.

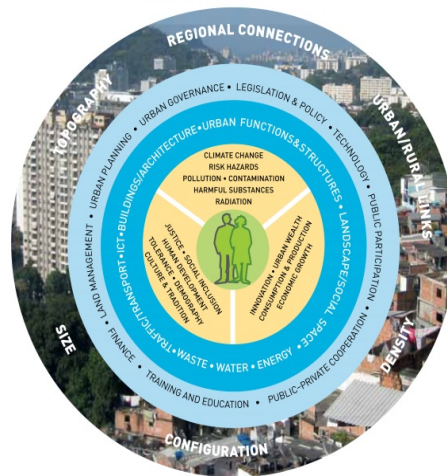
The concept integrates the whole sense of long-term sustainable development where the synergies between different processes or functions are used to create cost and resource effective solutions in a society. According to the Symbio City thinking, cities are not to be seen as the cause of environmental degradation but rather the solution. The model is very flexible and is considered to be a highly effective model regardless of local content as it is easy to adjust and localize.

The Symbio City conceptual model is described by one core and four circles, where the core is the ultimate development goal of quality of life. The first circle represents the economic, environmental and social dimensions and challenges of urban sustainability. The second circle represents the urban systems and functions that are vital for people's everyday life, i.e. urban systems for water, energy, transport and traffic, waste management, communications, green and other public spaces, housing, work places, social services and commercial buildings, etc. The third circle represents institutional and governance systems and factors that support and influence urban functions and their sustainable development. The fourth dimension of the model represents the built and natural environments<sup>19</sup>.

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<sup>19</sup>(2012), The Symbio City Approach, Ulf Ranhagen and Klas Groth





Figur 1 Illustration of the Symbio City framework

Source: *The Symbio City Approach*, Ulf Ranhagen and Klas Groth.

Two of the most studied and acknowledged Symbio City “Champion Projects” in Sweden are Western Harbour (Bo01) in Malmö and Hammarby Waterfront (Hammarby Sjöstad) in Stockholm. Both attract foreign delegations to visit and learn more about the eco-districts. Approximately 50 percent of all foreign delegations that visit Sweden are from China.

Hammarby Waterfront has been referred to as one of the world’s highest profile examples of sustainable city development<sup>20</sup>. It is the world’s first city district with a comprehensive eco-cycle model with an integrated environmental solution system. Hammarby Waterfront was a great inspiration when the Symbio City concept was developed. Every year, about 10,000–12,000 visitors come to Hammarby Waterfront and GlashusEtt. Some 60 percent are foreign delegations. The number of Chinese delegations is about two a month and some have external meetings with companies like Tengbom and Envac<sup>21</sup>.

## 2.2 Swedish exports of sustainable city development and environmental technologies in numbers

In 2011, Growth Analysis was commissioned to prepare statistics of Swedish exports of environmental technology. Between 2003 and 2011, the turnover in the environmental technology sector has increased every year, with the exception of 2009. The total increase in turnover for the whole period was 65 percent. In 2011, the environmental technology sector had a turnover of 241 billion SEK.

Swedish exports of environmental technology also increased over the period by 69 percent, compared to a 58 percent increase in total exports of Swedish goods and services. In 2011, the value of Swedish exports of environment-related goods and services was 39 billion SEK. During the period in question, Germany was the most important recipient country of Swedish environmental technology exports. In 2011, the most important recipient countries in terms of total export were Germany (15%), Norway (13%), Denmark (7%), Finland (6%) and China (6%).

<sup>20</sup> <http://cemea.economistconferences.com/event/future-cities/site-visit-cities#.UfOH1Y2pWoM>

<sup>21</sup> Malena Karlsson, GlashusEtt Hammarby Waterfront

Of total Swedish exports to these countries in 2011, exports of environmental technology were as follows: Germany (4.8%), Norway (4.3%), Denmark (3.6%), Finland (3.2 %) and China (5.6 %) <sup>22</sup>.

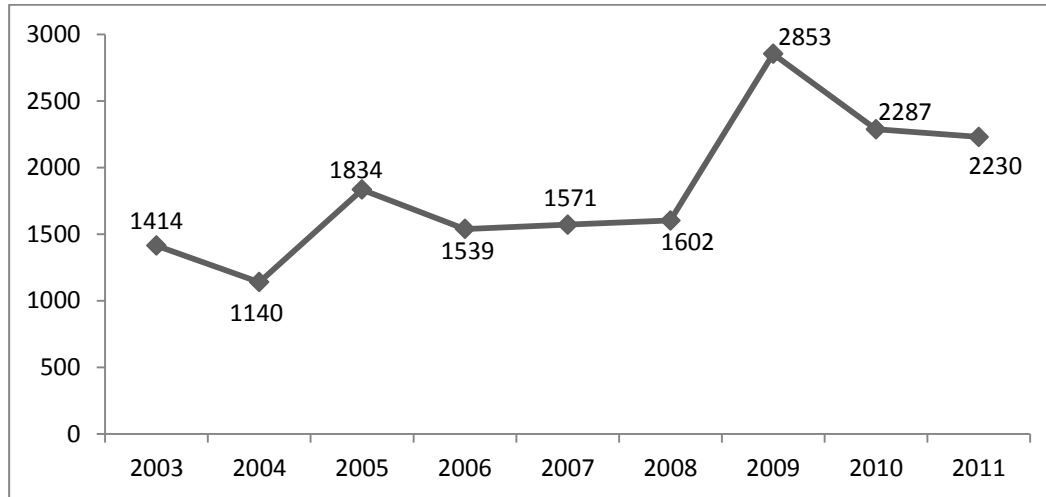


Figure 1 Swedish environmental technology exports to China from 2003 to 2011, SEK millions

Source: *Growth Analysis (2012:06) Statistik om miljösektorn – Arbetsställen omsättning och export 2003–2011*

### 2.3 Why Sweden?

China's demand for sustainable city development and clean-tech solutions is constantly increasing. At the same time, Sweden has an internationally highly acknowledged reputation of competence in these fields. As a result of Fredrik Reinfeldt's visit to China in 2008, a number of Sino-Swedish agreements were signed and Mr Mats Denninger was appointed special coordinator for Swedish cooperation with China in the area of energy and environmental technology and sustainable urban planning with responsibility to implement the agreements, and High Representative for International Environmental Technology Cooperation at IMT <sup>23</sup>. China and Sweden have a long history of good diplomatic relations since Sweden, as the first country in the west, acknowledged the Communist regime in 1949.

Sweden's reputation regarding sustainable city development and green technology is a result of acknowledged technology and know-how and solutions that can fairly easily be localized in other parts of the world, endless delegation visits to Swedish demonstration projects like Hammarby Waterfront, and a large number of Swedish delegations visiting Chinese districts and municipalities. Another important reason is the initiation by the Swedish Government of programmes and projects to facilitate and increase cooperation between Sweden and China in the environmental field <sup>24</sup>. Chinese delegations visiting Symbio City projects in Sweden are often interested in taking home a similar concept <sup>25</sup>.

However, it is not only Sweden that is identified as a strategic partner for the future. Many eco-cities around China are currently or soon to be under construction. For these projects, Chinese municipalities cooperate with many other European countries, e.g. England,

<sup>22</sup> (2012:06), Andreas Kroksgård, Statistik om miljösektorn – arbetsställen omsättning och export 2003–2011

<sup>23</sup> <http://www.regeringen.se/sb/d/10434/a/108161>

<sup>24</sup> Jan Stael von Holstein, Professor and Board Advisor at Tongji University, College of Design and Innovation

<sup>25</sup> Anita Jonsson, Head of Sino-Swedish Sustainable Business Program 2008-2012

Germany, France and Italy, as well as the USA, Singapore and Australia. Competition for Chinese eco-city contracts is constantly increasing.

## **2.4 The Swedish strategy for exports of environmental technology**

In September 2011, the Swedish strategy for development and export of environmental technology 2011–2014 was presented. During the period in question, the Swedish government is investing 400 million SEK. The aim is to improve the conditions for emergence and export of new Swedish clean-tech solutions. IMT is responsible for the coordination and development of bilateral cooperation with China. In China, IMT work together with the Swedish Embassy in Beijing, the Swedish Consulate in Shanghai and Business Sweden, for example. IMT's assignment is to initiate business cooperation through the Sino–Swedish agreements, grow interest in and knowledge about the Chinese market among clean-tech companies, coordinate Swedish resources in an efficient way, build platforms where Chinese clients and Swedish companies can meet, and help Swedish companies succeed in the Chinese market<sup>26</sup>. Four Sino–Swedish governmental agreements on environmental technology have been signed so far, although one of them expired in 2013. See appendix 6.1 for more information.

## **2.5 The Chinese market's potential for Swedish companies**

The demand for sustainable city development and green technology in the Chinese market is huge and constantly growing. In addition, China's 12<sup>th</sup> five-year plan emphasizes the importance of green technology and know-how to be able to attain the environmental goals. The Chinese market's potential for Swedish companies is growing. Swedish companies have the models, the technology and the reputation necessary for success, although current competition for contracts is strong and competition from both global and local companies is being increasingly tougher.

Investment capacity is one of the major challenges for Swedish companies. Many of our Swedish companies are fairly small with little capacity to make the substantial investments required, even if they have the technology and products. Financial support and better cooperation with already established companies in China would facilitate Swedish clean-tech's and environmental companies' exports to China<sup>27</sup>.

Another obstacle to Swedish exports of sustainable city development and green technology is insufficient knowledge of the Chinese market and the local content. Good relations with local government officials are vital for success, although government officials often change jobs after two to three years. This lack of continuity gives rise to unexpected delays in projects when new people are assigned to handle the projects on the local Chinese site<sup>28</sup>.

Chinese eco-city projects are often huge and extensive. There is a substantial cost and risk and there is a problem with long lead-times. The Chinese partners usually strive, if not expect, to have some of the investments covered by foreign aid<sup>29</sup>.

<sup>26</sup>(2013), Ministry of Enterprise, Energy and Communications, Ministry of the Environment and Ministry of Foreign Affairs, Regeringens strategi för utveckling och export av miljöteknik 2011-2014 – Lägesrapport februari 2013

<sup>27</sup> Jan Stael von Holstein and Anita Jonsson

<sup>28</sup> (2008), Rasmus Reinvang and Liv Inger Tønjum, Prepared To Ride The Green Dragon? An Estimate Of The Markets for Environmental Goods And Services In China, With A Survey Of Norwegian Companies And Recommendations

<sup>29</sup>(2008), Ulf Andreasson et al, *Svensk miljöteknik- En kartläggning av aktörer, marknader och konkurrenter*

There is currently a price issue for Swedish companies. The five-year plans are the central government's vision and goals for the period in question; the real work and the implementation of these goals, however, are a regional and local matter. Sometimes the local governments' ambitions do not match those of the five-year plan. For many local governments, low price is still the most important factor and environmental ambitions are fairly low.

## 3 Sino-Swedish Eco-Cities

### 3.1 Sino-Swedish Tangshan Bay Eco-City

#### 3.1.1 Background

The *Letter of intent on sustainable development cooperation* is one of three government agreements on environmental technology between Sweden and China that were signed in April 2008 during Prime Minister Fredrik Reinfeldt's visit to China. The *Letter of intent on sustainable development cooperation* is a more concrete project of cooperation between the Swedish government and Tangshan municipality to build the Tangshan Bay Eco-City (earlier Caofeidan International Eco-City in Tangshan).

There have been two levels of cooperation on Tangshan Bay Eco-City<sup>30</sup>: continuing and long-term cooperation between the Tangshan side and Swedish government institutions and a cooperation level between Tangshan and the companies involved in the project.

The planning of Tangshan Bay Eco-City began in 2007. Tangshan municipality decided to develop a sub-centre of Tangshan to cope with the rising demand for housing and urban services. It was decided that the new city would be situated on the coastline of Heibei province in eastern China, have a total area of 150 sq. km with an objective to host a population of approximately one to one and a half million inhabitants. The distances to major cities are about 220 km to Beijing, 120 km to Tianjin and 80 km to Tangshan itself<sup>31</sup>.

The call for bids for the Tangshan Bay Eco-City master plan was announced in December 2007. The Chinese political backing for the project was extensive and the Swedish Embassy was approached by Tangshan City at an early stage. The Embassy and CENTEC paid close attention to developments and eventually Sweco was introduced into the project<sup>32</sup>. By then, Beijing Tsinghua Urban Planning and Design Institute had already delivered the overall master plan for the 150 sq. km eco-city. Together with Beijing Tsinghua Urban Planning and Design Institute, Sweco won the tender for the conceptual physical planning of the 30 sq. km area and were commissioned to carry out four initial projects in the first phase of the eco-city development<sup>33</sup>. Sweco provided the conceptual structural plan and developed sustainability guidelines for the first development phase covering 30 sq. km of Tangshan Bay Eco-City, provided a detailed conceptual design plan for the 12 sq. km covering the first phase of construction, and delivered a preliminary conceptual design for the Sustainability Center of Tangshan Bay Eco-City<sup>34</sup>.

Tangshan Bay Eco-City is partly modelled on the technology and criteria for sustainable development that were used in both Hammarby Waterfront and Bo01 in Malmö; the latter has also been Tangshan's sister city since 1987. When developing the conceptual plan and guideline targets for the eco-city, Sweco used the Symbio City concept and localized it to suit local conditions<sup>35</sup>. As for sustainable guidelines, Sweco presented the *Nine Themes of*

<sup>30</sup> Email conversation Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT) and Monique Wannding, Deputy Director IMT

<sup>31</sup> <http://en.tswstc.gov.cn/>

<sup>32</sup> (2013), Embassy of Sweden in Beijing, CENTEC and Tangshan Bay Eco-City Administrative Committee, *Briefing of Sino-Swedish Tangshan Bay Eco-city Project*

<sup>33</sup> Ibid

<sup>34</sup> (2012), José-Ignacio Ramírez, Caofeidan Eco-city presentation

<sup>35</sup> SWECO, *Caofeidian International Deep Green Eco-City - Nine themes of planning*

*Planning*, and based on the Symbio City holistic thinking presented 141 sustainable indicators for the eco-city development, including seven sub-systems. However, the Tangshan side considered some of the targets to be too high and too innovative for Chinese standards. The main reason why Tangshan Bay Eco-City would not be able to reach such high targets as Swedish eco-cities was argued to be the behaviour of the society. The Chinese average citizen is not yet familiar with the sustainable thinking mind set, and that is why some of the targets were likely to fail<sup>36</sup>.

Sweco was active in the first phase of the Tangshan Bay Eco-project (2008–2010)<sup>37</sup> and although they have already finished their parts of the project, they still have some contact with the Tangshan side to receive updates on the progress. The real construction work is taking place during the current second phase of the project and is due to be completed by 2020.

Purac is another company that was introduced into the project through CENTEC in early 2008. Purac was assigned to provide the Eco-City's initial area with a demonstration sewage treatment plant (using the Swedish company Eletta as a supplier), partly financed by Sweden through the Demo Environment programme. In addition to building the plant, Purac took an active part in the discussions on Tangshan Bay Eco-City's sewage management and provided the Tangshan side with a sewage management and recycling proposal for the city. Purac had a Chinese representative actively involved in all meetings, but progress and negotiations were slow with a sense of everyone working for themselves and no decisions or agreements being made between stakeholders, unless they had been discussed at earlier delegation meetings.

Purac was hoping for an extension of the project to further include construction of the larger treatment plant but the client's investment plan was unrealistic and eventually it turned out that Purac had put in a great deal of work and effort without getting any new orders.

At the moment, Purac is still contact with Tangshan as they still have not delivered all their work due to the fact that there is no water going into the plant yet. If the sewage management project with large plants is initiated again, Purac will be interested in being involved, although they have not actively approached the Tangshan side as they consider it unlikely to be realized<sup>38</sup>.

In 2009, Skandinavisk Termoekonomi AB became involved in Tangshan through an introduction by CENTEC. Termoekonomi set up a joint venture named Tengmao Energy Saving Technology Utilization Ltd and developed a master plan of energy solutions for the 30 sq. km area<sup>39</sup>. As Termoekonomi has already provided the Tangshan side with the master plan, they consider their involvement in the project to be finished. However, they do not know when or even if their master plan of energy solutions will be implemented<sup>40</sup>.

Envac were also introduced into the development of Tangshan Bay Eco-City in the initial phase of the project and provided a feasibility study report, although their system was not applied due to limitations in the Tangshan Bay Eco-City budget<sup>41</sup>.

<sup>36</sup> (2011), Wenn Lu, *District heating – A possible part of sustainable urban development in China*

<sup>37</sup> Ulf Ranhagen, Senior Chief Architect, SWECO and Professor at Royal Institute of Technology (KTH)

<sup>38</sup> Sören Gothardsson, Director of Business Development, Purac

<sup>39</sup> (2012), Xinting Chen, *Bilateral Collaborations in Sino-foreign Eco-cities: Lessons for Sino-Dutch Collaboration in Shenzhen International Low-carbon Town*

<sup>40</sup> Tan Lei, Chief Representative China, Termoekonomi

<sup>41</sup> Frank Mao, Project Director, Envac

Other long-term agreements the government institution level were the *Letter of Intent on Sino-Swedish Cooperative Project of "City of Tomorrow"* and the *MoU on the Cooperative Project of "City of Tomorrow"*, both signed in 2010. The intention was to launch a pilot project based on the Bo01 project in the Western Harbour in Malmö but it was never implemented.

One successful agreement signed between the Mayor of Malmö and the Vice Mayor of Tangshan in 2010 was the *Letter of Endorsement for TangMa Training Programme*, a three year programme covering the fields of "Sustainable Urban Design" and "Utilization of Organic Waste as a Resource for Urban Renewable Energy". In 2011, another three-year programme was agreed in the *Letter of Endorsement for TangMa Learning Programme*<sup>42</sup>.

### 3.1.2 Progress

The cooperation with Tangshan has been a central part of both CENTEC's and IMT's work and has included a great many high-level visits, conferences, ceremonies, company visits and meetings. Since the successful involvement of Swedish companies in the initial phase of the project, more recent Swedish companies' efforts have not been successful in Tangshan. The absence of Swedish involvement in the development is not due to lack of interest from either Swedish companies or the Tangshan side, but rather an effect of slow progress in the development of Tangshan Bay Eco-City and a great many problems and constant changes in the Tangshan management.

From the second half of 2010 onwards, the progress of the project has been slow. One reason is the cooling down of the real estate market, that is argued to have affected Tangshan more than other cities and land prices are now too low for the Tangshan authorities to be able to sell<sup>43</sup>. Another issue concerning the development of Tangshan Bay Eco-City is its geographic location, i.e. not attractively located but rather isolated on the coast. The Tangshan Bay Eco-City is a very political project and political support for the Eco-City has had its ups and down depending on the changes of Tangshan decision makers, and the location of the eco-city was to a great extent chosen for its geographical conditions. The economic performance has been lagging and in recent years there has been very slow or no progress at all in Tangshan<sup>44</sup>.

After the Shanghai World Expo in 2010, Tangshan municipality bought the Swedish pavilion. By then, the relocation and reconstruction of the pavilion were expected to be completed by the end of 2011<sup>45</sup>. The pavilion, however, had still not been erected by 2013, most probably due to the project's current economic problems<sup>46</sup>. Since 2010, the only progress made by Swedish companies in Tangshan is a two million RMB contract, given to the Swedish consortium of architects and engineers<sup>47</sup> initiated by CENTEC, regarding the planning of the central parts of Tangshan Bay Eco-City called Innovation Island. However, due to a lack of economic resources the project remains unexecuted<sup>48</sup>. The Swedish

<sup>42</sup> (2013), Briefing of Sino-Swedish Tangshan Bay Eco-city Project, Embassy of Sweden, CENTEC and Tangshan Bay Eco-city Administrative Committee

<sup>43</sup> Email conversation Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT) and Monique Wannding, Deputy Director IMT

<sup>44</sup> Ulf Ranhagen, Senior Chief Architect, SWECO and Professor at Royal Institute of Technology (KTH)

<sup>45</sup> <http://en.tswstc.gov.cn/>

<sup>46</sup> Anita Jonsson, Head of Sino-Swedish Sustainable Business Program 2008-2012

<sup>47</sup> Sweco, Tengbom, ÅF, Nyréns, Tyréns, A&A Architects, AIX (White Arkitekter initially involved but chose to drop out)

<sup>48</sup> Email conversation Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT) and Monique Wannding, Deputy Director IMT

consortium has not been successful in Tangshan as the Tangshan side was not interested in dealing with more than one Swedish company at a time<sup>49</sup>.

### 3.1.3 Lessons from Tangshan

In the initial phase of the Sino-Swedish cooperation on the Tangshan Bay Eco-City project, CENTEC in particular but also IMT played an important role as dedicated promoters introducing Swedish companies to the cooperation, marketing Sweden as a country as well as presenting Swedish examples of sustainable city development and clean-tech solutions. CENTEC's work has also been of essential importance in maintaining continuity and relations with a changing Tangshan management. For the companies involved, the cooperation with the Embassy and Business Sweden was also of importance.

So far, one of few successful Swedish companies in Tangshan is Sweco, but Sweco's work was also affected by cultural differences in discussions, uncertainty in the schedule, short time frames to provide the client with extensive material as well as the differences in views of city development and architecture. Furthermore, Sweco had to wait quite a long time to be paid for the work they had delivered in the project although the Tangshan side showed a great deal of commitment to the cooperation, enabling Sweco's and Chinese ideas to be combined into an innovative way of delivering a very interesting and innovative product.

Coordination with different cooperation levels might be necessary in a project of this size but management of the cooperation turned out to be a little ineffective, making the project's progress rather slow for all parties involved. Other holdbacks in the Tangshan Bay Eco-City project were the lack of integrated thinking when considering solutions for different parts of urban systems and functions, regarding every sub-system as an isolated project. Swedish companies have learnt that the organizational management of the project was not as coordinated as first expected and that there were unrealistic expectations of investment capital inflow to the project from the beginning, which eventually affected the project's performance and progress.

The Swedish companies involved in Tangshan so far are all quite big and well-known also in the Chinese market. Compared to Swedish eco-city project, Tangshan Bay Eco-City is huge. Generally speaking, many Swedish companies do not have the economic capacity to make investments of this magnitude. As for the Swedish companies involved so far, it eventually turned out that some of them put in a great deal of work and effort without getting any economic return. In Purac's case, they did a great deal of consultancy work without getting paid extra and as Purac's core business is selling plants, not consultancy work, they are not at all organized to carry out consultancy tasks, which the Tangshan side expected. If they do not undertake to provide extensive proposals and solutions, companies cannot join in the biddings for projects. This means both a great deal of extra work without receiving economic compensation and uncertainty about and a risk of not winning the tender, delays, or even changes and cancellations of projects.

Purac wanted to get on-board the Tangshan Bay Eco-City project as it was considered to become the flagship of Swedish eco-city development in China. In the end, they have not incurred any financial losses from their participation in the project, although the resources used in the Tangshan project could have been allocated more effectively in other projects. What Purac has learned from this experience is to critically evaluate the potential business, the potential of the project to be realised and the time frame in the initial stages of a

<sup>49</sup> Ulf Ranhagen, Senior Chief Architect, SWECO and Professor at Royal Institute of Technology (KTH)



project. This is considered to be especially important for investment companies and companies delivering physical products as they do not receive payment for their ideas.

The Swedish governmental institutions are considered to have played an important role as regards introduction into the project, but the belief in the strength of the high-level government rootedness of the projects did not always meet companies' expectations.

There is also a desire for the governmental institutions to be more active in project follow-ups. There is a feeling that Swedish government institutions, after being actively involved in the initial phase, rather begin to look for new projects than be committed to more long-term involvement, continuous monitoring and project follow-ups.

## 3.2 Sino-Swedish Low-Carbon Eco-City in Wuxi

### 3.2.1 Background

The *Memorandum of understanding on development of a Sino-Swedish Low-Carbon Eco City in Wuxi* was signed on the 3<sup>rd</sup> of July 2010. The objective was to promote Sino-Swedish cooperation in the field of sustainable urban development and develop a first class Sino-Swedish Eco-City in China. The ambition was to bring advanced Swedish sustainable concepts and practical expertise, inspired by and modelled on the development of Western Harbor and Hammarby Waterfront, into the Sino-Swedish Low-Carbon Eco-City project. Six areas were identified as high priority components of the project<sup>50</sup>:

- Joint development of the eco-city concept
- Integrated and comprehensive planning and design
- A low-carbon eco-city environmental program
- Low-carbon environmental technology system solutions
- Management of low-carbon eco-cities
- Experience exchange on local policy incentives to promote low-carbon eco-city development

Wuxi municipality is one of China's most developed cities. It is situated in Jiangsu province, only some 150 kilometres from Shanghai. It was decided in 2007 that a new city, "Taihu New City", was to be built to secure the urban expansion of Wuxi. Taihu New City will cover an area of 150 sq. km and be situated between the Tai Hu Lake and downtown Wuxi. Taihu New City is expected to be home to 850.000 people. In 2007 there was already a significant presence of Swedish companies investing in and relocating to Wuxi. The Consulate General of Sweden in Shanghai was first approached by Wuxi municipality regarding Sino-Swedish cooperation in Wuxi in autumn 2008. Wuxi municipality had heard about Hammarby Waterfront and was extremely impressed and interested in having a Hammarby Waterfront in Taihu New City<sup>51</sup>. In February 2009, the Consulate General received a proposed cooperation agreement between Wuxi and Sweden from Wuxi municipality<sup>52</sup>. The agreement was signed in October 2009 when the party secretary of the Wuxi Municipal Committee, Yang Weizi, visited Hammarby Waterfront<sup>53</sup>.

<sup>50</sup> (2010), *Memorandum of understanding between Wuxi Municipal Government and Ministry of the Environment of the Kingdom of Sweden*

<sup>51</sup> Interview with You Zhi Bin, Wuxi Municipality

<sup>52</sup> 2009-07-06 PM, Bengt Johansson, Consulate General of Sweden in Shanghai

<sup>53</sup> (2012), Swedish Trade Council, Sino-Swedish Low-Carbon Eco-City project progress

Wuxi municipality also invited four Swedish architect firms to exclusively bid for the contract to design the master plan for the Sino-Swedish Low-carbon Eco-City covering an area of 2.4 sq. km, which is part of the Taihu New City development. It was eventually Tengbom that acquired the contract and the project began at the end of 2009. Tengbom had been responsible for providing both the master plan for the Sino-Swedish Low-Carbon Eco-City (2.4 sq. km), modelled on Hammarby Waterfront, and a detailed study of an area of approximately 30 hectares focusing on sustainable urban construction and the development of an environmental programme. The environmental programme focusing on the 30-hectare area included guidelines for an integrated, sustainable urban system covering functions such as energy usage, waste management, water resource usage, sustainable building design and architecture, green traffic, and landscaping<sup>54</sup>. The Swedish company ÅF was also subcontracted by Tengbom to provide the master plan with the city energy solution.

The ground-breaking ceremony for Wuxi Sino-Swedish Low-Carbon Eco-City was held the 3<sup>rd</sup> of July 2010, at which the memorandum of understanding was also signed. Except for the master planning undertaken by Tengbom, this was the main result from the work undertaken by a working group with delegates from the Government Offices of Sweden, the Swedish Trade Council (Business Sweden), Södertälje municipality (Wuxi's sister city) and Wuxi municipality, set up in January 2010. The objective of this working group was to identify collaborative projects and pave the way for Swedish clean-tech companies to be introduced into and become involved in the Sino-Swedish Low-Carbon Eco-City project.

In November 2010, the working group evaluated their work and decided to push the project further through the foundation of two mutually independent levels of cooperation; one political and strategic level of cooperation between Wuxi's government and the Swedish government and one level of cooperation between companies. The priorities of the government cooperation were to define the cooperation plan, clarify its aims and ensure its realization, discuss policies and technology solutions, guide investments, enlarge Wuxi-Swedish cooperation, etc. Regarding the company-level cooperation, the priorities were to push the exchange of visits, arrange social gatherings where Swedish and Chinese companies could meet, and open up for and facilitate Sino-Swedish company cooperation<sup>55</sup>.

### 3.2.2 Progress

The detailed land use layout of the Sino-Swedish Low-Carbon Eco-City has now been completed. The district has been divided into zones for residential, commercial and cultural areas as well as sporting and green areas.

After receiving Tengbom's 2.4 sq. km master plan in 2010, the Wuxi side decided to divide it into ten key projects. These 10 key projects (which eventually turned out to be 6) then became the subjects of new tenders to bid on.

Thereafter followed a period characterized by many challenges and slow progress. Economic recession, low land prices, some political issues on the Wuxi side, changes in Wuxi management and the huge disappointment at not getting the Swedish pavilion from the expo (Tangshan bought it) caused the progress of Sino-Swedish Low-Carbon Eco-City to stop for about a year, 2010–2011<sup>56</sup>. In 2011, however, it was decided to restart the

<sup>54</sup> <http://www.tengbom.se/sv-SE/projekt/90/sino-swedish-eco-city>

<sup>55</sup> (2010-11-16), Meeting minutes 7th work meeting

<sup>56</sup> Anita Jonsson, Head of Sino-Swedish Sustainable Business Program 2008-2012

cooperation through the establishment of two new working groups, a technical committee and a steering committee<sup>57</sup>.

In 2012, the Wuxi side appointed a new team for the project. As a result, much emphasis was put on relationship-building on the political level. In summer 2012, bidding opened on four of the key projects. Swedish companies showed great interest in participating in the bidding; A&A, ÅF, Sweco and Tengbom all decided to bid for some or all of the projects. The Swedish companies received the four Designing Assignment Documents for the key projects in late July (July 30). The deadline for receiving the project proposals at the time was August 15<sup>th</sup> although the Swedish side managed to negotiate an extension until August 31<sup>st</sup>. The Swedish companies bidding for the projects faced significant challenges in mobilizing all the necessary resources during vacation time and, most importantly, all documents were available only in Chinese.

The result of the public tender was a big disappointment from a Swedish point of view. None of the Swedish companies was given any of the four key projects even though the Wuxi side argued that the Swedish companies had been given more preferential terms. The evaluation committee found that the Swedish companies were not very well prepared compared to other companies, their application material was neither detailed nor deep enough and lacked the technical parts. The main focus of the Swedish companies' application material was rather on success stories from their earlier work than focusing on Wuxi's needs and local conditions. The Swedish companies' prices were also higher than the other companies'.

After the bidding, the four key projects were merged into three actual projects. The ultimate winners were a local company, a British company and the Shenzhen Institute of Building Research, which is also appointed technical advisor to Wuxi<sup>58</sup>.

At present, all bidding for the key projects is over, which means that the next time Swedish companies will get the opportunity to be involved is when construction starts and Swedish companies can be involved as subcontractors or suppliers<sup>59</sup>.

One Swedish company that was successful in bidding for projects in Wuxi, not one of the ten key projects, however, is Envac who at an early stage in the development of the Sino-Swedish Low-Carbon Eco-City won the bidding for the waste collection project<sup>60</sup>. Envac became involved as Tengbom, who delivered the master plan, recommended Envac's systems. Envac will supply an automated waste collection system for the project, but due to delays in the site development the installation of Envac's systems is also delayed. Envac is at the moment cooperating with a local design institute to modify their original system proposal as requested by the Wuxi side. According to the most recent update, Envac is expecting to begin their work in the end of 2013.

Envac entered the Wuxi project at a very early stage, after being recommended by Tengbom. Envac have been involved in several Chinese projects before and also in the development of Hammarby Waterfront. According to Helen Xu at Business Sweden, the plan provided by Envac was also very well prepared and detailed. So far, Envac has found the relationship with the Wuxi side to be good but Envac has faced some problems with the coordination of different parties in the project. They have also experienced unexpected

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<sup>57</sup> (2011-11-29), Premomoria

<sup>58</sup> Consulate General Meeting minutes

<sup>59</sup> Ben Chen, Commercial Officer, Consulate General of Sweden in Shanghai

<sup>60</sup> (2012), Swedish Trade Council, Sino-Swedish Low-Carbon Eco-City project progress

delays in construction, decision-making is slow and the design is constantly being revised<sup>61</sup>.

One recent concern from the Wuxi side is the foundation of a project evaluation expert panel for the ongoing key projects as well as a desire for more high-level communication and visits between Sweden and Wuxi.

Regarding the expert panel, the Wuxi side and the Swedish side had some differences of opinion. During a video-conference in December 2012, the Wuxi side asked to be provided with a list of experts since Wuxi needs the expert panel to evaluate a certain project. The Swedish side, on the other hand, advocated a system where they choose the most appropriate experts from the expert pool to consult according to the actual project Wuxi would like to evaluate. This system would be more efficient and enable the Swedish side to provide Wuxi with the best service.

At the same video-conference, the Wuxi side also showed interest in receiving information regarding Swedish construction supervising companies. The intention of the Wuxi side was to begin the construction work after the Chinese New Year 2013. However, the construction supervising company will have to go through a public bidding process, which the Wuxi side indicated would not favour Swedish companies due to price and qualification issues. The Wuxi side therefore proposed that a Swedish supervising company could work together with a local Chinese supervising company, with the actual potential to win the bidding, and offer them consulting services<sup>62</sup>. Sweco was pointed out as a potential company to conduct the supervision work but it turned out that Sweco did not hold a licence to conduct this kind of work in China<sup>63</sup>. Moreover, the Wuxi side added that the consulting fee could be paid by the Swedish government to demonstrate the spirit of cooperation in the Wuxi project.

Regarding the desire for more high level communication and visits between Sweden and Wuxi, the Consul General of Sweden in Shanghai met with the Wuxi side in March 2013. The meeting was more of a general discussion about the cooperation and progress of the Sino-Swedish Low-Carbon Eco-City. The Wuxi side expressed interest in having more Swedish companies take part and demonstrate their technology and products in Wuxi. They also pointed out that more support from the Government of Sweden would be highly appreciated.

During her visit to China in May 2013 the Swedish Minister for the Environment, Lena Ek, visited Wuxi and had a courtesy meeting with the party secretary in Wuxi. However, she was not invited to actually see the area for the Sino-Swedish Eco-City. During the meeting, some cooperation was initiated on a more extensive evaluation of the Sino-Swedish eco-city projects with the Chinese Ministry of Housing and Urban–Rural Development (MOHURD). Discussions are now going on about how and when the cooperation should take place and who should participate<sup>64</sup>.

From a Swedish point of view, the most important and interesting progress during 2012 and 2013 has been that a team from the Royal Institute of Technology, KTH, is currently modelling the energy plan for the Sino-Swedish Low-Carbon Eco-City area of Taihu New Town. The project is funded by the Swedish Energy Agency and is considered to be one of

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<sup>61</sup> Frank Mao, Project Director, Envac

<sup>62</sup> Consulate General Meeting Minutes

<sup>63</sup> Ben Chen, Commercial Officer, Consulate General of Sweden in Shanghai

<sup>64</sup> Telephone interview with Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT) and Monique Wannding, Deputy Director IMT

the six key projects of the Sino-Swedish Low-Carbon Eco-City project. The project was offered to KTH without going through a public bidding process.

In the first phase of the project, about 150 students generated 17 proposals to be further evaluated as a part of their Master's degree work. The best ideas were selected and further evaluated and subsequently presented for the Wuxi side. The KTH team first visited Wuxi in August 2012, at which time they presented their preliminary report. The energy plan is modelled on the Hammarby Model and the KTH team put a great deal of effort into promoting and presenting the extensive thinking and planning process behind the Hammarby Model. The response from the Wuxi side was positive although they wanted the final report to be similar to an implementation plan and guidance for the construction process, i.e. what to do and how to do it. KTH and the Wuxi side agreed on an extension of the time limit for KTH to present their final report as the request from the Wuxi side required more time to finalize. KTH's second visit was in November 2011. The Wuxi side was still not satisfied with the depth of the report and it was still not detailed enough to serve as the implementation plan the Wuxi side was aiming for. KTH was asked to submit their final report in January 2013<sup>65</sup>.

During their work on the energy plan, the KTH team has encountered problems with the information flow, which they feel is one-sided. The process has been opaque and there have been difficulties in not understanding how China operates, the players' network and the structure of hierarchy and cooperation in the project. The final report was eventually handed over to the Wuxi side in June 2013<sup>66</sup> during a visit in Wuxi on August 23<sup>rd</sup>. Due to another change in Wuxi's top management, the meeting was the first time the KTH team and the Consulate representative met the new person in charge. The presentation of the report went well, the new top leader seemed very happy, although a continuation of the KTH project is more or less dependent on more funds from the Swedish Energy Agency.

### 3.2.3 Lessons from Wuxi

It is stated in the Memorandum of Understanding signed with Wuxi that Swedish technologies have priority to be selected in the Sino-Swedish Low-Carbon Eco-City development project. However, it is Wuxi and the Wuxi management organization that have all the power to make any operational decisions. IMT, the Consulate General and Business Sweden put a great deal of effort into promoting Swedish companies and technology as strategic advisors to Wuxi, while trying to maintain a good relationship with the Wuxi side and making sure to obtain as much useful information as possible for Swedish companies<sup>67</sup>. However, the collective efforts of the Swedish governmental institutions is regarded as having been uncoordinated and sometimes unable to provide companies with enough detailed information about the Wuxi side's actual desires and needs and explicit information as to who is making the decisions.

Swedish government institutions can uphold good contact with Wuxi, but more important than inter-governmental relations are companies' need to mobilize their own resources and personnel in order to be successful. Tengbom considered their Chinese network, partnerships and staff all to be vital during their involvement in the project. Tengbom worked very closely with their local partners and with their help Tengbom was eventually able to ensure that the agreed key performance indicators Tengbom had provided the Wuxi side

<sup>65</sup> Consulate General Meeting minutes

<sup>66</sup> Interview with Omar Shafqat and David Stoltz, Royal Institute of Technology (KTH)

<sup>67</sup> Email conversation with Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT)

with were actually written into the site zoning plans as legislation. In that way, future developers will not be able to change the intentions in the master plan during the development process, but have no other choice than to respect the intentions of the master plan. What Tengbom achieved was very innovative and their work has received a lot of good publicity inside and outside China. On top of that, Tengbom has won prestigious awards for their innovative master plan. Their work in Wuxi has opened up for more opportunities and for this reason they do not regret their involvement despite the financial losses.

ÅF, subcontracted by Tengbom, also point out their “Chinese guy” as an invaluable resource in the project and in Envac’s case, they have a local Chinese office and they are currently cooperating with a local design institute to modify their original system proposal as requested by the Wuxi side.

The high-level inter-governmental cooperation in the Sino-Swedish Low-Carbon Eco-City project has been negatively influenced by changes in the Wuxi management and key people as well as by the fact that the Swedish pavilion was relocated to Tangshan and not Wuxi. This stopped the project from progressing for about a year. The former Consul General in Shanghai, Bengt Johansson, who had been extremely active in the cooperation took up a new post in 2011, which probably affected the cooperation. The recent downturn at all Swedish companies bidding on the four key projects in 2012 did not strengthen the spirit of cooperation in the project. This was a great disappointment followed by a feeling that the Wuxi-Swedish mutual benefit of the project was turning into a one-way cooperation where Swedish know-how, technology and ideas were drained without any counter-performance<sup>68</sup>. The Shenzhen Institute of Building Research was cooperating with Swedish companies as technical advisor to the Wuxi Sino-Swedish Low-Carbon Eco-City project when they suddenly entered the biddings for projects. From then on, the Swedish side learned to be more careful about what and how much information and technology can be offered for free in the cooperation, as the Shenzhen Institute of Building Research is likely to have benefited from this in the biddings.

There has also been a feeling that the recent demand for a list of Swedish experts who could evaluate the key projects is more or less just a desire to get Swedish experts’ names on paper to increase the political value of the eco-city. One other recurrent interest on the Wuxi side is a desire to have projects subsidised or part- financed from Swedish government programmes.

According to companies involved, there are no great differences in the use of technology and know-how when working in the Wuxi project compared to the Hammarby Waterfront project, for example, although in China there is a lack of understanding about how to integrate different urban subsystems in a city. Language and cultural differences in communication also affect the cooperation. For example, Tengbom struggled to argue and persuade the Wuxi side to accept their proposal. Tengbom also had problems getting paid, mostly due to the fact that the construction committee did not have the correct Chinese business licence to contract Tengbom. Tengbom was paid the contracted amount about a year after delivery and the economic outcome of the project was not good. Tengbom was later asked to submit a design for the environmental information building, which they did on the understanding that they would receive the commission. However, a Chinese design institute was awarded the project and Tengbom was never paid.

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<sup>68</sup> Ibid

Envac points out the challenges of lack of coordination between different stakeholders, unexpected delays in construction, slow decision-making, and constant revision of the design. Envac has now been involved in the Sino-Swedish Low-Carbon Eco-City project for almost two years and they have learned how to remain patient during the process. They try to be active and push the project ahead and maintain good relations with the Wuxi side, both privately and as regards business, as well as show interest in the concerns and demands of the Wuxi side.

Tengbom and ÅF, who have been working closely together in Wuxi, have learned that it is not easy to identify and understand decision-makers in the project. It is vital to check the possibility to be paid and they have learned not to accept doing work for free. They stick firmly to the contract delivery list and try to have expectations written into the contract.

In the case of KTH, their work on the energy plan was supposed to be carried out in six months. When KTH presented the final report in August 2013, they had been working on the energy plan for more than a year. They have been struggling with extremely high demands from the Wuxi side but without actually having a clear idea of what the Wuxi side wants and needs. The result of every meeting is a demand for more details and technology in the plan and there is a feeling that Wuxi is planning to use the energy plan to apply for other external funds.

The current involvement of Swedish companies is lower than expected. Swedish companies have shown great interest in joining in the biddings for the key projects but without any success. There is no doubt on the Wuxi side regarding the quality of Swedish technology, but the Swedish companies are too expensive. Swedish companies also face strong competition from foreign competitors but most importantly from local competitors. Local competitors have a better network and understanding about the Wuxi side's actual demands, as transparency of information is hard to obtain for foreign companies. Newly appointed Mr You Zhi Bin, from now on in charge of the Wuxi management, said during the KTH meeting in August that they are happy with the Sino-Swedish cooperation and the introduction of Swedish companies in Wuxi so far. The small number of Swedish companies involved is according to him due to external economic factors, although he is looking forward to having more Swedish companies in the eco-city project in the future as well as a management and economic cooperation with Swedish companies investing in the project. He also said that the Wuxi side needs more support in how to categorize Swedish companies, their expertise and their technology.

## 4 Conclusions from Tangshan and Wuxi

Environmental awareness is increasing in China. In particular the most recent five-year plan (the 12<sup>th</sup>) shows that the Chinese central government is ready to deal with China's environmental issues. China is currently experiencing a rapid urbanization; this is considered to be a substantial challenge as cities' and citizens' environmental footprint is larger than that of their rural counterparts. One popular way of addressing the environmental and urbanization issues is to develop eco-cities.

As China lacks know-how and experience of eco-city development, they are extremely interested in involving foreign expertise. Sometimes, Chinese municipal governments also sign governmental agreements with foreign governments to develop Sino-foreign eco-cities. From China's point of view, this is a convenient way of importing foreign know-how and technology.

So far, Sweden has signed two inter-governmental eco-city development agreements with Chinese municipalities: the *Memorandum of understanding on development of a Sino-Swedish Low Carbon Eco City in Wuxi*, between Wuxi Municipal Government and the Ministry of the Environment and the *Letter of intent on sustainable development cooperation*, between Tangshan City and the Ministry for Foreign Affairs and the Ministry of Enterprise, Energy and Communications.

Sweden is identified as a strategic partner in eco-city development due to its reputation in the fields of sustainable city development and clean-tech. China is very impressed by well-known Swedish eco-city projects like Western Harbor and Hammarby Waterfront and want to have a similar concept. The Swedish government, IMT, the Embassy in Beijing, the Consulate General in Shanghai, CENTEC and Business Sweden have all been important promoters of Swedish experience, technologies and companies.

The Symbio City concept, like most Swedish technologies, is fairly easy to localize to suit Chinese conditions. What is more difficult for Swedish stakeholders is how to adapt to the Chinese way of project coordination and cooperation and differences in expectations and mind-sets. Another big difference between eco-city development in Sweden and China is the way of financing eco-city development. For example, in the development of Hammarby Waterfront the investments were already secured before the project began. In China, on the other hand, the initial investment capacity is usually low and the eco-city concept is used to make land prices rise and attract investors. This exposes the Chinese eco-city projects to high risks.

Due to the signal of political backing for the Sino-Swedish Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City projects, one might think that Swedish companies would be rather successful in the cooperation; so far, however, this has not proved to be the case. Except for Sweco in Tangshan, and possibly Envac in Wuxi, and ÅF as they were subcontracted by Tengbom, the Swedish companies involved have not been successful. A number of Swedish companies have tried to become involved in the biddings for projects without success, ending up using resources and money to deliver master plans for free. The companies involved have actually been more successful in other eco-city projects around China and think they could have used the resources they put into Tangshan and Wuxi more effectively somewhere else.

There are no issues regarding the introduction of Swedish companies into the projects; through the political cooperation Swedish companies have easy access to the eco-projects.



However, the big issues regarding the Sino-Swedish cooperation in Tangshan and Wuxi can be divided into two parts: one pre-problem of how to get Swedish companies involved after introduction and issues related to the actual progress and outcome. The most urgent issue is how to close the gap between introduction and actual involvement. IMT, CENTEC, the Swedish Embassy, the Consulate General and Business Sweden are all trying to help Swedish stakeholders to close agreements but it takes a lot of work and effort to get there.

**INTRODUCTION →? → INVOLVEMENT → PROGRESS AND OUTCOME**

The Swedish government is working hard to introduce Swedish companies and technologies into the Sino-Swedish eco-cities, though a lot of companies end up using their resources to deliver master plans in bidding processes they eventually lose. This would make it impossible for small or medium-size companies, as most Swedish clean-tech companies are today, to become involved as they could not take the economic risk. Even if they were to win the tender, the substantial risk of delays or even project cancellation could be a matter of survival for these companies.

Some continuous problems in both Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City are;

- Unclear coordination of the project
- Opaque decision making
- Change in Chinese representation and project management
- Lack of information
- Exclusion of Swedish companies from bidding processes
- Project delays and delayed payments
- Companies ending up doing work for free
- Asking for Swedish government support in terms of funds

Until now, most Swedish companies involved in Tangshan and Wuxi have been and still are big companies already enjoying a good reputation in the Chinese market. This means that delays and non-paid work do not risk their existence. They also have their own channels and connections and do not need to rely only on Swedish governmental institutions, which have proven to be extremely important in these projects.

In the Sino-Swedish eco-city cooperation, especially in Wuxi, there is a current trust issue. The Swedish connection to the Sino-Swedish Low-Carbon Eco-City is currently quite vague. The only Swedish involvement in Wuxi right now is KTH, who are working on the energy plan. However, their work is fully funded by the Swedish Energy Agency. Envac is also waiting for their project to get started. The trust issue concerns the intention of the Wuxi side to actually develop a Sino-Swedish eco-city or if Wuxi's real interest is to get an inflow of Swedish ideas and expertise but give the actual projects to cheaper competitors.

Swedish companies involved in Tangshan and Wuxi have learned not to do any work for free just for goodwill and better prospects of getting future projects as this rarely happens.

They have learnt that the best approach is to write all expectations and a clear delivery list directly into the contract to avoid misunderstandings and changing demands on the client's side during the process, which would probably mean unpaid extra work and delays. It is also important to check the investment capacity in a project before becoming involved.

The demands from both the Tangshan side and the Wuxi side are and have been extremely high, Swedish companies do not consider meeting the high expectations an issue, the issue is that the demand and expectations are often vague and continuously changing.

The high Chinese expectations and demands are an important factor, where Swedish companies have been pushed to deliver highly innovative plans and solutions. Both Sweco's work in Tangshan and Tengbom's master plan for Wuxi have received a great deal of attention both inside and outside China. For this reason, Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City in Wuxi have become acknowledged reference projects both for Sweco and Tengbom and also for the other Swedish companies that have been or are about to be involved in the development.

As the planners and architects delivering the initial conceptual master plans are seldom part of the whole development process from beginning to end, it might be important for companies to secure the high quality of their own work and design, as Tengbom did, by actually writing agreed key performance indicators into the site zoning plan as legislation. Otherwise, future developers might be allowed to change the initial plan and design as they wish according to their own interests or ideas, which would risk the innovative standard and the possibility for Swedish companies to secure high-standard reference projects.

The Symbio City concept is very attractive in sustainable city development and has been used in the planning of both Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City. Nonetheless, it seems that the Chinese sides of the projects have some trouble fully understanding how to use the concept as a tool for development. Stronger Swedish support behind the Symbio City concept could therefore be an effective tool and it might be an advantage if the Swedish side were able to offer a "package deal" with Swedish companies and solutions for integrating different urban systems. The Swedish consortium in Tangshan could be seen as an attempt to do this but was unfortunately not successful. If Sweden should try this approach again, the consortium must be composed more carefully and include companies that complement rather than compete against each other. In the case of Wuxi, Envac were involved at Tengbom's recommendation. ÅF were involved as a subcontractor to Tengbom. ÅF is very satisfied with their achievement in Wuxi and the cooperation with Tengbom worked well. Envac are also satisfied with their involvement in Wuxi so far.

Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City are two special projects as they have national political backing and were intended to be Swedish flagship projects in China. The initial Swedish expectations were high and at both Tangshan and Wuxi there was a strong Chinese political will. Even though recent progress in the progress has been slow, IMT is working hard together with CENTEC, the Embassy and the Consulate General to push the projects forward. However, IMT is not pushing to close more governmental agreements with Chinese municipalities on eco-city development. More common today is less extensive cooperation, preferably between Chinese cities or districts and the Swedish Embassy as well as the Swedish Consulate General<sup>69</sup>.

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<sup>69</sup> Telephone interview with Mats Denninger, High Representative for the International Environmental Technology Cooperation (IMT) and Monique Wannding, Deputy Director IMT

## 5 Implications for Swedish Policy

This report shows that the potential for Swedish exports of sustainable city development and clean-tech to Chinese eco-city development projects is huge. However, Swedish companies have not been as successful as expected in the two Swedish flagship projects Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City in Wuxi. This chapter highlights and evaluates the strengths, weaknesses, opportunities and threats facing Swedish exports of sustainable city development and clean-tech to Chinese eco-city development projects.

### *Strengths*

- The acknowledged reputation of Sweden as a pioneer in the field of sustainable city development and clean-tech.
- Through the Swedish holistic Symbio City concept, Sweden has integrated solutions for the whole eco-city development process. These are the solutions Chinese eco-cities need and want.
- Promoters of Swedish experience, technologies, know-how and companies. Swedish government institutions have been successful in promoting and introducing Swedish technology and know-how into Chinese eco-city projects. The inter-governmental agreements and promoters are likely to have played an important role for Swedish companies' possibility to get recognized and involved in the eco-city projects.
- Even if the number of involved Swedish companies in Tangshan and Wuxi is lower than expected, Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City are still acknowledged Swedish reference projects, opening up for new projects and opportunities.

### *Weaknesses*

- Sweden has the technologies and know-how for integrated urban system solutions, but few Swedish companies have actually been successfully involved in Tangshan and Wuxi so far. Many Swedish companies have been introduced into the projects but few of them have actually been involved in the end. There is a gap between introduction and actual involvement in the projects that needs to be closed.
- The political rootedness of the governmental agreements did not turn out to be as deep as expected. Due to the high frequency of change in Chinese political top management, political backing for the projects fluctuates depending on who is in charge.
- Lack of clear information and opaque decision making.
- Investment issues and the question of who pays for what. The Chinese often asks for subsidies and economic support from foreign governments. There are few Swedish funding programmes. Compared to subsidies from other foreign governments, Swedish subsidies are quite rare.

### *Opportunities*

- One way forward could be to offer an attractive “package solution” with Swedish companies offering integrated solutions for the Symbio City urban system. As Sweden tried this solution with a Swedish consortium before, without success, we must take

into consideration *how* this “package solution” or consortium could be made more attractive. Some companies have been successfully involved in Tangshan and Wuxi after introduction/recommendation by already involved Swedish companies. If a consortium is not the way forward, more solid backing for the Symbio City concept and closer cooperation between Swedish companies might be an effective way of approaching Chinese decision-makers recommending involvement of other Swedish companies.

- It is important that promoters, e.g. IMT, CENTEC, the Embassy, the Consulate General and Business Sweden, identify Chinese eco-city projects with a high potential to be executed. Shifting the focus to less extensive eco-city development projects, closing agreements with Chinese cities and districts and projects with lower political and economic risk might facilitate cooperation, make it more transparent and make it easier for Swedish companies to actually close agreements. This would then open up for the possibility for small and medium-size Swedish clean-tech companies to be involved.
- In order for companies to be successfully involved, promoters could put even more effort into relationship building, identifying and opening doors to decision makers and providing Swedish companies and other stakeholders with as adequate information as possible.

### *Threats*

- Financial uncertainty and economic risk in Chinese eco-city projects is high, as most investments are not secured from the initiation and planning phases of the projects. Promoters could preferably help companies to evaluate their own utility of being involved as well as enter the project with realistic expectations.
- In Sino-Swedish Tangshan Bay Eco-City and Sino-Swedish Low-Carbon Eco-City, the Swedish connection is quite vague at the moment. In order to secure real Swedish stamps on Sino-Swedish eco-cities in the future, we could learn from Tengbom. To secure the high quality of their work in Wuxi, Tengbom insisted on writing agreed key performance indicators into the site zoning plan as legislation. Tengbom and other Swedish companies have also learnt to clearly write expectations into contracts and agreements in order to avoid misunderstandings. In potential future inter-governmental agreements, the Swedish government could also insist that agreements should include more concrete and distinct expectations.
- Trust issues and green wash. Swedish companies’ involvement in the Sino-Swedish eco-cities has so far been fairly low. There is a trust issue regarding whether the intention really is to build Sino-Swedish eco-cities or use the projects as a means for Swedish expertise inflow and then give the projects to cheap competitors rather than Swedish companies. Swedish companies should be aware of this and learn how to protect the own know-how and technology when entering project discussions.

## Appendix

### Sino-Swedish government agreements

Up till now, four Sino-Swedish governmental agreements on environmental technology have been signed<sup>70</sup>:

- *Memorandum of understanding on environment and energy technology cooperation* → between the National Development and Reform Commission and the Ministry of the Environment, the Ministry for Foreign Affairs and the Ministry of Enterprise, Energy and Communications.
- (The *memorandum of understanding on environment and energy technology cooperation* expired in spring 2013 as the MoU had a limit of five years.)
- *Memorandum of understanding on sustainable urban development* → between the Ministry of Housing and Urban–Rural Development and the Ministry of the Environment.
- *Memorandum of understanding on development of a Sino-Swedish Low Carbon Eco City in Wuxi* → between Wuxi Municipal Government and the Ministry of the Environment.
- *Letter of intent on sustainable development cooperation* → between Tangshan City and the Ministry for Foreign Affairs and the Ministry of Enterprise, Energy and Communications.

Adding to the governmental agreements there are many on-going eco-projects in China where Swedish companies are involved<sup>71</sup>:

- Caofeidan/Tangshan Bay Eco-City → Sweco, Purac and Termoekonomi
- Wuxi, Sino-Swedish Low-Carbon Eco-City → Tengbom, ÅF, Envac and KTH
- Chongqing → Envac, Läckeby Purac and Axon Miljöteknik AB
- Tianjin → Envac

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<sup>70</sup> <http://www.slideshare.net/GlobalUtmaning/denninger-3majpres>

<sup>71</sup> Ibid.

**Tillväxtanalys, myndigheten för tillväxtpolitiska utvärderingar och analyser, är en gränsöverskridande organisation med 60 anställda. Huvudkontoret ligger i Östersund och vi har verksamhet i Stockholm, Brasilia, New Delhi, Peking, Tokyo och Washington D.C.**

**Tillväxtanalys ansvarar för tillväxtpolitiska utvärderingar och analyser och därigenom medverkar vi till:**

- stärkt svensk konkurrenskraft och skapande av förutsättningar för fler jobb i fler och växande företag
- utvecklingskraft i alla delar av landet med stärkt lokal och regional konkurrenskraft, hållbar tillväxt och hållbar regional utveckling

**Utgångspunkten är att forma en politik där tillväxt och hållbar utveckling går hand i hand. Huvuduppdraget preciseras i instruktionen och i regleringsbrevet. Där framgår bland annat att myndigheten ska:**

- arbeta med omvärldsbevakning och policyspaning och sprida kunskap om trender och tillväxtpolitik
- genomföra analyser och utvärderingar som bidrar till att riva tillväxthinder
- göra systemutvärderingar som underlättar prioritering och effektivisering av tillväxtpolitikens inriktning och utformning
- svara för produktion, utveckling och spridning av officiell statistik, fakta från databaser och tillgänglighetsanalyser

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**Övriga serier:**

Rapportserien – Tillväxtanalys huvudsakliga kanal för publikationer.

Statistikserien – löpande statistikproduktion.

Svar Direkt – uppdrag som ska redovisas med kort varsel.