

Urban Development: The State of the Sustainable Art

an international benchmark of sustainable urban development



Drift
Urgenda
TU Delft

International New Town Institute



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Title: Urban Development: the State of the Sustainable Art, an international benchmark of sustainable urban development.

Commissioned by: the municipality of Almere, the City Manifest 2.0¹, the province Flevoland and the Ministry of Infrastructure & Environment

Place, date: Dutch Research Institute for Transitions (DRIFT), Erasmus University Rotterdam, May 2011

Urban development / Cities / Sustainable development / International benchmark / Sustainable urban development / Best practices / Frontrunners / Policy / Governance

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Layout and cover design by Nabble, Utrecht

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¹ The City Manifest 2.0 (or in Dutch: 'Stadsmanifest 2.0') is a manifest in which a large number of local and regional NGO's, public organizations and businesses in 2009 confirmed their support for the draft vision of the municipality on the future development of Almere as described in the Concept Structure Vision Almere 2.0.

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Executive summary

Urban Development: the State of the Sustainable Art

Major sustainability challenges are most urgently experienced at the level of cities. It concerns challenges like the need to reduce air pollution and to safeguard energy and food security. On the other hand, because of the concentration of people and businesses, cities also offer good opportunities for decisive local action to address these challenges. Many cities are therefore seeking for the best strategies and solutions to reach ambitious sustainability targets. The study *Urban Development: the State of the Sustainable Art* provides a quick scan of the worldwide state of the art in sustainable urban development. It draws lessons from the best practices and explores possibilities for application of (elements of) these practices within the Dutch context, especially in Almere, the youngest city of the Netherlands. This study is commissioned by a collaboration of representatives from the municipality of Almere, the City Manifest 2.0¹, the province Flevoland and the Ministry of Infrastructure & Environment.

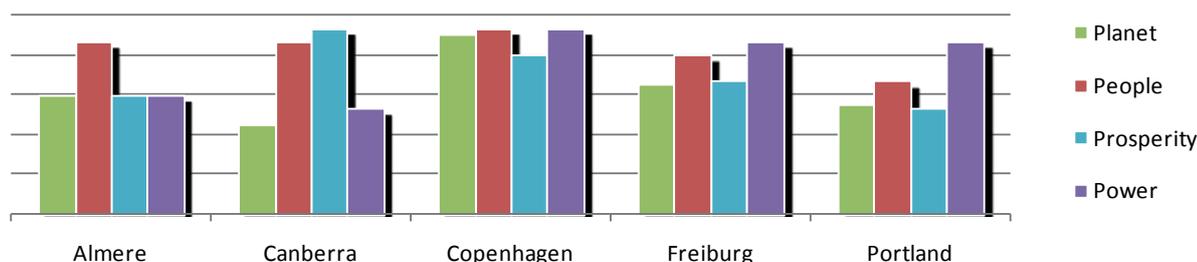
A methodology for assessing the sustainability of cities

Within the broad range of existing rankings for urban sustainability several cities keep popping up on the highest positions. Copenhagen, Freiburg and Portland are three of the most prominent examples. These cities have been selected for a detailed assessment, together with the new towns Tampines, Canberra and Almere (one of the commissioners of this study). A benchmarking methodology has been developed in order to be able to make an integrative, well-structured comparison between these cities, using both qualitative and quantitative data. This benchmark is inspired by the methodology and indicators of other rankings, but adds the 'power' domain to the commonly used 'people-planet-prosperity' domains in order to assess the governance approach (the 'how-question').

Frontrunners on the road to sustainability

The results of the benchmark are represented in the graph below².

Benchmark Results



¹ The City Manifest 2.0 (or in Dutch: 'Stadsmanifest 2.0') is a manifest in which a large number of local and regional NGO's, public organizations and businesses in 2009 confirmed their support for the draft vision of the municipality on the future development of Almere as described in the Concept Structure Vision Almere 2.0.

² Tampines is not included in this graph, because insufficient data was available to make an assessment of this city.



Block 16 ("The Wave"), Almere. Photo by William Veerbeek

Copenhagen is the overall-frontrunner, with highest scores on all domains except prosperity – where Copenhagen is second best. Freiburg takes the second position; especially power and people stand out because of the successful community-driven planning. Portland is often considered as the leading sustainable city in the USA, but the effect of their inspiring policies is compensated by the high average consumption of the residents – the energy consumption, water use, waste production, etc. are low relative to American standards, but high compared to other cities outside the USA.

Canberra is a new town and an expat city with rich inhabitants, offering a good quality of life but also causing a very high global impact due to for example the high energy consumption and car use. Almere gets high scores in the people-domain, because of cheap housing and high level of volunteering, but the results on the other domains are average. The difference between Copenha-

gen and Canberra, both rich cities, shows that sustainability policy can compensate for the negative effects of high consumption. On the other hand, Freiburg and Portland show that a high prosperity level is not a necessary precondition for successful sustainability policies.

The six cities and four additional thematic best practices show remarkable and inspiring results. Copenhagen, for example, successfully combined its commitment to the 'five-finger' development plan with its sustainability ambition to provide a high quality of life for the residents while reducing the ecological impact of the city. The capital of Denmark has become a lively and attractive city achieving serious environmental results - like a 30% reduction of per capita CO2 emissions in two decades. Portland is considered to be a model for sustainable urban design, with its urban growth boundary preventing urban sprawl and extensive facilities for bicycles and public transport. Freiburg masters the art of cooperation with residents, businesses and research institutions resulting in a high level of satisfaction of citizens and shaping a new identity that attracts new residents and businesses. Tampines managed to provide housing for more than 250,000 people in an area of only 12 km², in combination with a relative abundance of public space and good facilities nearby.

Each day in Curitiba, about 2 million people travel efficiently and comfortably with the affordable express bus system. In Detroit diverse local civil society organizations started a collaborative to support residents to cultivate gardens of abandoned homes providing food and jobs to the poor and revitalizing impulses to the city. Chicago is getting greener: more than half a million trees were planted since the start of the Green Streets Initiative with benefits ranging from improving air quality to increasing property values.

Critical success factors for sustainable urban development

Based on the analysis of the frontrunner cities and best practices, five critical success factors for sustainable urban development are identified.

1. A holistic approach that puts people first

Nearly all these examples show the power of an inspiring vision on sustainable urban development. These

visions start from a human perspective and link urban development strongly to prominent societal issues like quality of life and local environmental degradation. The visions are holistic because they take into account the interdependence of issues and also address less tangible needs: people also want a good place for their children to grow up, feel connected to their neighbourhood, enjoy culture, nature and attractive landscapes, et cetera.

2. *Inspiring and tenacious leadership*

The stories in this benchmark frequently show leading characters that play a key role in inspiring and mobilizing large groups of people for sustainable urban development. Without exception they are surrounded by a small group of frontrunners that is able to mobilize the platoon, thanks to their shared passion for sustainability and complementary competencies. This contributes to a 'virtuous cycle' of motivation and synergy. A key competence seems to be the ability to translate long-term goals into short-term actions that quickly produce visible benefits for the residents while they also contribute to the long-term goals.

3. *Operational sustainability guidelines that offer direction and room for initiative*

A common characteristic of successful sustainability visions is that they are translated into a few operational principles that provide clear guidelines for action in daily practice – guidelines that are so powerful that they hold for decades. Examples of such principles are provided by cities like Portland, Curitiba and Tampines where authorities have set clear regulations to limit urban sprawl and to concentrate high-density developments near public transport transits. It appears essential that a vision and the corresponding principles for sustainable urban development leave room for flexibility, and stay away from prescriptive details. Cities like Copenhagen and Freiburg show that cooperation and co-creation with residents and businesses in the urban development can be taken to higher level by providing professional support to bottom-up initiatives and local ownership.

4. *A smart mobilization of urban capital for sustainable purposes*

Several cities have succeeded in mobilizing 'dormant' urban capital for sustainable purposes. They all identified potential sources of wealth within their city and subsequently found smart levers to activate these latent, social, physical or financial 'assets' in support of sustainable urban developments. In financial terms, the cities do not stick to the question 'what does it cost?' but also address the question 'what are the benefits? – and to whom?'. The development becomes

more feasible by making the benefits explicit and involving the parties that benefit. An example is the market for 'sol criado' in Curitiba, where developers can buy extra floor surface (the latent asset) beyond the maximum building height in certain urban areas (a lever), enabling investments like restoration of monuments and maintenance of parks in the neighbourhood.

5. *A radical approach to promote sustainable system innovations*

A striking similarity between the most successful examples of sustainable urban development presented in this report (Copenhagen and Freiburg) is the radicalism in their aim for sustainable system changes. Both cities show a fundamental change in the way of thinking, doing and organizing shifting from a short-term, mono-disciplinary and top-down approach toward integral cooperation between disciplines and co-productions with other parties. Both cities also are rather uncompromising about ecological sustainability objectives, see for instance the high priority they attribute to public transport, the serious investments in sustainable energy and the high energy efficiency standards for buildings they legally impose.

Explorations and recommendations for Almere

The youngest city of the Netherlands, Almere, is an example of a city with high sustainability ambitions. This new town not only wants to double in size during the coming decades, it also wants to change the course of its development into a sustainable direction. In order to inspire all kinds of parties that work on the future of Almere, this study explores the possibilities for application of the successful approaches and solutions. The recommendations are structured as answers to the four main sustainability challenges for Almere.

1. *How to reconcile the ambition to become a complete, low-dense, polynuclear city with the aim for social, economic and ecological sustainability conform the Almere Principles?*

Although the Almere Principles are intended as an inspiring framework for the development of 'Almere 2.0' it is precisely this function that seems to be flawed in daily practice. To make these principles leading for the development of the city, self-reflection is needed to get a break-through in common practice and culture that hinders sustainable development (e.g. in organizational structure and finance). On the other hand, the 'playing field' can be limited in order to stimulate the creativity and innovation. To promote creativity in the search for a better accessibility of Almere, it is recommended to give clear priority to public transport, cy-

cling and walking above private car transport within the framework of an integral push-/pull-policy. On the regional scale it is recommended to join forces with motivated parties to enhance the capacity, quality and efficiency – in a cost-effective way – of the public transport system for the metropolitan region of the Randstad. And with reference to the Curitiba example it is recommended to look especially into ways to optimize the usage of (existing) infrastructure and facilities, a/o by reserving free lanes on the national highways like the A6 and A27 for express buses with a large capacity (of about 250 passengers per bus).

2. *How to create 60,000 new homes and 100,000 new jobs that add sustainable value to the development of Almere as a whole?*

The following actions are recommended to create synergetic connections between the Almerian ambitions for urban expansion and sustainability:

- » Create a local/regional market for sustainable surface development; such a market can be started at a small scale of e.g. an existing city quarter like Almere Centre.
- » Organize action-networks of local/regional frontrunners – residents, entrepreneurs, NGOs, etc. – to co-create new business models for sustainable services; besides sustainable surface development these networks can build upon the concept of product services like car sharing and the ‘public transport bicycle’.
- » Give the good example, by (gradually) abolishing unsustainable activities and by testing new sustainable technologies and business models on municipal buildings and infrastructure.

3. *How to maintain and enhance the added value of the green and blue infrastructure in Almere within the budgetary boundaries of the involved authorities?*

A Local sustainable Surface Development Company (a LSDC) can perfectly address this issue. Invite local/regional frontrunners – residents, entrepreneurs, NGOs, etc. – to establish a LSDC that provides organi-

zational and technical assistance to owners who want to develop their surface units in a sustainable way. This LSDC can help owners to develop their surfaces in many sustainable ways varying from the production of renewable energy to urban agriculture and the management of urban nature. The latter are of course important options to promote the diversity and quality of the green and blue infrastructure within the city.

With respect to the plans for a new connection with Amsterdam through the Lake IJ it's important to live up to the Almere Principle of cherishing diversity by staying focused on the options that really enhance the ecological quality of the Lake Marker and the Lake IJ and invest all human and financial resources into realizing precisely these options.

4. *How to renew the cooperation between the involved governments and stakeholders from society in such a way that it strengthens and accelerates the sustainable development of Almere?*

Examples from this benchmark have drawn the attention to several leading characters playing a key role in inspiring and mobilizing large groups of people for sustainable urban development. Leadership can't be enforced, but more room can be created for frontrunners to accelerate sustainable urban developments in Almere. Two major options are:

- » Organize a multidisciplinary group at the highest authoritative level of the so-called RRAAM organization with the assignment to bring about sustainable breakthroughs in all regional and local fields of activity and provide them with all the necessary authorities and (financial) resources to make a big difference.
- » Invite a small but heterogeneous group of innovators and change-agents from private and public sector to work on the future of Almere. This group can bring in refreshing views, search for synergy in new partnerships and start up radical sustainability projects. The group can expand to become an inspiring network of people and organizations committed to the sustainable future of Almere.

Wat is op dit moment de meest duurzame stad ter wereld? Hoe kunnen duurzaamheidsprestaties van steden het beste worden beoordeeld? Wat is het geheim achter het succesvolle programma van Portland voor verduurzaming van de bestaande bouw? Waarom lukt het in Freiburg en Curitiba wel om massa's mensen te laten overstappen van de auto op de fiets en het openbaar vervoer? Hoe mobiliseer je in tijden van crisis het in de stad aanwezige, sociale en fysieke kapitaal voor duurzame waardecreatie? Hoe heeft de fietsstad Kopenhagen kunnen uitgroeien tot een van de groenste en meest welvarende steden van Europa die een grote aantrekkingskracht uitoefent op hoogopgeleide bewoners en innovatieve bedrijven? En wat kunnen Almere en andere Nederlandse steden leren van deze en andere goede voorbeelden van duurzame stedelijke ontwikkeling uit de rest van de wereld?

Een onderzoeksteam van DRIFT¹, Urgenda², TU Delft³ en INTI⁴ geeft antwoorden op deze vragen in het onderhavige rapport *Urban Development: the State of the Sustainable Art*. Deze 'international benchmark of sustainable urban development' is geschreven in opdracht van het Regieteam Duurzaamheid 2.0 dat is samengesteld uit vertegenwoordigers van de gemeente Almere, het Stadsmanifest Almere 2.0, de provincie Flevoland en het ministerie van Infrastructuur en Milieu (I&M). De benchmark met de daarin opgenomen analyses van bewezen 'best practices' in duurzame gebiedsontwikkeling is bedoeld om opdrachtgevers en andere belanghebbende partijen (o.a. investeerders, bewoners, ondernemers) te inspireren met slimme en duurzame oplossingen voor de gebiedsopgaven waar Almere en ook andere Nederlandse steden voor staan. Er is gezocht naar integraal duurzame gebiedsont-

wikkelingen. In de vertaalslag van geleerde lessen naar aanbevelingen voor Almere is de focus echter gericht op ecologische duurzaamheid vanwege de link met de Duurzaamheidsagenda 2.0. Verder moet de benchmark een referentiefunctie kunnen vervullen zodat de Almeerse duurzaamheidsprestaties enigszins objectief kunnen worden vergeleken met die van internationale koplopers in duurzame stedelijke ontwikkeling. Tegen deze achtergrond zijn bovenstaande vragen in dit rapport als volgt behandeld en beantwoord.

In hoofdstuk 2 wordt een aanzet gegeven voor een methodiek op basis waarvan steden integraal met elkaar vergeleken en beoordeeld kunnen worden op bewezen duurzaamheidsprestaties bij stedelijke ontwikkelingen. Daarbij is een duurzame stedelijke ontwikkeling omschreven als een ontwikkeling die ertoe bijdraagt dat de stad in *alle* opzichten een goede en aangename plek is om te leven, te werken en te recreëren zonder afwenteling van problemen naar elders en later. Bij de voorziening van behoeften van bewoners en bezoekers maakt een stad *zoveel mogelijk* gebruik van de hulpbronnen die in de stadsregio (stad en ommeland) beschikbaar zijn. Import van hulpbronnen vanuit gebieden die buiten de stadsregio liggen wordt dus niet uitgesloten, maar om afwenteling te vermijden ligt de prioriteit bij gebruikmaking van lokaal en regionaal beschikbare hulpbronnen. Dit veronderstelt onder meer een *effectief* gebruik van energie, grondstoffen en materialen. Door deze benadering verschuift de duurzaamheidsoriëntatie van het beperken van ellende naar het creëren van waarde in alle domeinen van het leven. Bijvoorbeeld: van het beperken van schadelijke emissies zoals stikstofoxiden en fijn stof naar het creëren van een gezonde stad.

Om te komen tot een integrale methodiek voor de analyse en beoordeling van stedelijke duurzaamheidsprestaties zijn kapitaalvoorraden en indicatoren geïdentificeerd in vier duurzaamheidsdomeinen. Naast de bekende 'Peo-

1 DRIFT: Dutch Research Institute for Transitions, Erasmus University Rotterdam

2 Urgenda is de actie-organisatie voor duurzaamheid en innovatie die Nederland sneller duurzaam wil maken, samen met bedrijven, overheden, maatschappelijke organisaties en particulieren.

3 TU Delft: Delft University of Technology

4 INTI: International New Town Institute

Duurzaamheid-domeinen	Kapitaalvoorraden, o.a.	Indicatoren, o.a.
Planet	Mondiaal Ecosysteem	CO ₂ -emissie per capita
People	Sociaal Kapitaal	Gemiddeld aantal jaren scholing
Prosperity	Economische Vitaliteit	R&D Uitgaven als % BBP
Power	Participatie	Bijdrage belanghebbenden aan stedelijke ontwikkeling (kwalitatieve inschatting)

ple-, Planet- en Prosperity-domeinen' zijn ook indicatoren geselecteerd in het zogenoemde 'Power-domein' waarin het vooral gaat om bestuurlijke ('governance') kwesties als betrokkenheid van bewoners en bedrijven bij de stedelijke ontwikkeling. In onderstaande tabel staan enkele voorbeelden van de kapitaalvoorraden en indicatoren die geselecteerd zijn op basis van diverse vergelijkende studies naar stedelijke duurzaamheid en eigen onderzoek.

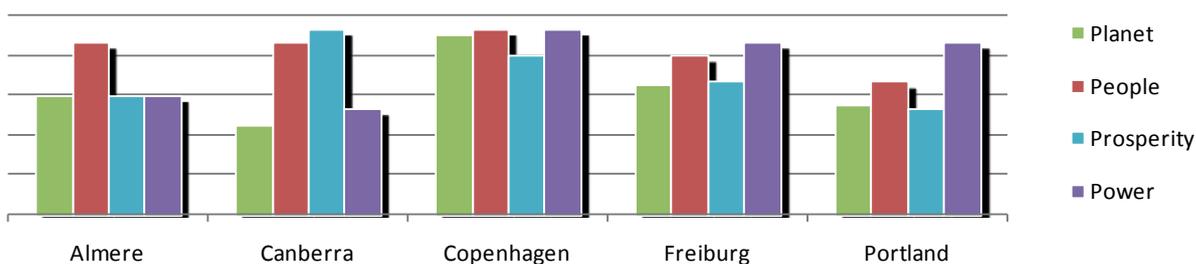
Aan de hand van het hiervoor geschetste beoordelingskader volgt in hoofdstuk 3 een kwantitatieve en kwalitatieve analyse van de duurzaamheidsprestaties van vijf internationale koplopers in duurzame stedelijke ontwikkeling: Portland, Kopenhagen, Freiburg, Tampines en Canberra. Op dezelfde wijze wordt een duurzaamheidsanalyse gemaakt van de nog jonge ontwikkeling van Almere als suburbane groeikern van de Randstad. Portland, Kopenhagen en Freiburg zijn geselecteerd op basis van hun hoge posities op de ranglijsten van de diverse vergelijkende studies naar stedelijke duurzaamheid. Tampines en Canberra zijn als zogenoemde 'new towns' toegevoegd ten behoeve van de vergelijkbaarheid met Almere. Uit de kwantitatieve vergelijking van deze steden met Almere komt het onderstaande beeld naar voren⁵.

Kopenhagen onderscheidt zich in bijna alle domeinen als de meest duurzame stad. Alleen in het welvaartsdomein wordt Kopenhagen voorbijgestreefd door Canberra. De Australische new town biedt aan zijn gemiddeld rijke

en hoog opgeleide inwoners (veel expats) een aantrekkelijke leefomgeving. Tegelijkertijd veroorzaakt de stad met een relatief hoog energie- en autogebruik een grote negatieve impact op het mondiale ecosysteem. Freiburg scoort hoog in het sociale en bestuurlijke (power) domein, onder meer vanwege de zeer actieve participatie van de bevolking in de stedelijke ontwikkeling. Ook de meest duurzame stad van de Verenigde Staten, Portland, doet het met inspirerend duurzaamheidsbeleid goed in het bestuurlijke domein. Omdat het wel een stad is met een *Amerikaans* consumptiepatroon scoort Portland minder goed in het ecologische domein. Almere scoort hoog in het sociale domein, onder meer vanwege betaalbare huizen en een relatief groot aantal mensen dat vrijwilligerswerk verricht. In de overige domeinen scoort Almere gemiddeld in vergelijking met de andere steden. De uiteenlopende prestaties van de rijke steden Kopenhagen en Canberra in het ecologische domein laten zien dat een stevig duurzaamheidsbeleid veel kan bijdragen tot vermindering van de negatieve milieu-impact van een hoog consumptieniveau.

Uit de goede praktijken die in hoofdstuk 3 en 4 staan beschreven, komen een aantal opmerkelijke duurzaamheidsprestaties naar voren. Zo heeft Kopenhagen de afgelopen decennia niet alleen een indrukwekkende milieuprestatie geleverd met een CO₂-reductie van nu al 30% ten opzichte van 1990. Deze Europese fietsstad heeft zich tegelijkertijd ontwikkeld tot het economische centrum van de

Benchmark Resultaten



⁵ Tampines ontbreekt in dit diagram vanwege een gebrek aan kwantitatieve gegevens over deze voorstad van Singapore.

regio dat met zijn vele groen en rijke culturele leven een grote aantrekkingskracht uitoefent op zowel bewoners als bedrijven en bezoekers. Portland geldt met zijn stedelijke groeigrens, gerichte verdichting en uitgebreide en hoogwaardige voorzieningen voor de fiets en het openbaar vervoer als een schoolvoorbeeld voor duurzame stedenbouw. In Freiburg is de creatieve samenwerking met bewoners, ondernemers en kennisinstellingen aan een duurzame ontwikkeling van de stad tot een kunst verheven. In het Aziatische Tampines hebben ze het voor elkaar gekregen om in een gebied van nauwelijks 12 km² niet minder dan 250.000 mensen comfortabele huisvesting te bieden, met relatief veel groen en goede voorzieningen dichtbij. Dagelijks reizen in Curitiba zo'n 2 miljoen (!) mensen efficiënt en comfortabel met een betaalbare expresbus door deze ecologische hoofdstad van Brazilië. In Chicago zijn sinds de start van het 'Green Streets Initiative' in 1986 ruim een half miljoen bomen bijgeplant, hetgeen in sommige buurten ertoe heeft bijgedragen dat de waarde van het vastgoed met 10% is gestegen. Een samenwerkingsverband van lokale, maatschappelijke organisaties helpt bewoners in het zwaar door de crisis getroffen Detroit om hun leven weer op te pakken door hen te ondersteunen bij het verbouwen van voedsel in tuinen van verlaten woningen.

Wat is het geheim achter deze successen? In hoofdstuk 5 worden, in relatie tot de internationaal beste praktijken voor een duurzame stedelijke ontwikkeling, de volgende kritische succesfactoren onderscheiden.

1. *Holistische benadering vanuit menselijk perspectief*

Bijna alle voorbeelden die in dit rapport worden geanalyseerd, tonen de kracht van een inspirerende visie op duurzame stedelijke ontwikkeling. Deze visies zijn holistisch vanuit menselijk perspectief; ze gaan uit van wat belangrijk is voor de mensen in de stad. In deze visies wordt stedelijke ontwikkeling sterk verbonden met de aanpak van prominente maatschappelijke vraagstukken zoals de verarming van historische binnensteden, toenemende sociale onveiligheid en (lokale) milieuvuiling. De visies zijn holistisch, omdat daarbij ook aandacht wordt besteed aan voorziening van minder tastbare behoeften zoals de behoefte aan een goede plek voor kinderen om op te groeien, aan een rijke en vitale natuur en aan identiteit en verbondenheid met de eigen woon-, werk- en leefomgeving.

2. *Inspirerend en vasthoudend leiderschap*

In de succesverhalen uit deze benchmark duiken regelmatig leidende figuren op die een doorslaggevende rol spelen bij het inspireren en mobiliseren van grote groepen mensen voor een duurzame stedelijke ontwikkeling. Soms doen ze dat vanuit een formele machtspositie zoals de burgemeesters van Chicago

en Curitiba. In andere gevallen, zoals in Detroit, verwerven mensen met visie, overtuigingskracht en een groot doorzettingsvermogen de informele macht om duurzame vernieuwingen tot stand te brengen. Zonder uitzondering worden deze leidende figuren omringd door een kleine groep koplopers die, mede dankzij hun gedeelde passie voor duurzaamheid, in staat blijken het peloton te mobiliseren. Een kerncompetentie lijkt daarbij te zijn: het vermogen om een langetermijnvisie te vertalen in kortetermijnacties die bijdragen aan de langetermijndoelen en direct, duidelijk waarneembare voordelen opleveren voor bewoners.

3. *Duurzaamheidspelregels die richting en ruimte geven*

Een gemeenschappelijk kenmerk van succesvolle duurzaamheidsvisies is dat ze geoperationaliseerd worden in een beperkt aantal regels en richtlijnen die duidelijk richting geven en tegelijk ruimte bieden voor flexibiliteit in de dagelijkse praktijk van stads- en gebiedsontwikkeling. Met robuuste regels tegen stedelijke verrommeling en voor verdichting en een heldere prioriteit voor het openbaar vervoer, de fiets en het wandelen *boven* de auto hebben steden als Portland, Kopenhagen, Freiburg, Tampines en Curitiba de stedelijke ontwikkeling heel bewust in duurzame richting gestuurd. Participatie van belanghebbende partijen in de stedelijke ontwikkeling is in Kopenhagen en Freiburg geen vrijblijvende prioriteit, maar een serieuze zaak die professionele ondersteuning krijgt. Essentieel bij dergelijke regels en richtlijnen is dat ze ruimte laten voor flexibiliteit en initiatieven van onderop; gedetailleerde middelvoorschriften zijn taboe.

4. *Slim mobiliseren van stedelijk kapitaal*

Diverse steden uit deze benchmark zijn erin geslaagd om 'slappend' stedelijk kapitaal te mobiliseren voor duurzame doelen. Dat begint steevast met de identificatie van potentiële bronnen van welvaart in de stad. Vervolgens worden slimme hefboomen ingezet om deze latente bronnen van sociaal, fysiek of financieel kapitaal te mobiliseren voor een duurzame stedelijke ontwikkeling. Enkele voorbeelden:

- » In het "Clean Energy Works Pilot Project" in Portland is een kleine opslag (slimme hefboom) op de maandelijkse energierekening ('slappende' kapitaalbron) van huurders en eigenaars gebruikt voor de financiering van de verbetering van de energieprestaties van bestaande huizen.
- » In San Francisco heeft een meerderheid van de bevolking ingestemd met de uitgifte van obligaties (slimme hefboom) door het stadsbestuur om extra duurzame energieprojecten te kunnen financieren. De verwachting is dat de gemeente deze obligaties kan terugbetalen dankzij de energie-



Waterway in Almere connecting people's backyards to the city centre. Design by Mecanoo and West 8

en kostenbesparingen (latente kapitaalbron) die voortvloeien uit de projecten.

- » Curitiba heeft de markt voor 'sol criado'⁶ (slimme hefboom) waar projectontwikkelaars extra verdiepingen kunnen kopen als ze in bepaalde gebieden hoger willen bouwen dan de maximum bebouwingshoogte (latente kapitaalbron). Zij kunnen extra vloeroppervlak kopen van beheerders of eigenaars van bijvoorbeeld een stedelijk monument of park in de buurt, die een oppervlaksurplus hebben en de opbrengsten gebruiken voor bijvoorbeeld het onderhoud van hun monument of park. En hoogwaardige culturele of groenvoorzieningen (latente kapitaalbron) zijn weer goed voor de waarde van het vastgoed van de projectontwikkelaars die aldus ook profiteren van de markt 'sol criado'.

5. *Radicale benadering voor bevorderen systeeminnovaties*

De meest duurzame steden uit deze benchmark – Kopenhagen en Freiburg – blijken ook het meest radicaal in hun streven naar een duurzame stedelijke ontwikkeling. Die radicaliteit komt in verschillende vormen tot uiting. Beide steden hebben de klassieke manier

van denken en werken – gericht op korte termijn, monodisciplinair en top-down – fundamenteel veranderd in een integrale aanpak op basis van structurele en multidisciplinaire samenwerking met andere belanghebbende partijen. Met een professionele ondersteuning van Burgerdialogen (Kopenhagen) en Forum Vauban (Freiburg) hebben de betrokken overheden met veel succes geïnvesteerd in cocreatie van duurzame stedelijke ontwikkelingen. Bovendien volgen beide steden een tamelijk compromisloze koers bij het nastreven van ecologische duurzaamheidsdoelen met onder meer forse investeringen in duurzame energie en energiebesparing en een hoge prioriteit voor het openbaar vervoer en het fietsverkeer.

Tegen deze achtergrond en in het licht van de geplande schaa sprong worden in hoofdstuk 6 vier grote duurzaamheidsuitdagingen geïdentificeerd voor Almere. Vervolgens worden de mogelijkheden verkend voor toepassing van de beste internationale gebiedspraktijken in Almere en andere Nederlandse steden. Hieronder worden enkele van de aanbevelingen genoemd waarmee dit hoofdstuk wordt afgesloten in antwoord op de grote duurzaamheidsuitdagingen voor Almere 2.0. Deze aanbevelingen zijn gericht aan alle partners die het Integraal Afsprakenkader Almere (IAA) hebben ondertekend.

6 Sol criado betekent letterlijk: gecreëerd vloeroppervlak.

1. Hoe kan de Almeerse ambitie een complete stad te worden, met meerdere kernen en behoud van een relatief lage dichtheid, het beste worden verenigd met het streven naar sociale, ecologische en economische duurzaamheid conform de Almere Principes?

De Almere Principes kunnen een inspirerend kader zijn voor de ontwikkeling van 'Almere 2.0', maar verdwijnen toch gemakkelijk naar de achtergrond bij het nemen van beslissingen in de dagelijkse praktijk. Een radicale aanpak is nodig om de Almere Principes richtinggevend te maken. Dit vraagt enerzijds om zelfreflectie op wegen om doorbraken te forceren in de gangbare praktijken (bv. in de financiering) en (organisatie)culturen die duurzame ontwikkelingen belemmeren. Anderzijds kan het 'speelveld' worden beperkt om aldus de creativiteit en innovatie te stimuleren die nodig zijn voor de duurzame doorbraken die de Principes beogen.

Het beperken van het speelveld kan bijvoorbeeld de creativiteit bevorderen bij de zoektocht naar een betere bereikbaarheid van Almere. Almere bevestigt tot dusver in grote lijnen de internationale ervaringen met voorsteden in rijke landen met een lage bebouwingsdichtheid. Mede vanwege de ruime opzet worden deze steden in het algemeen gekenmerkt door een relatief hoog autobezit en autogebruik en een mede daaraan verbonden hoge consumptie van (fossiele) energie en grondstoffen. Om deze trend in duurzame richting om te buigen doen we onder meer de volgende aanbevelingen.

- » Geef bij alle stedelijke ontwikkelingen in Almere en omstreken duidelijk voorrang aan het openbaar vervoer, de fiets en het wandelen *boven* de auto in het kader van een integraal push-/pullbeleid. Aarzel daarbij niet om naast stimulerende pullmaatregelen ook een aantal pushmaatregelen (bv. opheffing parkeerplaatsen) te treffen, omdat de praktijkvoorbeelden leren dat deze veel kunnen bijdragen tot duurzame waardecreatie in de stad.
- » Bundel de krachten met gemotiveerde partners om gezamenlijk te werken aan een betaalbare verhoging van de capaciteit, kwaliteit en efficiency van het OV-systeem in de metropoolregio Amsterdam/Randstad. En leer daarbij van het Curitibaanse voorbeeld door systematisch te zoeken naar mogelijkheden om de benutting van de (bestaande) infrastructuur en OV-faciliteiten te optimaliseren, bijvoorbeeld door het vrijmaken van rijbanen op rijkswegen zoals de A6 en A27 voor express bussen met een grote vervoerscapaciteit (ca. 250 passagiers per bus).

2. Hoe kunnen 60.000 nieuwe woningen en 100.000 banen worden gecreëerd die duurzame waarde toevoegen aan de hele stad?

In antwoord op deze uitdaging zijn onder meer de volgende aanbevelingen geformuleerd.

- » Geef het goede voorbeeld. De IAA-partners kunnen een voorbeeld stellen door evident onduurzame activiteiten op te geven. Zo is de ambitie om regionaal extra werkgelegenheid te creëren via uitbreiding van vliegveld Lelystad om diverse redenen onverenigbaar met de Almere Principes⁷. Deze activiteit zou daarom stilgezet moeten worden. De IAA-partners kunnen de geloofwaardigheid van hun duurzaamheidsambities weer versterken door innovatieve duurzame technieken eerst uit te testen op publieke gebouwen en infrastructuur. Zo zou het stadhuis een icoon van duurzaamheid kunnen worden als het eerste bestaande gebouw met een natuurdak in de stad dat netto duurzame energie en gezuiverde lucht levert.
- » Creëer een lokale/regionale markt voor duurzame oppervlakteontwikkeling. Met relatief veel ruimte binnen de gemeentegrenzen heeft Almere een in potentie omvangrijke voorraad 'slapend' kapitaal tot zijn beschikking: oppervlakten! Het gaat hierbij om allerlei soorten oppervlakten, uiteenlopend van muren, daken, wegen en parkeerplaatsen tot parken, betegelde tuinen, sloten en braakliggende (bouw)terreinen. Almere zou deze kapitaalbron kunnen mobiliseren door eigenaren te verplichten een bepaald percentage van hun oppervlakten duurzaam te ontwikkelen door toevoeging van duurzame functies, variërend van opwekking van hernieuwbare energie tot wateropvang en van stadsnatuur tot vermindering van het stedelijk hitte-eilandeffect. Eigenaren zouden hierbij technische en organisatorische ondersteuning kunnen krijgen van een nog op te richten, Lokaal Duurzaam Oppervlakte Ontwikkelingsbedrijf (LDOB).
- » Almere kan *duurzame* werkgelegenheid creëren door koplopers uit de private en publieke sector uit te nodigen om gezamenlijk innovatieve markten en bedrijfsmodellen voor duurzame productdiensten⁸ te ontwikkelen. Zo kan de gemeente

7 Uitbreiding van de luchtvaart is voornamelijk onverenigbaar met het streven naar ecologisch gezonde systemen, vanwege de grote klimaatimpact van vliegverkeer en vanwege het gebrek aan duurzame luchtvaartalternatieven. Zie bijvoorbeeld: Een prijs voor elke reis; een beleidsstrategie voor CO₂-reductie in verkeer en vervoer. Een gezamenlijk advies van de Raad voor Verkeer & Waterstaat, de VROM-raad en de Algemene Energieraad, Den Haag, 2008.

8 Een productdienst is een marktmodel waarbij geen producten worden verkocht maar alleen diensten die verbonden zijn aan het product. De deelauto en de OV-fiets zijn voorbeelden van productdiensten. Producenten krijgen hierdoor financieel belang bij duurzame producten die lang meegaan en makkelijk te recyclen zijn in technische of biologische kringlopen.

koplopers op gebied van duurzame mobiliteit uitnodigen om samen, naar het voorbeeld van Freiburg, 'package deals' te ontwikkelen die de overstap van individueel autovervoer op multimo- daal duurzaam vervoer aantrekkelijk maken. Deze 'package deals' (bv. opgave eigen auto in ruil voor een 3-jarig deelautoabonnement) kunnen dan aangeboden worden aan bewoners, bedrijven en organisaties met de belofte van een gelijkblijvend of gereduceerd mobiliteitsbudget. Op soortgelijke wijze kan de gemeente actienetwerken organiseren rond de ontwikkeling van andere productdienen- sten zoals Duurzame Oppervlakteontwikkeling (door een LDOB, zie vorige punt) Energiediensten (bv. klimaatbeheer voor gebouwen), Interieurdien- sten voor woningen en kantoren, enzovoorts. De beschikbare budgetten voor o.a. onderhoud en beheer, energie en interieur kunnen het financieel uitgangspunt vormen voor de ontwikkeling van deze diensten.

3. *Hoe kan de toegevoegde waarde van de bestaande groene en blauwe infrastructuur in Almere worden behouden en vergroot binnen de budgettaire kaders van de betrokken overheden?*

Bij deze uitdaging is het van belang te onthouden dat de belangrijkste knelpunten niet zozeer op het technische vlak liggen maar veel meer in de organisatorische en financiële sfeer. In deze richting hebben we dan ook onder meer de volgende aanbevelingen geformuleerd.

- » Bij de plannen voor een nieuwe IJmeerverbinding is het van groot belang om gefocust te blijven op de 'Cradle-to-Cradle-opties' die de ecologische kwaliteit van het Markermeer en het IJmeer werkelijk verbeteren zonder dat er een noodzaak ontstaat om eventuele schade aan de natuur elders te compenseren.
- » De gemeente kan koplopers uitnodigen om, al dan niet in het verband van een Lokaal Duurzaam Oppervlakte Ontwikkelingsbedrijf (LDOB), nieuwe bedrijfsmodellen te ontwikkelen voor een betaalbaar onderhoud en beheer van de groene en blauwe infrastructuur in Almere. Hierbij kan worden gedacht aan bedrijfsmodellen waarbij lokale bewoners, bedrijven en maatschappelijke organisaties zelf het onderhoud en beheer van openbaar groen ter hand nemen en inkomsten genereren uit bijvoorbeeld stadslandbouw, welzijnswerk en recreatie.

4. *Hoe kan de samenwerking met belanghebbende partijen en zodanig vernieuwd worden dat het bijdraagt tot een versnelling en versterking van een duurzame ontwikkeling van Almere?*

De RRAAM-organisatie⁹ rond de beoogde schaal- sprong van Almere vertoont alle kenmerken van een uitgebreid polderoverleg. Het poldermodel heeft zich bewezen met het neutraliseren van allerlei hardne- kige belangenconflicten, maar het model heeft geen goede reputatie in het stimuleren van duurzame ont- wikkelingen voor de lange termijn. Uit diverse transi- tieanalyses blijkt dat met name ecologische en soci- ale duurzaamheidsbelangen in polderprocessen nogal eens het onderspit delven in de strijd met financiële en economische belangen op de korte termijn. Tegen deze achtergrond zijn onder meer de volgende aan- bevelingen geformuleerd.

- » Organiseer een multidisciplinaire groep op het hoogste bestuurlijke niveau van de RRAAM-orga- nisatie en geef deze groep de opdracht om duur- zame doorbraken tot stand te brengen op alle beleidsterreinen van de schaal- sprong. En voorzie deze groep van alle noodzakelijke (financiële) mid- delen en bevoegdheden om een groot verschil te maken.
- » Nodig hiervoor een kleine, maar heterogene groep van vernieuwers en veranderaars uit de private en publieke sector uit om samen te werken aan de duurzame toekomst van Almere. Deze groep kan frisse inzichten inbrengen, zoeken naar synergieën in nieuwe samenwerkingsverbanden en radicaal duurzame projecten opstarten. Zo'n groep kan zich geleidelijk ontwikkelen tot een inspirerend netwerk van mensen en organisaties die duur- zame ontwikkelingen in het Almere van vandaag initiëren en realiseren.
- » Versterk tegelijkertijd de lopende bottom-up pro- cessen van samenwerking met belanghebbende partijen door de koplopers onder hen uit te nodi- gen een voortrekkersrol te vervullen, onder meer via de cocreatie van nieuwe, duurzame markt- en bedrijfsmodellen. Geef hen daarbij alle noodzake- lijke (bestuurlijke en financiële) ondersteuning.
- » Begin gewoon met de cocreatie van een aantal projecten en acties die passen bij de langetermij- nambities van Almere en direct voordeel hebben voor de Almeerse bevolking.





Kerngroep Stadsmanifest Almere 2.0

It takes two to tango

Uit de internationale benchmark *'Urban Development: the State of the Sustainable Art'* blijkt hoe Almere het doet in vergelijking met internationale koplopers op het gebied van duurzame gebiedsontwikkeling. De 'best practices' rond de thema's duurzame energie, productief landschap, duurzame mobiliteit en watermanagement geven inspiratie aan de stedelijke duurzaamheidsambities in Almere. Bij het in de praktijk brengen van de Almere Principles kan de Duurzaamheidsagenda Almere 2.0 hiervoor het lange termijn perspectief neerzetten. Het Stadsmanifest, in deze vertegenwoordigd door Natuur- en Milieufederatie Flevoland, denkt daarom mee over het opstellen van deze Duurzaamheidsagenda. De slag voor de korte en middellange termijn moet immers worden gemaakt door nadrukkelijk de stap naar de stad te maken.

De Benchmark toont ook het belang van de eigen kracht van de stad aan bij de duurzame ontwikkeling van steden als Portland, Freiburg, Kopenhagen, Tampines en Canberra. In het Stadsmanifest Almere 2.0 benadrukken meer dan 50 organisaties dat Almere de kans heeft om de duurzaamste stad van Nederland te worden. Niet alleen nieuwe wijken, maar ook bestaande wijken en bedrijventerreinen verdienen een ambitieuze benadering bij (her)ontwikkelingsprojecten. Bouwen voor toekomstige leegstand is namelijk in strijd met de duurzaamheidsambities in Almere. Dat geldt zowel voor woningen als voor bedrijven. Vraaggericht bouwen moet het motto zijn. En dat motto mag niet worden overvleugeld door de drang om grondopbrengsten te incasseren en een te eenzijdige focus op nieuwe projecten. Duurzaamheid kan daar goed bij passen. De energie van de bestaande stad kan de schaa sprong in een duurzame richting voortstuwen.

Tot duurzaamheid behoort ook: voldoende aantrekkelijke banen, goed onderwijs, recreatie en culturele voor-

zeningen. Stad en omgeving zijn onlosmakelijk verbonden. De natuur en het water dat ons omringt bieden een mooie en gezonde leefomgeving. De ecologische diversiteit en samenhang moeten worden versterkt. Niet alleen in de stad, ook in haar directe omgeving.

De combinatie van Schaa sprong en Almere Principles biedt ook unieke kansen voor de kenniseconomie. Nergens in Nederland is zoveel ruimte om te experimenteren met duurzame vormen van bouwen, vervoer, energie en recreatie. Vooruitstrevende samenwerking tussen zorg, welzijn en huisvesting zal de gezondheid van onze inwoners bevorderen. Almere als nationaal duurzaamheidslaboratorium! Daar ligt een prachtrol voor het hoger onderwijs weggelegd.

De P van Power in deze internationale benchmark is een belangrijke toevoeging. In de vertaling naar Almere ligt de uitnodiging 'kleur te bekennen'. Naast de bekende Planet, People en Profit (Prosperity) vraagt duurzame stedelijke en gebiedsontwikkeling vooral ook om inspirerend leiderschap en lef om expliciete keuzen te maken. Het benutten van de eigen kracht van de stad is daarbij essentieel. En het vraagt om een gemeentebestuur dat een stip op de horizon wil plaatsen, de routekaart hiernaar kan uitstippelen en vervolgens de weg voortvarend wil afleggen. Daarbij hoort ook een set spelregels, zodat het mogelijk is om samen de duurzaamheidsambities concreet te maken. Immers: 'It takes two to Tango'.

Leden van de Kerngroep Stadsmanifest

Vera Dam, Natuur- en Milieufederatie Flevoland

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Wouter de Jong

Voorzitter Platform Duurzame Gebiedsontwikkeling

How to do more good?

Het is zonder meer interessant en bemoedigend om de vergelijkende studie over de mate van duurzaamheid van een aantal stedelijke gebieden in de wereld tot je te laten doordringen. Ook zijn er veel goede lessen te leren en over te nemen in de Nederlandse situatie. In de studie zelf worden daar de nodige aanbevelingen en conclusies aan gewijd. Op een aantal daarvan wil ik later nog wel even kort terug komen. Curitiba en Kopenhagen verschijnen ten slotte al 20 jaar op mijn radar als lichtende voorbeelden en ze worden nog maar steeds niet voorbijgestreefd. Deze studie toont aan dat we ook in Nederland aan de slag kunnen met de missie voor een meer duurzame stedelijke ontwikkeling.

In de vergelijkende studie wordt een stevig ambitieniveau gekozen. *'Duurzame stedelijke ontwikkeling draagt er toe bij dat de stad in alle opzichten een goede en aangename plek is om te leven, te werken en te recreëren zonder afwenteling van problemen naar elders en later.'* Een dergelijke ambitie is noodzaak. De urgentie van een duurzame versnelling is groot. De vraag naar grondstoffen, fossiele brandstoffen en voedsel stuwt wereldwijd de prijzen omhoog. Na een kortdurende dip vanwege de financiële crisis stijgt de vraag weer fors. En die is structureel stijgend door de opkomende economieën als China, Brazilië en India. Er zal ook nog heel wat moeten gebeuren aan reductie van de uitstoot van broeikasgassen om de kans op een temperatuurstijging van meer dan 2 graden niet verder te laten toenemen. En duidelijk is: als we te weinig doen zullen eerst de kwetsbaren van deze wereld de tol betalen, maar uiteindelijk zal ook het welvarende deel van de wereld de gevolgen gaan merken. Daar komt bij: een steeds groter deel van de wereldbevolking leeft en werkt in stedelijke gebieden. Radicale inzet op duurzame stedelijke ontwikkeling levert daarom de beste kans op een blijvende welvaart en een sterke economie.

De vergelijkende studie leert ons echter ook dat datgene wat we duurzame stedelijke ontwikkeling noemen duidelijk te kort kan schieten in ambitie. Dan is wat zich presenteert als duurzaamheid niet meer dan een beetje beperken van de schade, een beetje verlengen van de lijdensweg. En dat is niet genoeg! Echte duurzame stede-

lijke ontwikkeling verbetert de leefomgeving ter plekke én verkleint het beslag op hulpbronnen elders of later.

Carolyn Steel heeft in *The Hungry City* (2009) laten zien hoe onvoorstelbaar groot het beslag is dat steden doen op de hulpbronnen van de aarde. Maar ze wijst ook een weg van stedelijke en regionale voedselproductie die veel minder afwenteling met zich meebrengt en die ik graag aan de aanbevelingen zou willen toevoegen. Natuurlijk zullen steden nooit zelfvoorzienend kunnen worden, maar beperking van de 'foodprint' is nuttig, zeer goed mogelijk en nodig.

De financiële crisis is ten diepste een crisis van een onduurzaam verdienmodel. Een verdienmodel gebaseerd op afwenteling van vervuiling, uitstoot en schulden op andere gebieden en generaties. Ad Verbrugge¹ betoogt dat het accent op schuldencreatie in plaats van waardecreatie de fundamentele fout is in ons economisch systeem. Een verstandige afbouw van belangen in 'oude' economische verdienmodellen en een omschakeling naar een productiesysteem dat uitgaat van hernieuwbare energie en grondstoffen moeten onderdeel zijn van het denken over duurzame stedelijke ontwikkeling. Een ommezwaai van het beperken van de schade naar het toevoegen van waarde is nodig en biedt ook weer kansen voor nieuwe economische groei. Daarbij past bijvoorbeeld een strategie van hergebruik in plaats van sloop, een strategie van organische herontwikkeling in plaats van masterplanning, een strategie waarbij de stad niet langs functies wordt georganiseerd, maar waarbij ruimte wordt gegeven aan mensen en bedrijven.

Duurzame steden zijn aantrekkelijke steden die het economisch goed doen. Dat wordt ook bevestigd in de studie van Gerard Marlet (*De Aantrekkelijke Stad*, 2009). De traditionele vestigingsvoorwaarden voor bedrijven als bereikbaarheid en ligging worden steeds meer overvleugeld door op de werknemer georiënteerde voorwaarden als stedelijke voorzieningen en woonklimaat. Die randvoorwaarden koppelen goed mee met duurzame stedelijkheid. Het koppelen van een duurzame economische strategie aan duurzame stedelijke ontwikkeling is de tweede aanbeveling die ik zou willen toevoegen.

Tot slot is het aardig te wijzen op een paar opmerkelijke zaken uit de studie. De succesvolle ont koppeling tussen economische groei en milieubelasting die in Kopenhagen is bereikt (overigens in een aantal Scandinavische landen) is er zo een. Een CO₂-reductie van 30% gecombineerd met 20 jaar economische groei. Ook het decennialange pragmatisme van Curitiba: slim en goedkoop Bus OV, 0,5 miljoen bomen planten, armen een inkomen verschaffen. Detroit maakt van een nadeel een voordeel door groenten te telen in tuinen van leegstaande huizen waarmee

¹ Zie: www.filosofimagazine.nl

de stad en voedselvoorziening weer bij elkaar worden gebracht. Alleen al het combineren van deze goede voorbeelden levert een slimme duurzaamheidsstrategie op.

Kernaanbeveling is dat het om de wezenlijke strevingen en ambities van mensen moet blijven gaan. Wat vinden mensen waardevol, wat verbindt hen met elkaar en met de plek. Een van de redenen dat de klimaatonderhandelingen zo moeizaam zijn gaan, is volgens mij dat het over

abstracte percentages gaat en over vermindering van schade. Dat levert een somber toekomstperspectief op. Het erkennen van menselijke behoeften en het neerzetten van positieve ambities ('do more good' in plaats van 'do less harm') kan krachten mobiliseren die duurzame ontwikkeling in een stroomversnelling brengen. Laten de goede voorbeelden uit deze vergelijkende studie ons inspireren!



Chapter 1

Introduction

1.1 Context

Major sustainability challenges are most urgently experienced at the level of cities. It concerns challenges like safeguarding energy and food security, mitigating the urban heat island effect, reducing air pollution and maintaining social cohesion in urban districts and neighbourhoods. On the other hand, because of the concentration of people, businesses and research and development, cities also offer good opportunities for decisive local action to address these sustainability challenges. Sustainable *urban* development therefore plays a key role in the quest for a sustainable society.

Many cities recognize this role and are now seeking for the best strategies and solutions to reach high sustainability aims. Several cities already achieved good results in some key domains of sustainability (like energy or mobility). But only few manage to generate long-term developments that are heading toward sustainability in a holistic way. Although even for these cities there is still a long way to go, they can be considered as frontrunners on the road to sustainable urban development. It is in this capacity that these cities are the main object of this study.

The youngest city of the Netherlands, Almere, is an example of a city with high sustainability ambitions. This new town not only wants to double in size during the coming decades, it also wants to change the course of its development radically into a sustainable direction. The national government and the province of Flevoland¹ have subscribed this ambition, while the projected growth of Almere is a cause of national and regional interest. On January the 29th 2010, these governments signed an Integral Framework of Agreements on Almere (IFA) on a threefold, sustainable 'jump of scale' in the nature, accessibility and urbanization of Almere.

Against this background, at the end of 2010, a collaboration of representatives from the municipality of Almere, the City Manifest 2.0², the province Flevoland and the Ministry of Infrastructure & Environment commissioned the study in hand to gain an overall picture of the worldwide state of art in sustainable urban development and to learn from, and be inspired by, the best practices. To be more precise, the assignment was to:

- make an integrative, well-structured comparison between the sustainability performances of some front-runner cities and those of Almere, so that Almere can benchmark itself;
- analyse the best practices of sustainable urban development in four thematic fields: *Mobility and Land Use, *Energy Efficiency and Renewable Energy, Productive Urban Landscape and *Water Management;
- analyse the key drivers for success in all of these front-runner cities to enhance the ability of learning from these examples;
- explore the possibilities of application of successful approaches and solutions for Almere 2.0, to inspire all kinds of parties that work on the future of Almere.

The results of this study are described in the underlying report *Urban Development: the State of the Sustainable Art*.

1.2 Approach

The Dutch Research Institute for Transitions (DRIFT, Erasmus University Rotterdam) has formed a consortium with Urgenda, TU Delft and the International New Town Institute (INTI) to perform this study. The study is based on

¹ Flevoland is the province in which Almere is situated.

² The City Manifest 2.0 (or in Dutch: 'Stadsmanifest 2.0') is a manifest in which a large number of local and regional NGO's, public organizations and businesses in 2009 confirmed their support for the draft vision of the municipality on the future development of Almere as described in the Concept Structure Vision Almere 2.0.

literature research, collection of statistics, personal conversations, three expert sessions and three intermediate discussions with representatives of the commissioners.

As a start, several existing rankings and their indicators were analysed. A selection of these indicators and some additional indicators have been integrated into a new benchmark methodology for making holistic assessments of the sustainability of urban developments. A long-list of cities and areas with proven sustainable results was constructed, mainly based on the rankings. A further selection was made to form a short-list of five frontrunners.

In this report five frontrunner cities and Almere have been benchmarked on their performances on the road to a sustainable urban development, using both qualitative and quantitative data in the domains of People, Planet, Prosperity and Power. The content as well as the process of urban development in these cities are analysed in more detail with a special focus on the key drivers for success. Four extra best practices were analysed to account for the specific themes that Almere has special interest in: *Mobility and Land Use, *Energy Efficiency and Renewable Energy, Productive Urban Landscape and *Water Management.

Finally, critical success factors for sustainable urban development were abstracted from the analyses of the five cities and four cases. Additional research and discussion sessions led to the identification of sustainability challenges of Almere and the indication of possibilities for application of state of the art approaches in Almere and other Dutch cities.

1.3 Structure of this report

Chapter 2 explores definitions and principles for sustainable urban development. It analyses existing indicators for sustainable cities and introduces the benchmark methodology as developed in this study.

Chapter 3 analyses five frontrunners on the road to sustainable urban development, both qualitatively and quantitatively. The analyses of each city include a general assessment, a specific case and the main insights. At the end of this chapter Almere is being compared to the frontrunners.

Chapter 4 elaborates thematic best practices in sustainable urban development. The selected themes are: Mobility and Land Use, Energy Efficiency and Renewable Energy, Productive Urban Landscape and Water Management and Climate Resilience.

Chapter 5 draws general conclusions in terms of critical success factors for sustainable urban development.

Chapter 6 starts with a discussion of the specific sustainability challenges of Almere on the basis of the analysis in chapter 3. The chapter continues with an exploration of some options for application of lessons learned in Almere and other Dutch cities. The report is concluded with some specific recommendations to the partners who signed an Integral Framework of Agreements on Almere (IFA) on the projected 'jump of scale' of Almere 2.0: the national government of the Netherlands, the municipality of Almere and the province of Flevoland.



Chapter 2

A methodology for assessing the sustainability of cities

2.1 Exploring definitions and principles for sustainable urban development

First the notion of ‘sustainable urban development’ needs to be explained, before we can dive into a methodology for assessing sustainable urban development. Since there is no simple definition, below we explore some important principles.

Sustainable urban development is nowadays an important issue for policy makers, politicians, citizens, businesses and scientists. Since 2010 more than half of the world’s population lives in cities; prognoses show that proportion to increase to two-thirds by 2050. Cities are responsible for the bulk of national output, innovation and employment, and they constitute the key gateways of transnational capital flows and global supply chains (OECD, 2006). It is therefore not surprising that cities are the places where society of faces up to the major sustainability challenges of our time. Whether it concerns problems related to energy and food security, climate change, water management, congestion, air pollution, cultural segregation or social tensions; they all tend to get together and intertwine in cities (Kamal-Chaoui, Lamia and Alexis Robert, 2009).

As a place where problems tend to accumulate and concentrate cities also offer good opportunities for decisive local action to address the sustainability challenges. Issues of sustainability are less abstract and more tangible at the urban level. Small-scale alternatives can grow here, first from the district to the urban level and then spread to national and global level. Moreover, due to the size of cities and their population, actions taken at an urban level can relatively easy produce a global impact and meaning. Numerous examples are included in this report. However, even frontrunner cities can still hardly be called ‘sustainable’. While they already produce good and sometimes impressive results on some key domains of sustainability

(like energy or mobility), frontrunner cities still also use fossil energy, import lots of food from abroad, use and waste enormous amounts of materials and emit gases with negative impacts on local and global ecosystems.

So what is *sustainable* urban development? The challenges mentioned above already imply that sustainable urban development requires a holistic approach: optimizing just a few aspects is not enough, it’s about improving the quality of the city as an integrated system. The commonly used triple bottom line or People-Planet-Profit approach (see e.g. Elkington, 1997) is instrumental for this: it assesses the effects of a development in the social, economic and environmental domains. The triple-P approach therefore stimulates inclusive strategies that increase the quality of life in all domains.

During the last century, the triple-P approach has gradually gained ground in urban planning. In the early 20th century the physical paradigm was dominant – using urban morphology to solve societal problems like for instance the Garden City theory (Howard, 1902). After the war urban planners started to include social dimensions and began planning for ‘human scale’ (see e.g. Jacobs, 1961). While the negative consequences of monodisciplinary planning have become clearer and insights in the complex relations between domains are increasing, urban planning is now slowly growing towards a more holistic paradigm. A future orientation on the long-term urban development has been added, a/o to overcome cultural lock-ins in the mindsets and routines of policymakers and stakeholders that prevent them from looking beyond the most obvious day-to-day realities.

Recently upcoming methodologies like the Natural Step (Robert, 2002) and Transition Management (Rotmans, Loorbach, 2008) apply the orientation on long-term developments to co-create inspiring images of e.g. a sustainable city of the future and to mobilize parties and resources around these images and their corresponding

transition pathways. Because of that development goals shift towards more fundamental changes while the development agenda becomes more positive and future-oriented. The talk of town is then about 'becoming a healthy city' instead of 'reducing the concentration of particulate matter', or about 'making a power plant of your house' instead of 'saving energy'. The orientation on positive agenda setting can also be attributed to the popular Cradle to Cradle-philosophy, introduced by William McDonough and Michael Braungart (Braungart, McDonough, 2002). The dissemination of this philosophy has contributed much, especially in the Netherlands, to a shift in sustainability thinking from efficiency to effectiveness, or stated otherwise: 'From being less bad to generating positive impacts on all fronts'.

Both literature and practice also indicate that sustainable urban development is characterized by a new governance approach that builds on the insights that not one single party has the magic key to success and that simple recipes do not exist. Governments, businesses, NGO's, scientists, *nor* residents can do it alone; they have to join forces to be able to take up effectively the giant and complex challenges of sustainable urban development in the 'glocal' context of modern society. So new collaborations are indispensable to bring about the necessary sustainable system changes. This brings along fundamental questions about values like: 'What is a great place to live for you?' and also: 'What do you want to sustain?'. From a governance perspective, it's therefore not sufficient to bring together knowledge from experts from several disciplines and sectors. It's essential that such knowledge be connected to the local context, especially to the knowledge, values and perspectives of local stakeholders. Within this context, local governments have important roles to play, not only as a regulating authority or provider of regular public services (e.g. infrastructure), but also as a large customer (of buildings, energy, paper etc.) and as a facilitator or initiator of new collaborations and public-private partnerships that cooperate to realize sustainable developments. To fulfil such roles and ambitions properly, (local) governments need to develop new competencies and skills like participatory technology development, building innovative alliances and learning for sustainability.

Against this background we choose to describe (not define) a sustainable urban development as a development that makes the city a great place to live, work and visit, without shifting problems like pollution or climate change to other regions or future generations. It promotes welfare and well being without compromising 'the ability of future generations to meet their own needs', by for example degradation of (urban) landscapes or depletion of natural resources. This also means that a city *as much as possible* uses local sustainable resources, which can be



harvested within its boundaries¹ without depleting them and without producing or 'exporting' waste and/or harmful emissions. This is illustrated in Figure 1 – based on the extended metabolism model of Newman (1999). By saving and recycling energy and materials a city reduces its need for resources, limits its waste streams and increases the liveability.

2.2 Analysis of existing indicators for sustainable cities

There are nowadays many rankings that assess the sustainability of cities or closely related themes. Table 1 provides an overview of all rankings that are used in this study. Both the rankings and their indicators are analysed. The cities that perform 'best' and 'quite well' on multiple rankings are added to a long-list of inspiring cities (see section 3.1 and appendix 2). The indicators used in the rankings are compared and the most suitable ones form the building blocks of the benchmark as developed in section 2.3.

¹ Often a city plus its hinterland is regarded as one urban region, since a city also provides functions beyond its geographical boundaries.

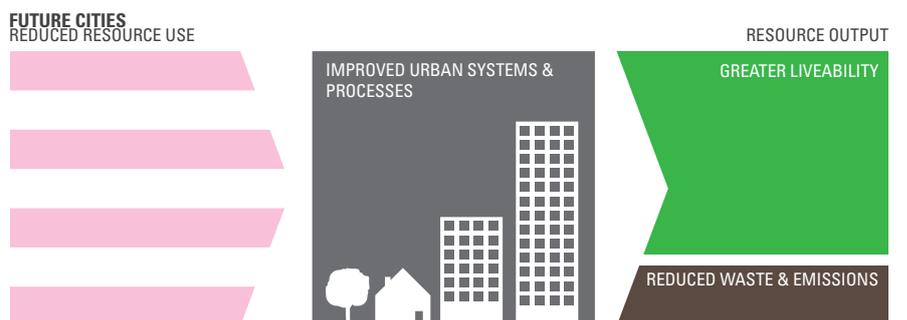
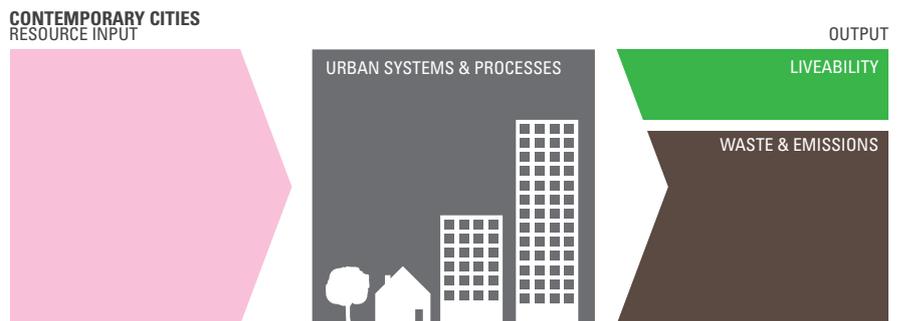
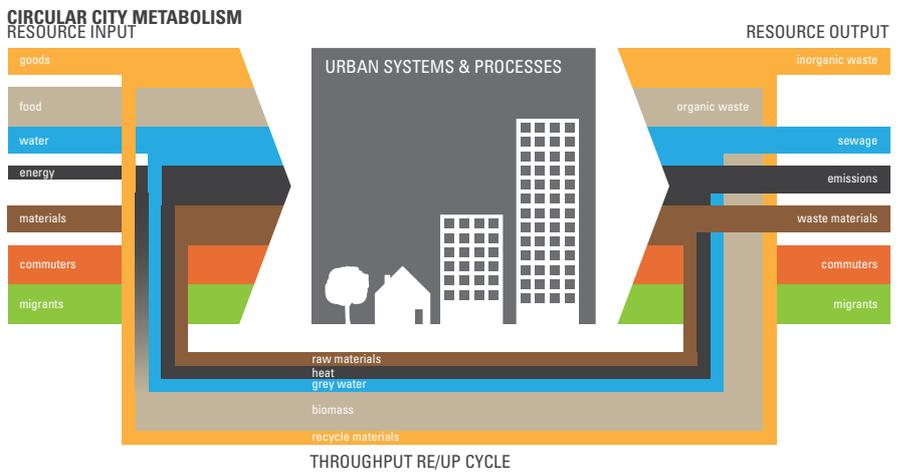
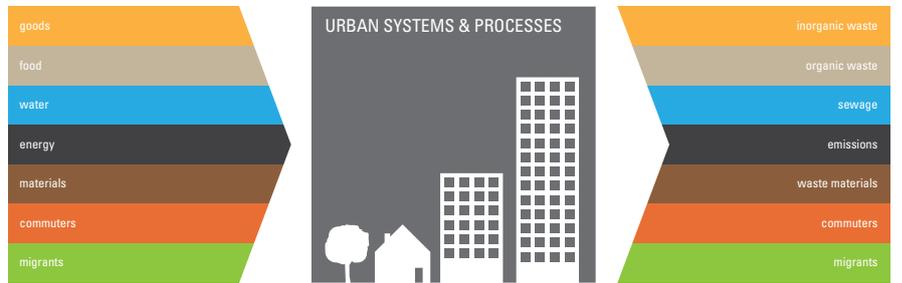


Figure 1: Figures by Doepel Strijkers Architects (as published in: DRIFT and DSA, 2011); based on Newman's Extended Metabolism Model (Newman, 1999).

Table 1: Overview of rankings related to sustainable urban development

	Ranking	Source	Year	Scope
Worldwide	Quality of Living, global city rankings	Mercer	2010	Worldwide. Quality of living
	Monocle's Most Livable Cities Index	Monocle	2010	Worldwide, Quality of living
	The Economist's World's Most Livable Cities	The Economist	2010	Worldwide, uses Mercer data
	Global City Indicators Program	Global City Indicators Facility	2010	Not a ranking, but a broad indicator set developed for global comparability of city performance and knowledge sharing.
USA	US Sustainable cities	Sustainlane	2008	USA, 50 most populous cities
	Smarter Cities	Natural Resources Defense Council's (NRDC)	2008	USA cities >250.000 inhabitants, broad range of sustainability factors
	50 Greenest Cities	Popular Science Magazine	2008	US cities > 100,000 inhabitants. Main categories: electricity; transportation; green living; recycling & green perspective
	Green Cities	Business Courier	2010	USA cities, assessing congestion, healthy air. carbon emissions rank and green jobs
Canada	Sustainable Cities Report	Corporate Knights	2010	17 Canadian cities, in three categories by size (small <250,000, medium and big >750,000)
	GreenApple Canada SMART Transportation Ranking Report	The Appleton Charitable Foundation	2008	Canadian cities benchmarked on sustainable planning and mobility
Europe	European Green City Index	Siemens / Economist Intelligence Unit	2009	30 European capitals or major cities focussed on green urbanism and energy
	Smart cities – Ranking of European medium-sized cities	TU Vienna, University of Ljubljana & TU Delft	2007	Europe, 70 medium-sized cities (50.000 - 100.000 inhabitants)
	European Green Capital Award	European Commission	2009	Based on submissions from cities who want to take part in this competition. The competition is focussed on environmental, spatial and social economical parameters.
	Urban Audit	Eurostat	2007	Not a ranking, but a collection of comparable statistics and indicators for European cities
United Kingdom	Sustainable Cities Index	Forum for the Future	2009	UK, 20 biggest cities
The Netherlands	Local sustainability benchmark	COS Nederland	2009	Dutch cities mainly base don the implementation of people, planet, prosperity parameters.

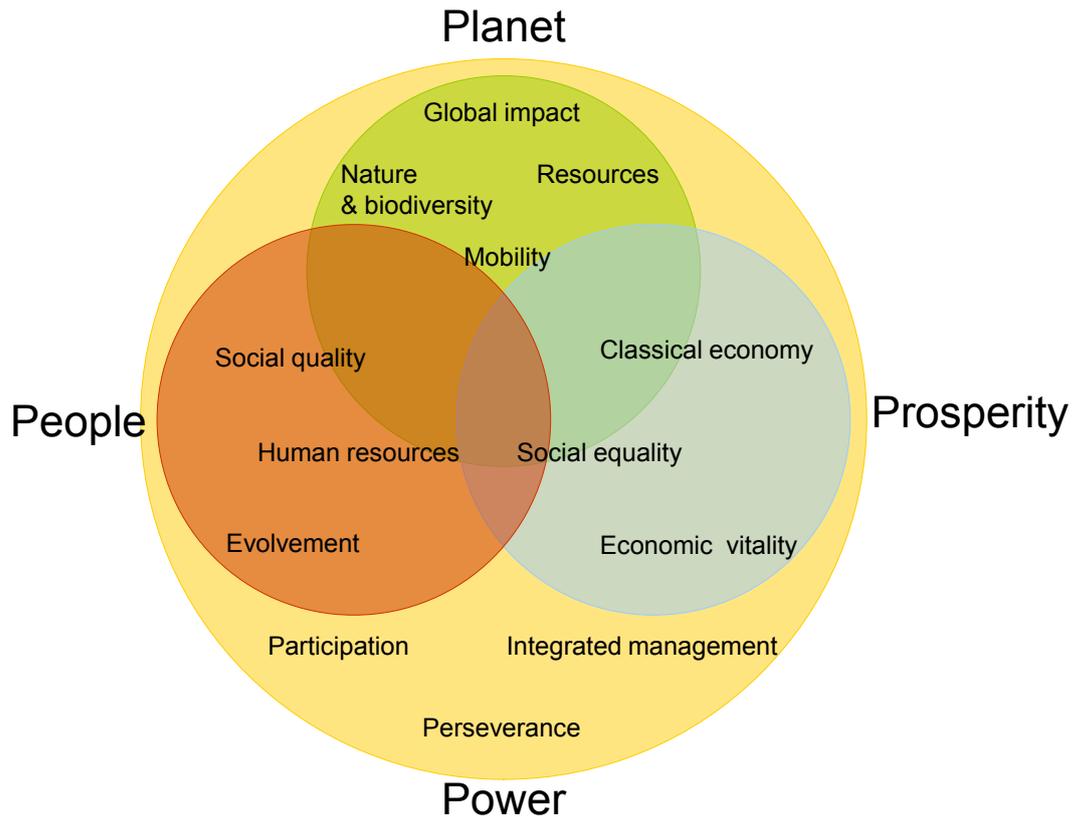


Figure 3: Stocks in the four domains of People, Planet, Prosperity and Power

This benchmark is inspired by the rankings and indicator sets as discussed in the previous section. While clustering the indicators a few blank spots were identified. First of all, the rankings tend to focus on *what* is achieved and not on *how* it is achieved, which makes it hard to draw lessons. The rankings generally assess the current situation without relating it to the past – what’s the pace of progress? – or the future – will the initiated developments and policies lead to progress on the road to sustainability; can the city adapt to unexpected developments?. Similarly, the rankings don’t take into account ‘genetic’ differences due to location-specific characteristics.

In this benchmark these omissions are addressed by adding the ‘power’ domain to the commonly used ‘people-planet-prosperity’ domains. This has enabled us to describe the governance approach in more detail. Another choice is to combine the assessment of a limited number of cities with elaborated background stories.

The benchmark assesses the four domains – People, Planet, Prosperity and Power – of (urban) development by evaluating a number of ‘stocks’ that represent its main

properties. These stocks can be quite generic, such as ‘human resources’ (People) or ‘environmental quality’ (Planet). Figure 3 provides an overview of the selected stocks. The generality of the stocks decreases the tendency to favour stocks in the selection for which quantitative data are readily available.

The condition of the stocks can be evaluated with (quasi-) quantitative indicators. The indicators used in the benchmark are inspired by the analysis of the rankings mentioned in Table 1. Appendix 1 elaborates the characteristics, indicators and parameters for all stocks. Table 2 for example shows these aspects for the stock “Resources” in the Planet domain. Examples of indicators in other domains are mean years of schooling (yrs), R&D expenditure (as a % of GDP) and an assessment of sustainability strategies. The values of the indicators are scaled and weighted in order to assign a final mark (between 0 and 5) to each stock. This results in a spider-diagram with final marks on the various stocks in the four domains, representing an integrative assessment of the ‘state of the sustainable art’ for each city.

Table 2: Examples of indicators in the Planet domain.

Stock	Characteristic	Indicator	Parameter
Resources	Renewable energy production	% Renewable energy in total energy production	%
	Energy consumption	Annual energy consumption per capita	GJ/cap/yr
	Energy intensity	Annual energy consumption, in MJ per unit GDP	MJ/\$/yr
	Materials	Percentage of the city's solid waste that is recycled	%
	Materials	Municipal waste per capita	kg/cap/yr
	Water use	Water use per capita	l/cap/day
	Land use - Population Density	Number of inhabitants per km ²	cap/km ²



Photo by Tom Cochrane

Chapter 3

Frontrunners on the road to sustainability

3.1 Introduction: long-list and short-list

Sustainable urban development is a quest; many cities have adopted ambitious sustainability goals and are now seeking for the best strategies and solutions to reach them. Several cities already produce good results on some key domains of sustainability (like energy or mobility), but very few examples of a holistic and radical sustainable urban development exist.

In order to identify 'frontrunners on the road to sustainability', a broad range of recent studies and rankings on sustainable cities has been reviewed. The top-performing cities and the cities that perform quite well on multiple rankings are added to a long-list of inspiring examples (see appendix 2). These cities show – each in their own way – examples of (more) sustainable urban development. A few cities stand out. These 'usual suspects' keep popping up in the highest ranks of several studies.

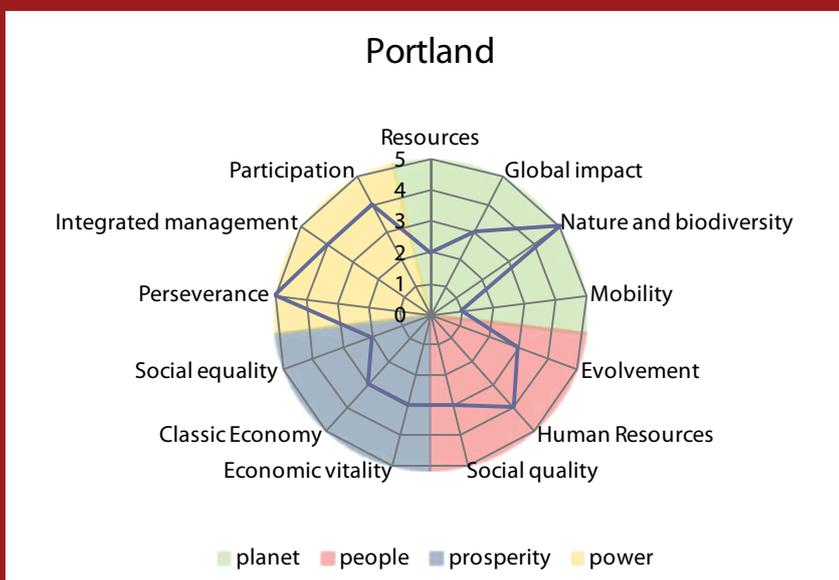
A short-list of five cities was selected for further exploration: Portland, Copenhagen, Freiburg, Canberra and Tampines. This final selection was not only based on performance, but also on diversity in size, geographical spread and presence of 'new towns' for purposes of comparison to Almere. The benchmark methodology of this study was applied to assess the sustainability performances of the short-list cities and Almere. The following sections analyse the sustainability performances of these six cities in more detail, including their benchmark results.

This chapter is concluded with a comparative analysis of the benchmark results of four short-list cities and Almere.

Besides official publications, various websites have been used for further information. See "Literature and additional sources" on page 105.



Benchmark Portland



The City of Portland is widely known as one of the most environmentally friendly or green cities in the world. The city and region are noted for strong land-use planning and investment in light rail, supported by the directly-elected metropolitan planning organization Metro.

Portland is often referred to as the most sustainable city in the United States. Therefore, the low scores in the planet-domain seem surprising. The citizens use a lot of energy and water, produce high amount of waste and travel mostly by car. This is not a sign of bad policy, Portland's baseline is simply worse because of the consumption pattern in the United States. For example, the ecological footprint of an average American citizen is 70% higher than that of a European citizen.

On the other hand, Portland's status as leading environmental city is supported by results such as reduction of 1% carbon emissions in 1990-2008. This is indeed a good result, while in the same period the population grew with 30% and carbon emissions in the United States as a whole increased 13 per cent. The city also offers a high amount of green space per capita.

Portland scores well on the power-domain, because of the perseverance of environmental policies, structural cooperation with societal partners and an integrated approach with concrete results.

With regard to the social and economic domains, Portland stays behind compared to the other cities. Characteristics are a high unemployment rate, a low level of education and a high social inequality.

3.2 Portland

City profile

Portland is the most populous city of the State Oregon, located in the Northwestern United States. It has over 580,000 inhabitants, making it the 30th most populous in the United States.

Portland was incorporated in 1851 and is the county seat of Multnomah County. Portland's location, with access both to the Pacific Ocean and to the agricultural Tualatin Valley, gave it a comparative advantage over nearby ports. The city was the major port in the Pacific Northwest for much of the 19th century.

Planet

Portland is often cited as a model of urban planning in the United States. In 1973, the Oregon legislature authorized regional planning authorities to establish an urban growth boundary (UGB), the purpose of which was to stop urban sprawl and to encourage densification in the city.

Portland has a light rail line, which has significant positive effects on the urban development. To increase ridership and accommodate growth within the UGB, a number of policies were adopted to facilitate transit-oriented development. Such policies include transit area overlay zones and several public-private partnerships established to encourage high-density housing and employment growth around station areas.

Besides promoting the use of the light rail, Portland has also doubled its bicycle lanes since the 90's. The city's extensive network of bicycle lanes, which includes clear pavement markings and bicycle signals, is being maintained on a regular basis. Portland has the highest percentage of bicycle commuters in the nation and they are accommodated with bicycle parking, showers and storage facilities. Portland is also praised for its pedestrian friendly neighbourhoods.

Portland's high density and strong mass transit system have reduced car driving substantially, which contributed to the reduction of energy use and CO₂-emissions. The Portland metropolitan area had the third-lowest CO₂-emissions per person in the US in 2005 when it came to residential energy use and highway driving. The carbon footprint for those two categories combined dropped nearly 5 percent between 2000 and 2005 while it increased just more than 2 percent nationwide.

Portland's residents recycle more than half of their waste, which puts them among the top recyclers in the nation. They also consume more-than-average local food, en-

General information

City-name:	Portland
Country:	United States
Population:	582,130 (June 2009)
Area:	347.7 km²

couraged by the cities support for local farmers and farmers' markets.

The 'Clean Energy Works Pilot Project' shows that environmental ambitions can be successfully coupled to social and economic ambitions (see boxed text).

Power

For 40 years, Portland has made environmental preservation a keystone in its urban development policy. A major element has been the establishment in 1973 of the nation's first statewide smart growth program to rein in urban sprawl. By creating a rural-urban boundary, Portland ensured that farmland would remain for agricultural use and encouraged dense growth in the city while at the same time leaving the precise borders open to change as the future needs of the area shifted.

In 1993, Portland became the first local government in the USA to adopt a strategy to address global warming, with results as shown in Figure 4. In its 2009 Climate Action Plan, the city and county formulated an ambition of 40% carbon emission reduction in 2030 and 80% in 2050, relative to 1990 levels. A 1% reduction level has already been achieved in the period 1990-2008, despite rapid population growth. The plan focuses on major actions to be taken in the next three years to shift the emissions trajectory. The 2030-ambitions are elaborated for eight domains.

Portland's citizens and businesses play an important role too. To stimulate sustainable development within the Portland metro region the 'Portland Sustainability Institute' was founded in 2009. The institute systematically brings together business, higher education, non-profit

From a visitors perspective

Portland is considered to be the greenest city of the United States. You find trees in all streets, and many parks connected by the 40 Mile Loop. Portland doesn't have the hectic feeling of a big city, but a friendlier atmosphere. The city is dense for American standards, downtown you find many mid- and high-rise buildings, but off-centre the urban landscape is dominated by stand-alone houses.

Clean Energy Works Pilot Project

Clean Energy Works Portland (CEWP) is a pilot program that will help up to 500 qualified Portland homes to finance and install energy efficiency upgrades.

The pilot offers homeowners access to low-cost financing for energy efficiency home improvements, like new insulation or the installation of a high efficiency furnace or water heater. To help decide which upgrades and financing options make sense, participants will receive the assistance of a qualified Energy Advocate throughout the process.

The project combines social-economic goals with environmental ambitions: it is intended to save energy, reduce carbon emissions, improve home comfort and home values, and create new jobs, long-term employment opportunities and career paths for Portland area residents.

CEWP uses on-bill financing; an innovative approach that allows residents to upgrade their homes with no up-front costs, while they pay for the retrofits over time through a charge on their utility bills. CEWP also includes a Community Workforce Agreement. This agreement establishes a set of contracting, training, and employment policies that will ensure high-quality work, high-quality jobs, and career opportunities for low-income and other historically underserved populations.

Homes with the greatest potential for energy savings will be given priority for inclusion in the pilot. The participating households pay nothing until after their home improvements are completed, when they start monthly payments on their heating utility bills. The Energy Trust of Oregon offers homeowners, through its regular program, cash incentives to cover the cost of the home energy assessment and Energy Advocate services.

A broad range of parties cooperated from an early stage to set up the Clean Energy Works Portland. These parties include the City of Portland, a Community Development Financial Institution, utility companies, the local workforce investment board and the NGO Green For All.

The 470-home pilot project started in the summer of 2010 and after this pilot phase, the City of Portland and the Energy Trust of Oregon will significantly scale up CEWP in an effort to retrofit estimated 100,000 qualifying homes in Multnomah County over the next several years. Inspired by the success, 17 other Oregon communities already decided to launch a similar program in 2011.



and municipal leaders to drive a set of next-generation initiatives for urban sustainability in the Portland metro region. The goal: big and game changing ideas that weave together community livability, ecological resilience, and broad-based prosperity, with the help from several stakeholders.

People

Portland has a high participatory rate in the community. The city was ranked second in the list of the nation's largest cities for volunteer rate in the country. 37% of the city's residents volunteer, compared to the 2008 national average of 27%. Portland's Neighborhood Small Grants Program funds a wide variety of community projects in Portland's neighborhood districts.

On the other hand, Portland has a high unemployment rate: 10.1% as of July 2010. Especially the manufacturing and constructing sectors suffered a great loss of jobs. Or-

egon has often been among the top 10 state rates when it comes to unemployment. This is why Portland tries to launch successful policies to create new jobs; the 'Clean Energy Works Project' is an example in case.

Prosperity

Portland's gross national income per capita is \$37000, which is high compared to the overall GNI of the US (\$33,000 per capita). The GINI coefficient amounts 0,45 for the city of Portland, meaning that the income inequality is average for a US-city.

Portland encourages sustainable business by their yearly 'Businesses for an Environmentally Sustainable tomorrow'-awards and the Community Workforce Agreement as part of the Clean Energy Works Pilot Project.

Sustainability Lessons from Portland

- Since the seventies, Portland is a frontrunner in addressing environmental preservation and global warming. This pays off in environmental and social terms and has become part of the identity of the city.
- A clear priority to environmental goals is translated into guiding principles and concrete actions in all sectors.
- The strong retaining of the Urban Green Boundary effectively prevents urban sprawl.
- Cooperation between business, higher education, non-profit and municipal leaders is systematically organized in the Portland Sustainability Institute.
- Environmental goals are successfully coupled to social and economic ambitions, for example in Portland's Clean Energy Works Pilot project.
- Portland is often considered as the leading sustainable city in the United States. However, the use of resources and the global impact is still high compared to the European cities in the benchmark. This does not mean Portland's policies are ineffective – their baseline is simply worse. For example, the ecological footprint of an average American citizen is 70% higher than that of an average European citizen.

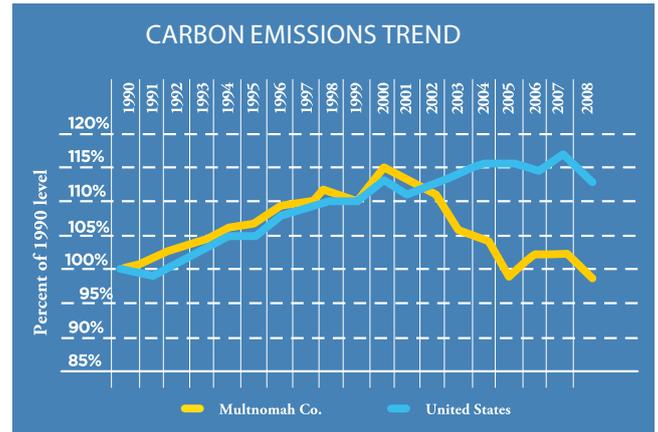
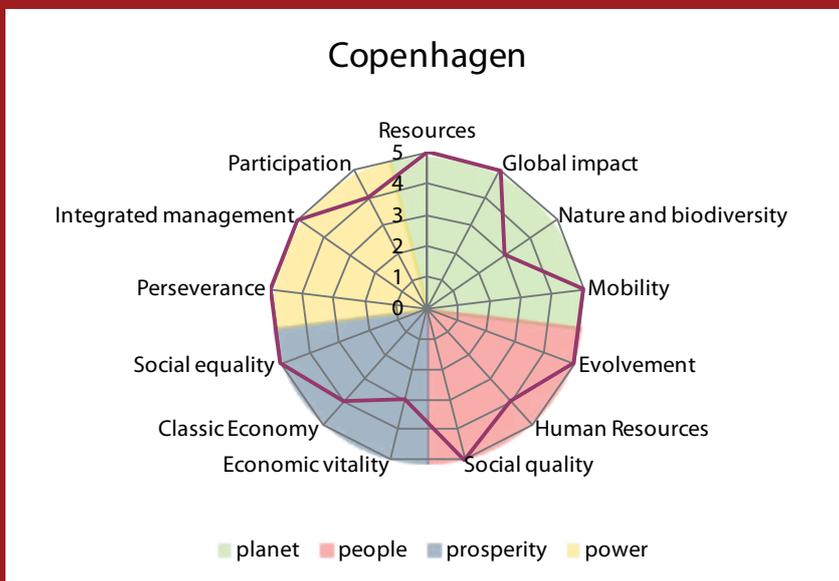


Figure 4: Carbon Emissions Multnomah County 1990-2008



Benchmark Copenhagen



Copenhagen scores very high in all domains.

Of all cities, Copenhagen has the highest renewable energy production (10%), carbon emissions reductions (-30% in 1990-2010) and lowest per capita CO2 emissions. With regard to mobility, Copenhagen has most cycle lanes and least car use. The only aspect in the planet domain, which falls behind, is nature and biodiversity, because of the relatively small amount of green space per capita in the city.

The city is rich and the welfare is distributed evenly, but the R&D investments are relatively low. The citizens are actively involved in society.

Copenhagen's consequent policies, holistic approach and long-standing tradition in citizen dialogue lead to a high score on the power-domain.

3.3 Copenhagen

City profile

As the capital and largest city of the country Copenhagen is the cultural, educational, and economic center of Denmark. The metropolitan region of Copenhagen provides home to nearly 1.2 million residents, one quarter of the entire population in Denmark. It is situated on the western shore of the Strait of Øresund, a narrow strait separating Denmark from Sweden.

Copenhagen’s recorded history begins in the 11th century. After being ravaged by the plague and by two great fires, in 1728 and 1795, Copenhagen was subsequently rebuilt according to a new town plan. In the 20th century, Copenhagen struggled through the two world wars, and was occupied by German forces for five years during World War II.

After the Second World War, the city adopted the ‘five-finger’ development plan, which directed suburban growth to the west along five train lines, or ‘fingers’ with green belts and highways in between. The five fingers grew significantly during the 1970s and the plan is now seen as a model for suburban development. Today, Copenhagen is extending its regional influence by strengthening its economic connection with Malmö, located just across the Strait of Øresund in Sweden. Since 2000, the cities are connected by a toll bridge and form the center of a growing urban agglomeration.

General information	
City-name:	Copenhagen
Country:	Denmark
Population:	519,000 (2009)
Area:	88.25 km²

Planet

The industrial areas in the suburbs of Copenhagen are next in line for urban transformation, moving from the famous finger plan to a ‘loop city’. A new Metro loop determines the development model for the cross border region, connecting the area around the Øresund Strait in a sustainable spine of public transport, energy exchange and electric car infrastructure. The Finger Plan from 1947 was about connectivity from suburb to centre, the loop is connecting a string of differentiated urban nodes in a metropolitan region.

No less than 36% of all Copenhagengers choose to go by bike to their place of work or education. Stimulated by ongoing investments in cycle tracks, Copenhagen’s cycle culture has evolved and developed over many years. ‘Bicycle-friendly’ is a very important selling point in the marketing of Copenhagen as a healthy and sustainable city. The policy targets are even more ambitious: 50% of people by bike, 50 % less injuries by bike (now 118), 80% of cyclists in Copenhagen to feel safe and secure in traffic.



Figure 5: The finger plan (left) and the Copenhagen S-train map (right)

To boost the quality of life further, the municipality wants to increase the percentage of Copenhageners able to walk to a park, a beach or a sea swimming pool in less than 15 minutes from 60% now to 90%. One of the ways to achieve this is to merge urban structures with green structures such as green roofs, green facades, green streets and corridors, integrating sports fields, playgrounds, recreational spaces for children and adults in pocket parks which help cool the city on hot days and absorb rain on wet days.

Denmark is self-sufficient in energy and is a leader in sustainable energy, with much of the country's power needs being met by offshore wind turbines. The district heating is an important infrastructure in the city as it provides heating to many houses. All new developments are highly energy efficient and existing areas are being transformed to meet the new sustainable energy standards. These standards require a series of alternative sources like wind turbines, biomass fuel extracted from sea lettuce and geothermal heat, which is pumped up from the interior of the earth.

Power

The development of Copenhagen is centred on its people in an integrative way. The social and physical health of the citizens is well integrated into the desired future

From a visitors perspective

Copenhagen is designed in a clever and spacious way, with ample space and good infrastructure. As a visitor you feel welcome here. The city combines old heritage with interesting new architecture. The urban landscape is enriched by the presence of green and water. To a large extent the city is adjusted to the human scale, e.g. in terms of height of buildings. Copenhagen is a vibrant capital.

and plans of the city. The wellbeing of the residents and visitors is further supported by smart spatial and transportation policies. Key elements of Copenhagen's urban policy are:

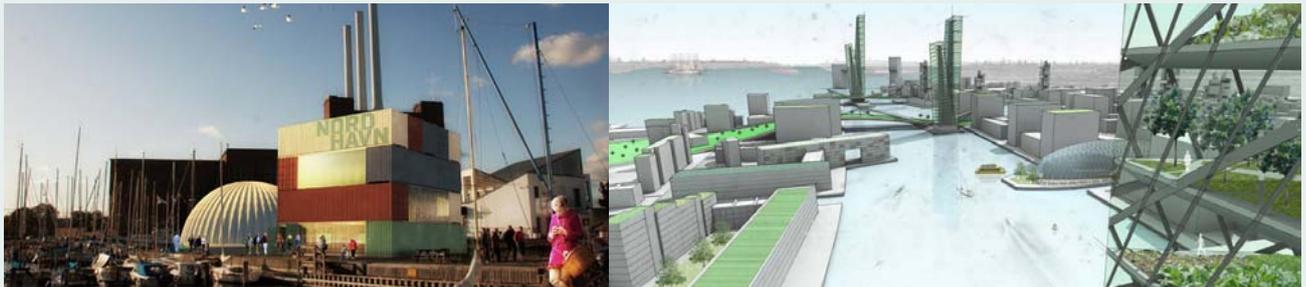
1. The post-war choice for the five-finger plan as the organizing framework for the city planning;
2. The clear priority to public transport, cycling and walking and to a large availability of, and easy access to, green (urban) landscapes as the primary prerequisites for sustainable densification;
3. The political commitment to stick to these choices until today.



New urban developments in Copenhagen

Nordhavn

Nordhavn is a former industrial port, which is transformed into a dense and dynamic waterfront district. The vision for Nordhavn is to become the sustainable city of the future Copenhagen. Nordhavn is being developed to create 'places' for 40,000 jobs and 40,000 inhabitants. Employees and residents are to have nature as well as the city centre right next-door. The energy ambition for Nordhavn is to produce more renewable energy than it consumes. With a view to mobility and the increasing social costs of commuting (time, money, pollution, etc.) the overall objective is to make it easier to walk, cycle or travel by metro than to take the car. In Nordhavn Copenhagen delivers another sign of perseverance in implementing the sustainability policies that were originated long ago in this city.



Ørestad

The Ørestad concept is about 15 years old. As a result of an ongoing interpretation of the masterplan, today's Ørestad - with 5,400 residents, 20,000 students and more than 10,000 people working there every day - has become a rapidly developing city district. There are good public transport connections (metro and train) between Ørestad, the rest of Copenhagen, the Øresund region and Malmö. The area borders on a large natural area. Ørestad is a laboratory for new ideas and typologies – within the fields of temporary functions and architecture. This 'lab' does its research by combining attractive urban spaces; innovative architecture and transport orientated planning.



Carlsberg

After 160 years of brewing in the inner city Carlsberg will become a new city district in the centre of Copenhagen. In order to ensure the diversity of this new city district Carlsberg is working strategically with temporary interventions in the area instead of redeveloping the whole area in one project. The main strategy is to create a lively urban space by using the cultural heritage as an asset. The idea of a living urban space is being promoted, a/o by renting buildings to creative dwellers such as dancers, gallery owners, architects, artists, designers and others. Spaces between buildings are designed attractively to encourage people to stay, or to play and exercise in indoor-outdoor sports. The buildings are multifunctional and host concerts, conferences and other kinds of events, ensuring urban activities at all hours. Place making is crucial.



These building blocks have contributed much to the realization of a strong urban and regional structure that provides residents and visitors easy access to neighbourhoods, working areas and surrounding landscapes by means of public transport, bike and foot. Perseverance in policies stimulating public green spaces, biking, walking together with densification has boosted the quality of life in Copenhagen. The city evokes reminiscences to the ideal of a historic city centre where walking is the natural way of transportation and where always something is happening. It is more than programming a city: it is encouraging city life. To quote the chief architect of the city on the densification policy of Copenhagen: 'The exact point at which density becomes sustainable (...) is when homes, jobs and day care centres are all within easy reach of one another and when the obvious choice is to use either the bike or public means of transport to reach them.'

People

Participation has been raised to a professional level in Copenhagen. Several projects have been implemented in which planners, architects and politicians have tried to create new cities and city districts from a holistic and sustainable perspective. Moreover, for more than 20 years Copenhagen has been facilitating 'citizen dialogues' thereby delivering an important contribution to the maturation of this tool for urban renewal in Europe. With architects or other specialists as mediators many residents have been reflecting on, and delivering valuable inputs in the process of renewing city districts all over the city, turning the Copenhageners into an important, innovative and critical resource in the development of the city. This is supported by the website www.copenhagenx.dk that functions as a virtual communication platform for thousands of people, taking part in the urban development. In this context bottom up and top down really come together as there are a lot of long-term bonds between people, developers and the city. Instead of a project or discipline driven approach

the community or place driven approach has become the main way of working.

Prosperity

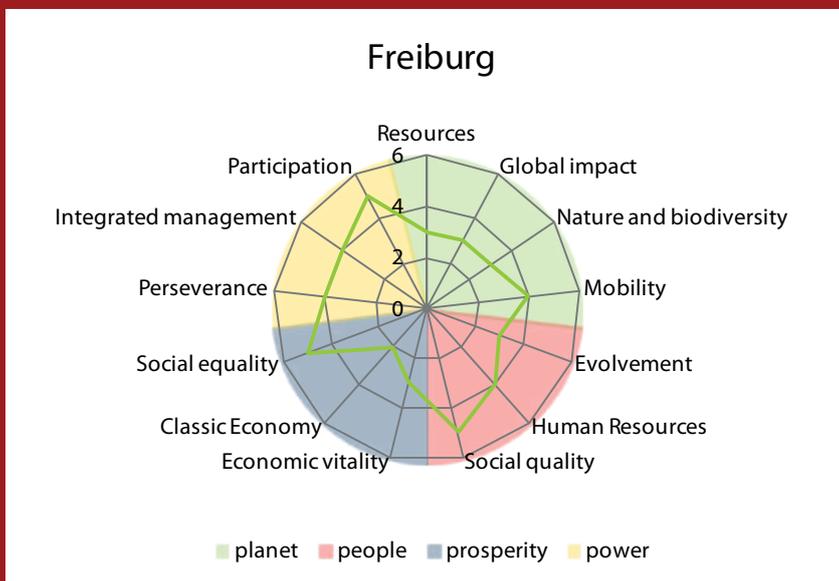
An accessible city with lots of dynamic, (public) urban spaces, cultural heritage, appealing architecture, with landscape and nature nearby, with a nice and varied cultural life, is indeed a very attractive place for people to be. It is also sustainable from an economic point of view. In the past decade many companies and dwellers were attracted to Copenhagen. The high quality and education level of the city's workforce serves as a magnet to businesses as well as to new, highly educated employees.

Sustainability Lessons from Copenhagen

- Copenhagen is the overall-frontrunner, with the highest scores on all domains except Prosperity where Copenhagen is second best.
- The 'five-finger' development plan, the commitment to stick to it and the clear priorities for non-car transport modes, and a large availability of green (urban) landscapes have proved important success factors for the sustainability achievements of the city. They've contributed to a dense, lively and attractive city.
- The sustainability ambitions are driven by the aim to provide for a high quality of life for the residents of Copenhagen.
- A 30% reduction of CO2 emissions since 1990 has been achieved, thanks to expansion of the district heating network, cleaner fuels in CHP stations and investing in sustainable energy - especially wind energy.
- Copenhagen has a long-standing tradition in facilitating citizen's dialogues concerning the urban development. This has contributed much to the high level of involvement and active support among residents, businesses and NGO's to the sustainable development of Copenhagen.



Benchmark Freiburg



Freiburg stands out in the Power and People domains, because of the successful community-driven planning.

In the Planet-domain, Freiburg has average scores. The good environmental results in the neighbourhood of Vauban are not reproduced on the city level. There are some positive exceptions: low waste production, high recycling rates, low water consumption and limited car use. Freiburg puts quite some attention to renewable energy, but only 3,9% of the city's electricity comes from locally generated, renewable resources. If solar water heating and imported renewables were included, the share of renewable energy would be much higher.

The relative high unemployment (8%) and high percentage of elderly lowers the score on the people domain a bit. The low GDP (\$32,000 per capita) explains a low score on prosperity.

3.4 Freiburg

City profile

Freiburg was founded in 1120 as a free ('frei') market town. The town was strategically located at a junction of trade routes between the Mediterranean Sea and the North Sea areas and also between the Rhine and Danube rivers. The city is situated in the Rhine valley between the Black Forest and the Vosges Mountains in France. As part of the wine-growing area of southwest Germany it is one of the sunniest places in Germany with 1800 'sun-hours' per year. During World War II some 80% of the old city was destroyed. Most of the destroyed buildings have been rebuilt in the old historical style.

In the 1970s, the region planned to build a nuclear power plant near Freiburg. There were major protests, and in 1975 the plans were cancelled. This event produced a gap in the region's energy plans but raised the environmental awareness of many citizens. It marked the beginning of a very successful local quest for green and sustainable solutions.

Planet

In Freiburg, farmers markets, waste recycling, good public transport and extended networks of cycle lanes and sidewalks are commonplace. But the sustainable ambitions of the city reach further. This is best illustrated with Vauban, a neighbourhood that was built as a model district for sustainability (see boxed text on Vauban).

Sustainable energy supply

Freiburg has numerous projects that use all kinds of sustainable energy technologies, especially solar energy. Over 400 installations of photovoltaic panels (for electricity) are installed next to solar thermal installations (for heating water). Houses are equipped with solar sunrooms for winter gardens, passive solar design, solar cooling and transparent solar insulation (which converts the solar heat of a wall into useable thermal energy).

Water and sewage

Rainwater from roofs and streets in Freiburg does not end up in the sewage system, but is redirected to the urban soils via natural (reed) filters. Some 80% of the residential area is covered by this system. The model house of the Baugruppe Wohnen und Arbeiten is equipped with an innovative ecological sewage system. Vacuum pipes transport faeces into a biogas plant where it is co-digested with organic wastes from the household, producing biogas for the household and organic fertilizer for local gardens. The remaining wastewater (grey water) is sanitised by plants (reed) and recycled to the natural water system. The Fraunhofer Institute, a regional knowledge institute,

General information

City-name:	Freiburg im Breisgau
Country:	Germany
Population:	221.924 (2009)
Area:	153.07 km²

offers technical assistance for the design, operation and maintenance of the system.

Waste

Freiburg has an ambitious recycling program. Every household has four containers to separate waste. All kitchen and garden wastes are composted. The waste disposal has been reduced from 140,000 tons a year in 1988 to 50,000 tons in 2000.

Transport

'A cycling plan was drawn up in 1970, and the city now has over 500 km of bicycle paths; a third of all urban journeys are by bicycle. There are more than 5000 bicycle parking spaces in the city, with concentrations at tram stops for 'bike and ride' commuters. The main railway station has parking and other cyclist facilities for 1,000 bicycles. The old town centre became car-free in 1973, and in 1990, a 30 km/h zone was introduced for almost all residential streets, except main roads. Freiburg introduced a low-cost-flat-rate monthly 'environment ticket' for the region-wide bus service in 1991. Since 1980 the number of people using public transport has increased by 100%.

Power

With 42% of the surroundings of the city under nature or countryside protection, where building is no longer permitted, Freiburg has installed a kind of urban growth boundary to densify the existing city and to protect the surrounding landscape.

The protest against nuclear energy and the choice for green energy solutions marked a fundamental shift in the mind-set of the Freiburgers. This shift has had many consequences. In 1986 the municipal council voted to adopt guidelines for a future-oriented energy policy. These guidelines were articulated in 'SolarRegion Freiburg', a long-term development vision that the city has embraced. In the mid 1990s the city council adopted a resolution that only construction of low energy buildings on municipal land would be permitted. (max. heat energy of 65 kWh/m²a). Recent laws require new buildings to meet the 'passivhaus' standards (15 kWh/m²a).

From a visitor's perspective

Freiburg is both the smallest and oldest city in this research. It mixes old buildings with apartment blocks of social housing and even some high-rise offices. The history shapes the identity of the city, but the city is still continuously developing. Especially the district of Vauban offers an excellent living quality with a lot of attractive, green public spaces where people can meet and children can play safely.

New ways of involving the citizens have been crucial for the urban development of Freiburg, as the example of Vauban shows.

People

The people in Freiburg are very environmentally conscious. 25% of the citizens vote for the green party, even up to 40% in certain districts. The involvement of the community in the urban development is very high. One typical example is the reaction to the City's invitation to participate in the development of Vauban, the new sustainable district. The enthusiastic response made it possible to form about 30 groups with a wide variety of people, businesses and organisations within the framework

of the Forum Vauban. This Forum was initiated by a group of active citizens. It was recognized as a legal body for the citizen participation by the City of Freiburg in 1995. A small team of full-time professionals as well as an executive board and several working groups contribute to the thematic and organisational work of the association. Forum Vauban is being financed through membership fees, donations, public grants and a moderate economic income.

Forum Vauban was founded as an NGO and has a non-profit status. Nevertheless, the association influenced or initiated numerous economic activities. The main fields of activity are:

- To organize and facilitate the far-reaching participation of residents in the development of the district.
- To support the implementation of community-based building projects such as 'Baugruppen' (groups of building owners), co-housing and co-operative building.
- To realise a sustainable model district, especially in the fields of mobility and energy.
- To coordinate the social work and implementation of a neighbourhood centre

Prosperity

As mentioned before, the protest against nuclear energy and the choice for green energy solutions marked a shift



Vauban

Vauban is often cited as the example of sustainable neighbourhood development. With 2000 houses, 5000 inhabitants and 600 jobs Vauban is located about 4 km from the town centre on the site of a former French military base ('Vauban'). Construction began in the mid-1990s.

Within Vauban, all houses are designed and constructed to low energy consumption standards. Many units comply with passive house standards. Heating and electricity for buildings are provided by solar collectors, photovoltaic cells and/or a combined heat and power station in which wood chips are burned. Probably one of the best examples of Vauban's sustainable energy supply is the 'Solar settlement' a housing community with 59 homes that produces more renewable energy than it uses. The energy surplus is delivered to the grid and sold to the regional energy company.

In Vauban, all districts are connected to the city centre by a tramway. All homes are within walking distance of a tram stop. Transportation within Vauban is primarily by foot or bicycle. In 2009 about 70% of the households had chosen to live without a private car! The success for walking and cycling is partly the result of the layout of the district combined with the possibility of car sharing. The plan starts with a grid. Then



a network geometry is created that favours walking and cycling and, selectively, filters out the car. The number of streets that run through the district is reduced and most local streets are crescents and 'cul-de-sacs' (dead-end street).

During the planning process of Vauban a citizen participation process was set up by the City and also supported financially. Facilitated by a project team of the City this participatory urban development process went on throughout the entire project, including the construction of the site and the corresponding infrastructure. A central task of the project team was the sale of building lots.

in the mind-set of the Freiburgers. As a result various environmental organizations, businesses and research institutes were founded, forming nowadays a wide sustainability network. About 10.000 people work in green energy industries and research in Freiburg. The city has also attracted solar research and development institutes like the Fraunhofer Institute for Solar Energy Systems. Fraunhofer has developed a new system for solar refrigeration. A Solar Training Centre is set up in a trade school. It educates technicians and installers who are needed to service the growing activities in the city. The International Solar Energy Society (ISES) and many other solar institutions have their headquarters in the city. Freiburg has often hosted important solar energy conferences, attracting many delegates. Many city officials around the world visit Freiburg to learn from their experiences.

Sustainability Lessons from Freiburg

- The holistic approach, starting from the human scale, appeared successful in reaching ambitious environmental goals and in providing a high quality of living.

- The development of Vauban is an inspiring example of creating a sense of ownership by (future) residents that contributed to a high level of satisfaction and enthusiasm among the people involved. The local government played a stimulating role by continuously facilitating the participatory development process that also contributed much to the enhancement of knowledge and skills of the participants.
- Clear priority was attached to sustainable urban development, for example when opting for solar energy and car-free neighbourhoods.
- The car-free neighbourhood shows that the satisfaction of the quality of public space just in front of the door and the availability of efficient and high quality public transport, car sharing and parking garages can outperform the usual preference of parking in front of the door.
- The focus on sustainable urban development has many positive effects: it shapes the identity of Freiburg in a positive way and makes the city a good place to live for a diverse group of new residents. It also attracted new businesses and organizations.

3.5 Tampines¹

City profile

Located in the East Region of the main island, the site of Tampines New Town was originally occupied by fishing villages and coconut plantations. By the 1980s, the site was considered a wasteland, ravaged by the effects of sand quarrying. The development concept for Tampines was first broached in 1979, although it was not until 1990 that the construction actually began. In 1992, the new town received the World Habitat Award by the Building and Social Housing Foundation (BSHF) of the United Nations. This award was given in recognition of Tampines New Town's 'high-quality, high-density and affordable housing for its citizens and [its demonstration of] a timely lesson to a rapidly urbanizing world on excellence, economy and efficiency in the provision of high-rise housing, as well as on how to retain socially cohesive communities'.

Since the early 1990s, Tampines has continued to evolve unlike most of its Western contemporaries. Currently, Tampines has 61,000 residential units that offer accommodation to more than 250,000 people on just 12 km² and there are plans to complete another 22,000 units in the coming decade. The scarcity of land in Singapore was a major factor in the decision to house residents in high-rise estates.

The high-density development has made it necessary for Tampines to look for innovative modes of growth. The new town is divided into five districts, each with their own community centre, which provides all sorts of amenities for the residents. Tampines Central Community Centre, for example, offers residents a supermarket, cafés, sporting facilities and health clinics. The individual districts are further subdivided using the 'precinct concept', a design solution which clusters apartment blocks with 'well-defined spaces and facilities for 400-800 dwelling units, to help foster community development'. This has been cited as a contributing factor to Tampines' sense of community and belonging (Guillot, 2008).

Planet

Tampines was originally designed with consideration for human scale, useful spaces, passive energy efficiency, solar and wind orientation, as well as traffic noise and social interaction (Wang, 1987). The precinct concept allows Tampines New Town to maintain a relatively high percentage of open green space (Guillot, 2008). Landscape design is incorporating green into the urban fabric in the form of weaving connecting 'green fingers' through the

¹ Unfortunately, insufficient data are available for Tampines to make a quantitative assessment of this city. Therefore, the city gets only a qualitative assessment and is not listed in the benchmark results.

General information

City-name:	Tampines New Town
Country:	Singapore
Population:	261,743 (2010 Census, Singapore Statistics)
Area:	12 km² (residential area: 0.5 km²)

city rather than simply constructing towers around a central open space.

More recently, in April 2009, the Inter-ministerial Committee on Sustainable Development (IMCSD) released The Sustainable Singapore Blueprint, a plan that outlines key measures and initiatives to drive sustainable development in Singapore. The Blueprint concludes that energy efficiency should be Singapore's key strategy to mitigate greenhouse gas emissions. Energy Efficiency supports the twin objectives of economic competitiveness and environmental sustainability. Under the Blueprint, Singapore's key target is a 35% reduction in energy intensity from 2005 levels by 2030. The methodology adopted under the Blueprint will support the adoption, application and demonstration of new energy efficient technologies, as well as raise awareness to stimulate energy efficient behaviour among the population.

Since the closing of the last landfill on the main island in 1999 Singapore has implemented solid waste management strategies that are quite similar to the Dutch strategies of the last decades. Singapore aims to minimize the total waste volume by prevention and recycling, a/o through public awareness programs, and by means of incineration, thus recovering 938 million kWh per year and reducing the waste volume by 90%. The Singapore Packaging Agreement (SPA), a policy to limit packaging wastes, has helped reduce waste production by 2,500 tons in its first 2 years. The National Recycling Program provides door-to-door collection of paper, metal, plastics, glass and clothing every two weeks, as well as public recycling bins and 'recycling corners' in school classrooms.

From a visitor's perspective

Tampines is characterized by its density, which makes it the opposite of cosy. The 2 to 4-lane roads wind through the five separated districts of the city. Most buildings are similar: high-rise apartments of about 12 floors, constructed in the eighties and nineties. The city feels artificial; this is only somewhat compensated by the relative high amount of green space and the decentralized community services.



Figure 6: Transportation Network of Tampines

The integrated transportation policy is a successful example of transportation management, allowing residents to travel efficiently both outside and within Tampines (See Figure 6).

The Land Transit Authority (LTA) is committed to promoting the use of bicycles and public transport and invests \$43 million to the construction of bike lanes throughout Singapore in the period 2009-2012. On March 1, 2010, the Tampines Town Council voted to legalize cycling on footpaths, making it the only part of Singapore where pedestrians and cyclists can now legally share space. Of all transport modes public transport has currently a share of about 63% during peak hours. LTA aims to increase this share to 70% over the next 10-15 years by enhancing infrastructure and improving services.

Various incentives are being used to promote the use of energy efficient and climate friendly vehicles. The Green Vehicle Rebate offers buyers of hybrids, electric or CNG (compressed natural gas) vehicles a 40% rebate of the open market value, as well as tax incentives. The Mandatory Fuel Economy Labeling Scheme (FELS) requires manufacturers to provide information on a vehicle's fuel efficiency at the point of sale, to help buyers choose the most fuel-efficient models.

Power

The national Housing and Development Board (HDB), a department of the Ministry of National Development, was originally responsible for the planning, construction and management of the new town. The planning and construction of Tampines was therefore a heavily top-down

undertaking. However, in recent years Singapore has attempted to reduce the role of the state in people's lives and encouraged public participation. After finishing the new town in 1991, the management was handed over to the newly established Tampines Town Council, a body of local residents. The town council became responsible for the landscaping, control and maintenance of common property. This form of self-management is said to contribute to a feeling of group accountability and community pride.

People

In order to reduce the risk of racial self-segregation and sectarian communities the HDB introduced in 1980 an ethnic quota system. Different income groups are also housed together in mixed towers and estates, in order to prevent social stratification.

As the new towns have aged, HDB has concentrated on upgrading programs to meet changing social needs. During the late 1990s HDB for instance began a program to construct studio flats especially suited to the needs of Singapore's aging population.

Timely maintenance and efficient management of housing estates, public facilities and landscape have contributed to Tampines' reputation as a sustainable model. Some of the more pioneering grassroots programs in Tampines include programs which allow residents to exchange recyclables for food every weekend, relaxed cycling restrictions and free professional health consultations once a month. The inclusion of an array of amenities has also helped fuel this growth. Tampines offers residents good transport connections, as well as commercial, social, institutional, health and recreational facilities, making this new town an attractive and self-sufficient alternative to downtown Singapore.²

Prosperity

Singapore has put in place an effective way to enable its residents to finance their houses in the new towns. Since 1968, residents of Singaporean New Towns have been allowed to use their pension funds (Central Provident Fund) to purchase real estate property instead of renting it. This gives them an incentive to work, as well as a stake in what happens to their community.

Tampines New Town contributes to Singapore's economy in various ways. Continued construction within Tampines has benefited the job market. Telepark, a recently con-

2 For more on Tampines' efficient public transportation infrastructure, see: Goldblum, 2008



structured IT park in Tampines, provides employment opportunities in line with Singapore's national strategy to develop high-tech R&D centres. Local industry has also contributed to the city-nation's decade of almost non-existent unemployment, although the recent global economic crisis did bring this statistic up to 3%.

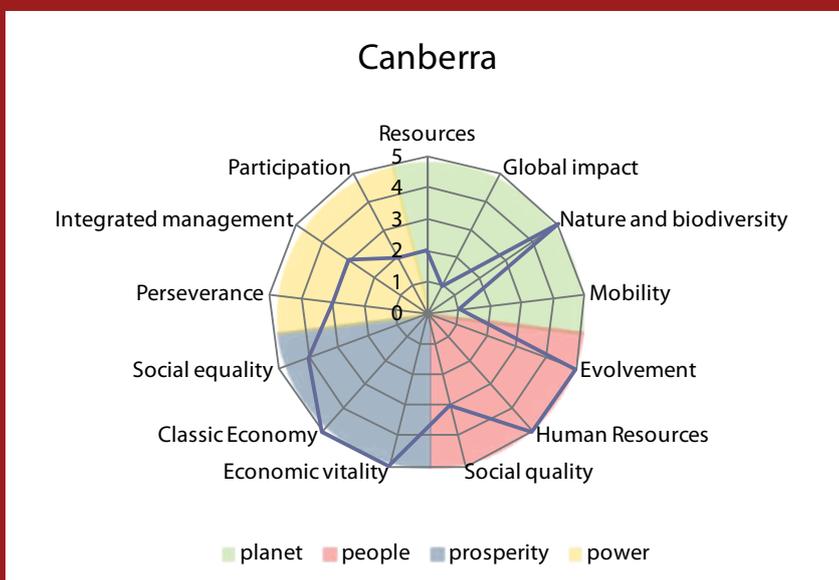
Within the framework of the national energy policy Singapore has implemented several financial instruments to stimulate the green economy. The Energy Efficiency Improvement Assistance Scheme (EASe) co-funds up to 50% of the cost of engaging Energy Services companies or ESCOs to conduct energy assessments for industrial and building facilities. The Singapore Certified Energy Manager (SCEM) Training Grant is a federally funded training and certification program in the area of energy management. The goal of this program is to develop local expertise and capabilities in professional energy management. The Grant for Energy Efficient Technologies (GREET) encourages owners of industrial facilities to invest in energy efficient technologies and equipment by funding up to 50% of the costs with a maximum of \$2 million per project.

Sustainability Lessons from Tampines

- The scarcity of land makes the need for a very compact city.
- In planning the city, the choice has been made to make the residential areas extra dense to leave room for green space – following a 'green finger' structure. This adds up to the well being of the inhabitants.
- The policy context is quite incomparable to the other cities of this benchmark study as is shown for example by the ethnic quota system and the top-down planning. However, for a Singaporean city the level of citizen involvement is relatively high.
- On national level, large investments are made to reduce energy use and stimulate the new green economy.
- Some simple local sustainability policies prove to be quite effective, like the food-for-waste recycling programme and the new laws to stimulate bicycle use by making cycling on the pavements legal.



Benchmark Canberra



Canberra has an unequal distribution among the domains.

Canberra is a very wealthy city, with a GDP of over \$71,000 per capita. The city has only 3,5% unemployment and a high life expectancy. Canberra scores poorly on planet, mainly because of the 4.3 increase of per capita carbon emissions, the 29% increase of carbon emissions since 1990 and the low percentage on non-car transport. There is one exception to the poor planet performance of Canberra and that's the high amount of green area per inhabitant: 403 m²/inh.

Although Canberra has an advanced monitoring and evaluation policy and formulated actions in many fields, the city does not score well on the power domain. The main reason is that it only recently formulated targets with respect to sustainability.

3.6 Canberra

City profile

Canberra was selected in 1908 as the future home of the Australian capital amidst political infighting and competition between Sydney and Melbourne. Even though Canberra began as a rather muddy seasonal settlement for indigenous Australians, today the city is widely considered to be one of the best in the world. In 2010, the Mercer Worldwide Quality of Living Survey ranked Canberra 26th globally and 21st of the world's top 100 eco-cities.³

After winning an international competition to design the city's master plan, American husband and wife team Walter Burley Griffin and Marion Mahoney Griffin moved to Australia in 1914 to oversee construction of their master plan proposal. Both architects had previously worked under Frank Lloyd Wright and considered themselves members of The Chicago Group, now widely known as the Prairie School (Krutty, 1998). Their design was also heavily influenced by the English Garden City movement, and included an abundance of natural vegetation.⁴

The Griffins' master plan used geometric shapes to organize the urban space. Concentric circles with radiating lines formed the core of their design (the Parliamentary Triangle). Parts of the plan also relied on more complex geometries, such as concentric hexagonal street organization. World War I, the Great Depression and World War II, however, interrupted implementation of the Griffins' plan for decades. When construction resumed in the 1950s, more organic street structures were used to infill space between mountains. In 1964, a major piece of the Griffins' plan, Lake Burley Griffin, was completed.⁵ The Lake was constructed by damming the Molonglo River, which reduced flooding issues and created a geographical focal point for the city. Development of the city continued through the 20th century. The late 1960s and 1970s turned out to be boom years for the city. The new districts

3 Criteria for the Quality of Living Survey included economic stability, infrastructure and transport facilities, crime rates and relative strength in areas of education, the environment, housing, sporting facilities and even the range and quality of restaurants, theatres and cinemas. The criteria for the Eco-City ranking included water availability, water quality, waste removal, sewage, air pollution and traffic congestion. See: <http://www.mercer.com> for more information on the rankings as well as ranking results from previous years.

4 In Architectural Historian Andrew Ward's Assessment of Garden City Planning Principles In the ACT, the author characterizes the influence of the Garden City movement as low-density residential development (largely single family housing) arranged in self contained communities, within a garden setting. Ward also describes efficient transport options and 'an orderly and efficiently planned environment' as remnants of Garden City planning (Ward, 2000).

5 The Griffins' design varied from the final version of the lake. Their plans for the artificial lake were much more geometric, including straight-edged waterfronts and perfect circles. The built version appears more natural in form.

General information

City-name:	Canberra
Country:	Australia
Population:	351,868
Area:	814.2 km²

established by the National Capital Development Commission attracted much of the growth.

Canberra is nowadays a hub of political and cultural activity. The city is home to Australia's national parliament, High Court, federal government departments, National Library, National Gallery, National Museum and National Portrait Gallery. As such, Canberra has attracted a comparatively affluent and well-educated population.⁶ According to the 2006 census, more than 20% of the residents are expatriates. Canberra is the only city in the Australian Capital Territory (ACT), which is a small self-governing internal territory.

Planet

Australia was one of the last western countries to ratify the Kyoto protocol. Australia signed the Kyoto protocol ten years after its formation, in December 2007. This might be a reason that Canberra's carbon emission reductions stayed behind. In fact, since 1990 the total carbon emissions have risen by 29%, the per capita carbon emissions by 4,3%.

On the other hand, the carbon emissions are dropping since 2006 (see Figure 7) and Canberra has set some ambitious targets in reducing its carbon emissions. In October 2010, the ACT Legislative Assembly passed legislation for the introduction of the most ambitious greenhouse gas reductions targets in Australia. *The Climate Change and Greenhouse Gas Reduction Act 2010* will see emissions reduced by 40% by 2020 and 80% by 2050, based on 1990 levels. In order to achieve the emission reduction targets, action plans are being developed. For the period of 2007-2025 there are four action plans in the making. In the first action plan (2007-2011) 43 individual actions have been formulated that supposedly attribute to Canberra's emission reduction ambitions. Examples of these actions are: assisting schools and government buildings to become carbon neutral (investment: \$40 mln. over 10 years), public transport improvements, climate change social impact analysis and implementing sustainability in schools.

6 As of May 2004, 30% of people in the ACT aged 15-64 had a level of educational attainment equal to at least a bachelor's degree, significantly higher than the national average of 19%.

Canberra does not only have set goals for carbon emissions, but also for its ecological footprint and water use:

- **Ecological footprint:** The ACT's current per capita ecological footprint is 8.5 gross ha, which is very high, compared to the global average of 2,7 gross ha per person. The target is to reduce this by 30% by 2030, but there aren't any specific plans made to achieve this so far.
- **Water Use:** Reduction in per capita mains water use from 174,000 L (2003) to 130,000 L per year and a 20% increase in the use of recycled, storm water and rain-water both by 2030.

Currently, Canberra gets most attention for its effort to significantly reduce waste (see boxed text).

The benchmark indicates that Canberra does not score well on the planet-domain. Why than can it get such a high score on Mercer's Eco-City ranking? This is because Mercer first looks at 'quality of life' from an expat point of view and takes only indicators for 'local sustainability' into account: water availability, water quality, waste removal, sewage, air pollution and traffic congestion. Resource depletion and global impacts – related to the high ecological footprint – are not accounted for.

Power

Unlike other Australian cities, all land in Canberra is owned by the national government. This means that there is no freehold ownership of land, allowing the government to control more planning decisions.

Canberra knows two planning systems:

- National Capital Plan (NCP)
- Territory Plan (TP), managed by the ACTPLA

The Territory Plan divided national land from territory land. The ACTPLA is required to consult the public during

From a visitor's perspective

Canberra has an interesting structure, almost mathematical. This makes the city well organized and spatially unique, but yet it does not feel totally right. Canberra is a new town and appears to be designed from a helicopter-perspective. In a way, people are only background actors. This makes Canberra a somewhat cold-hearted city.

planning of the territory land. This supports bottom-up planning in a city that was originally planned top-down.

People

Canberra has a young average population age. The median age is 34 years, and only 9.8% of the population is aged over 65 years.

The average hours of volunteering by Canberrans are 56 hours per year.

Prosperity

Canberra has been fairly proactive about building a mix of public and private sectors into its economy. The presence of governmental departments has also played a role in the city's economy at both micro- and macro-scales. As of early 2010 Canberra's unemployment rate of just 3.9% was consistently among the lowest in the nation; the national unemployment rate was at that moment 5.3%.

Australia has supported the growth of a Green economy by taking a broad interpretation of the term. This has allowed them to use market-driven implementation to encourage the adoption of green technologies at multiple scales. The national government has also used the Climate Change Adaptation program to directly fund

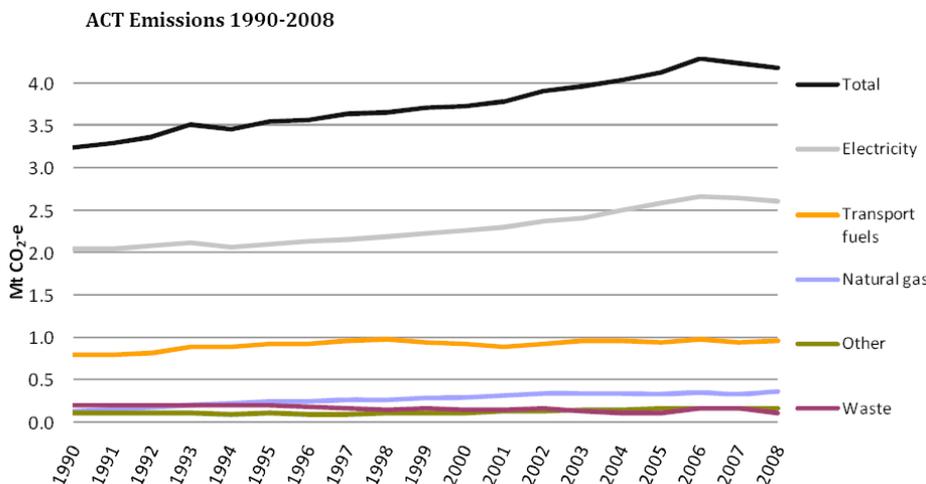


Figure 7: Carbon emission trend in the Australian Capital Territory

capacity-building projects and make assessments regarding the impacts of climate change.

The Payment for provision of Ecosystem Services (PES) scheme is an example of the government’s belief in market-based implementation. PES can be defined in terms of payments to undertake actions that increase the levels of desired ecosystem services, and can therefore be broadly defined within market-based approaches. PES provides some key opportunities to link up those involved in ‘supplying’ ecosystem services more closely to those benefiting from the same ecosystem services and in doing so, potentially provide cost-effective ways of developing new streams of financing.

Sustainability Lessons from Canberra

- Canberra has an advanced monitoring and evaluation policy, which makes that ambitions are quickly translated into concrete actions and implemented.
- Although the title ‘No Waste Strategy’ turned out to be far too ambitious, the high ambition served as a clear guideline for rapid change of policies and practices.
- Canberra is an expat city with rich inhabitants and therefore has a high global impact and resource use.
- The high ranking of Canberra on Mercer’s Eco-city ranking seems to be surprising - and indicates the limited value of such rankings. Canberra is ranked 21, well above for example Toronto and Amsterdam. The reason is that Mercer’s ranking is based on local sustainability issues (water availability, potable water, waste removal, sewage, air pollution and traffic congestion) and does not take into account issues with global impact such as energy use and as CO₂ emissions.

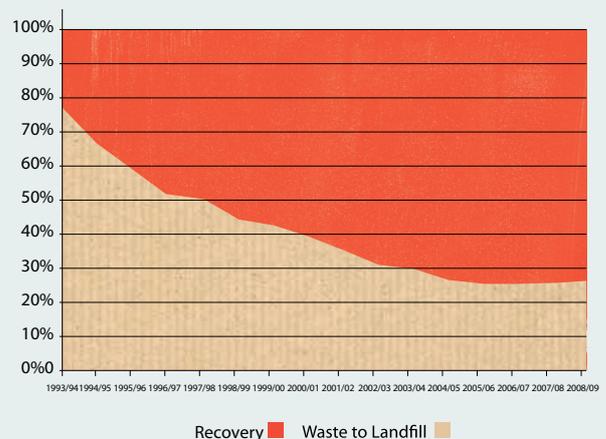
Canberra’s: No Waste Strategy

Canberra has developed a waste management strategy, after extensive consultation, to achieve a waste-free society by 2010. The major emphasis in the project was based on ‘community commitment’. Or as it was stated in the strategy: *‘The success of this strategy will rely largely on the acceptance and commitment of the community. Information programs aimed at raising awareness coupled with feedback to the community are essential. There will be rewards and recognition for successful community initiatives which reduce waste.’*

Since 1995, the ACT has doubled the amount of resources recovered and recycled from waste, rising from 185,000 tonnes in 1995–96 (or 42 per cent of waste generated) to more than 584,111 in 2008–09 (73 per cent of waste generated). While the ACT has achieved one of the highest rates of resource recovery in Australia at over 70 per cent, this rate has reached a plateau over the past six years. Moreover, this result is overshadowed by the almost doubling of the amount of waste since 1995, so the absolute amount of waste-to-landfill is only slightly decreased. Actions undertaken towards the ‘No waste’ ambitions:

- The ACT Resource Guide – a tool to help local government, industry and the general public identify and locate recyclers and markets for recycled materials
- ‘Eco-business’ - a series of workshops where business can learn how to improve environmental performance.
- Community recycling initiatives such as ‘Second-hand Sundays’, and public event recycling.
- New ‘waste pricing strategy’ to encourage recycling and re-use.

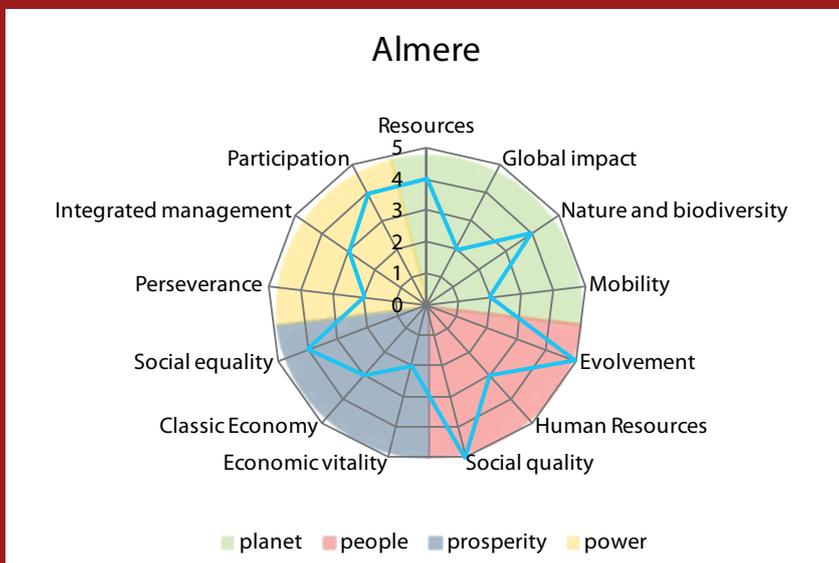
Rate of Resource Recovery in the ACT



The projected targets have not been achieved, but the share of waste to landfill has decreased steeply:



Benchmark Almere



On all indicators in the Planet-domain Almere has a moderate score, not being the worst but also certainly not being the best city in the benchmark. Especially in mobility, Almere scores low, because of the high rate of car ownership and use.

Almere gets high scores in the People-domain, because of cheap housing and a high score in volunteering. On the other hand, in terms of prosperity the city performs poorly: low income and very low R&D investments.

In the Power-domain, there is a tension between good intentions and the actual results. The general framework of the Almere principles is well established and Almere shows enthusiastic attention to sustainable urban development. On the other hand, the management style of the project-oriented organization still seems to be more focused on tempo and restriction of costs than on quality and sustainability.

3.7 Almere

City profile

Almere is the youngest city in the Netherlands: the first houses were constructed in 1976 (Almere Haven), and the city became a municipality in 1984. It's located 30 km east of Amsterdam. The city currently houses 190,000 inhabitants and has the ambition to double in size to 350,000 inhabitants in 2030. The city can be characterized as suburban: Almere is not the economic heart of the region, but a convenient place to live near Amsterdam and Utrecht.

With a view to the fast urbanization of the west of the Netherlands after the war and the corresponding risks of overpopulation and urban impoverishment, the Dutch government was looking for alternate locations to build new affordable homes in a suburban living environment. In 1968, a reservation in the land consolidation plans of the recently created polder 'Zuidelijk Flevoland' provided the space for the future suburb of the 'Randstad': Almere.

Being part of the 'Flevopolders', the city has been created at the drawing tables of the national agency for the 'Lake IJssel polders', the newly created land in the former Southern Sea. With their expertise in creating productive farmland, the founding fathers of Almere wanted to create a city on the basis of a green and blue infrastructure, almost like a mixed farm. Much against the, at the time dominant trend of making compact cities, the choice was made to create a low density, multinuclear city with suburban quarters surrounded by green spaces and corridors. These quarters were to provide a suburban living environment for the upcoming middle classes who had developed a growing demand for affordable, low-rise homes with a garden that weren't available in the Randstad (Feddes ed., 2008).

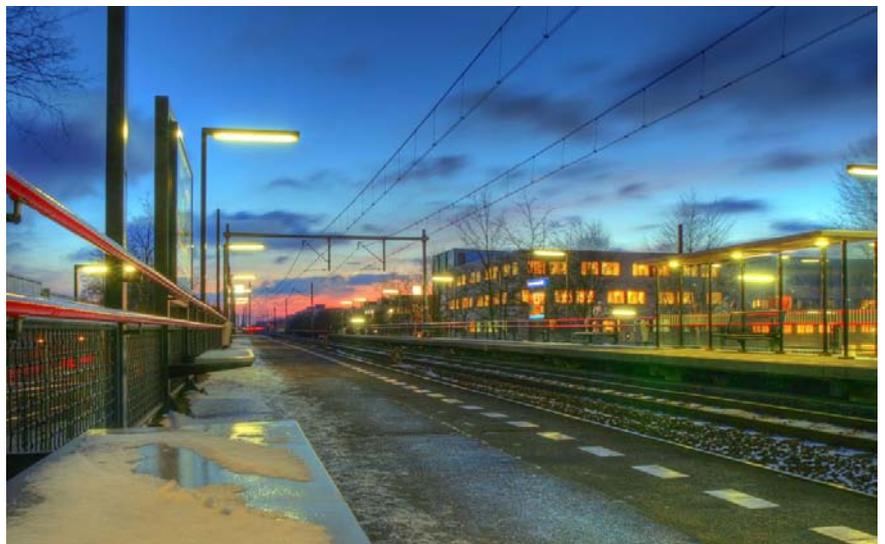
Against this background the first residential nuclei of Almere were built at an astonishing pace. In barely two decades no less than four city districts – in chronologic order: Almere Haven (start in 1976), 'Almere Stad', 'Almere Buiten' en 'Almere Poort' (under construction) – were built, providing homes to over 190,000 residents. With this fast growth Almere has fulfilled a valuable sustainability function by providing a large supply of affordable, low-rise family homes (90% of the total!) in a suburban, green living environment for the middle classes. Moreover, the fast growth of Almere proved to be an important precondition to keep valuable national landscapes like the 'green heart' of the Randstad open and green.

General information

City-name:	Almere
Country:	The Netherlands
Population:	190.699 (2010)
Area:	130,33 km²

The primary drive to build a 'green' suburb for the upcoming middle classes of the Randstad has also had some serious disadvantages from a sustainability perspective. First of all, the urban development of Almere is flawed by a lack of diversity. The focus on affordable low-rise family homes within an almost agricultural framework of green and blue spaces and corridors has not only lead to a relatively monotonous composition of the housing stock, but also to an urban population in which the lower middle classes are overrepresented and a natural living environment that's rather 'monocultural'. This lack of diversity can be a symptom of the young age of Almere; as a rule of thumb, urban diversity as with biodiversity is in most cases a matter of long-term development in which cities get the chance to mature. Nevertheless, the 'symptom' deserves serious attention. Second, the focus on providing homes has not been accompanied by a comparably strong focus on providing employment within the municipal boundaries of Almere. This explains why Almere up till now has developed into a predominantly residential suburb from which the biggest part of the residents commutes each day to work out of town.

Another 'flaw' in the development of Almere is the direct consequence of the fact that the new town and its infrastructure have been designed from the expectation that the 'Markerwaard' would be drained to become the third



Almere-Muziekwijk, Almere, The Netherlands. Photo by Martijn van Dalen

polder of Lake IJssel. The blueprints of the town districts and corresponding streets and roads contained projections of important infrastructural connections to the west of the Netherlands through the Markerwaard (Huisman and Van Latum (eds.), 2008). However, due to strong resistance from civil society, the third polder of Lake IJssel never came into existence. And with the omission of the Markerwaard, the corresponding connections to the west, especially to Amsterdam, also never came into existence. Due to this flaw of design, Almere now has only two connections – the ‘umbilical’ - to the west: the ‘Hollandse Brug’, a bridge with a national highway (the A6) and a railway, and the ‘Stichtse Brug’, a bridge with another national highway (the A27).

Planet

In the energy field Almere has made some significant steps forward toward sustainability. About 60% of the houses in Almere are linked to a district heating system, which is fed by residual heat from conventional power plants. Large-scale wind farming in Almere Pampus and along the A27 is delivering enough renewable energy for 27.000 households. Since May 2010 the Solar Island Almere, a renewable energy production site of 7000 m² of solar collectors (520), is delivering heat and warm tap water

to 2700 homes in the new neighbourhood Noorderplas-sen West. The project is the third largest example of a solar heat island worldwide. Sustainability in more general terms is also an important starting-point for the development of new neighbourhoods, like the Columbus Quarter (see textbox). Although the building stock in Almere is relatively new and built according to the national energy standards, there is still a lot to win in terms of energy conservation.

Storm water in Almere is kept separated from the wastewater of buildings by means of a special storm water system. After purification, the storm water is being discharged on the surface water. Wastewater from households, businesses and other activities is being transported via the separated sewage system to the central wastewater purification plant in Almere Buiten. After purification, it is being discharged on the canal, the ‘Lage Vaart’ (Almere, 2010a).

Almere has a well-equipped public transport network. Within the municipality 10 city buses travel around with a high frequency along dedicated bus lanes which are separated from other traffic. There are also regional bus routes to the metroregion of Amsterdam and to the provincial towns Zeewolde and Nijkerk. As the owner of the urban



Solar Island, Almere

The Columbus Quarter: in search for a sustainable neighbourhood

After the completion of the third town district Almere Buiten at the end of the 1990s Almere had a lot of new homes, but still little diversity. The development of Almere Poort, which started around the millennium, offered the opportunity to add more urbanity to the suburban character of the new town. Sustainability became an important criterion in the development of this fourth town district, which was planned to provide a/o 10,000 new homes and 115 hectares of business area. The Columbus Quarter, a neighbourhood within Almere Poort in which 400 new homes were planned, was designated to become the sustainable showcase of the district.

After some start-up problems an integral triple-P approach was chosen to develop the Columbus Quarter in a sustainable way. The municipality focused on the people's 'P' of social sustainability and as a consequence the project team put a lot of effort in exploring the possibilities to facilitate modern day schedules, life styles and consumer preferences with spatial planning. How to translate themes like social cohesion, liveability, social safety and child friendliness into practical spatial planning was the big issue here. At the same time, sustainability in the other P-domains of Planet and Prosperity were treated as important preconditions to realize social sustainability.

The most important change in the development process was the decision to organize a European tender instead of the traditional 'blueprint planning process'. In the Netherlands urban planners of the municipality traditionally plan spatial developments with a high level of detail. After the urban development plans have been worked out, market parties are invited to compete on a cost-effective execution of the spatial 'blueprints' with detailed quality standards. This practice safeguards a certain level of quality and continuity but limits creativity. In order to stimulate creativity and to challenge the market, Almere chose to organize a EU-tender for the development of the southern part of the Columbus Quarter. The northern part was to be developed by a number of private parties that had a building claim to the municipality.

The tender challenged the municipal policy makers to convert the traditional prescriptions of means into an assignment to realize sustainability goals in the three P-domains that leave a lot of room for the market parties to come up with creative ideas and measures. In the end private parties were invited to tender on goals like:

- The realization of 400 homes, from which
 - » Minimally 180 should be certified a 'solar homes'
 - » 175 should be affordable for low income households



- » 60-100% should be adaptable to new conditions and requirements in the future
- » 45 should be furnished as 'special care homes'
- The support and coordination of circa 5 projects of collective private commissioning for about 120 homes
- The development of buildings that provide room for (commercial) amenities like two primary schools, a sports facility, a nursery, a service centre for health and wellness and a community centre.

Important awarding criteria were the urban design (20%), the financing of the development (30%) and the sustainability vision of the tendering parties (10%). Similar goals and criteria were negotiated with the private parties who were to develop the northern part of the neighbourhood.

The results of the new approach and procedures were satisfying. The involved market parties came up with many fresh ideas and some high quality proposals to meet the demands of the municipality. The Columbus Quarter now has:

- A so called 'children's path', a safe, attractive and car-free route through the neighbourhood that functions as a sort of backbone of sustainability
- A water management system which cares for a separated, over ground conveyance of storm water while the waste water from the households is transported via the underground sewage system to the treatment facility
- 0,6 MWp of solar panels installed on roofs of homes
- 400 'sustainable homes' that perform well on comfort, energy efficiency, renewable energy and sustainable materials
- The best financial performance for urban development in comparison with the other districts in Almere.

Source: Almere, 2009

The Almere Principles

The municipality of Almere has elaborated the Almere Principles in close cooperation with William McDonough, one of the inventors of the Cradle to Cradle-philosophy. They build on the Hannover Principles that were developed by William McDonough and Michael Braungart in 1992 preparing for the World Expo 2000 in Hannover. On the occasion of their formal adoption in 2008 the Almerian city council has confirmed that the Almere Principles will be used as 'leading and guiding starting points for the development of the whole city [...].

The Almere Principles comprise the following 7 principles for a sustainable urban development.

1. *Cultivate diversity*
To enrich the city, we acknowledge diversity as a defining characteristic of robust ecological, social and economical systems. By appraising and stimulating diversity in all areas, we can ensure Almere will continue to grow and thrive as a city rich in variety.
2. *Connect place and context*
To connect the city we will strengthen and enhance its identity. Based on its own strength and on mutual benefit, the city will maintain active relationships with its surrounding communities at large.
3. *Combine city and nature*
To give meaning to the city we will consciously aim to bring about unique and lasting combinations of the urban and natural fabric, and raise awareness of human interconnectedness with nature.
4. *Anticipate change*
To honor the evolution of the city we will incorporate generous flexibility and adaptability in our plans and programs, in order to facilitate unpredictable opportunities for future generations.
5. *Continue innovation*
To advance the city we will encourage improved processes, technologies and infrastructures, and we will support experimentation and the exchange of knowledge.
6. *Design healthy systems*
We will utilize 'cradle to cradle' solutions, recognizing the interdependence, at all scales, of ecological, social and economic health.
7. *Empower people to make the city*
Acknowledging citizens to be the driving force in creating, keeping and sustaining the city, we facilitate them in pursuing their unique potential.

bus lanes the municipality is responsible for the development and maintenance of the infrastructure: the lanes, the bus stops and the terminals. All homes and amenities are within a maximum of 400 metres or 5 minutes walking distance from the nearest bus stop in Almere. Besides the buses, Almere is equipped with no less than 5 train stations: Almere Muziekwijk, Almere Centrum, Almere Parkwijk, Almere Buiten en Almere Oostvaarders. Within a few years even a sixth station will be added: Almere Poort. In nearly all modes of public transport within and around Almere passengers can make use of one public transport chip card to pay for journeys.

Despite the well-equipped public transport network Almere has, even compared to Dutch standards, a high level of car ownership and car use. The suburban character of the new town and the extensive Dutch infrastructure for car traffic can explain this paradox. Within the municipal boundaries of the low density, suburban city, space is still abundantly available, a/o for parking places. Due to lack of employment within the municipality most residents are obliged to commute out of town to their working places. And while the Dutch roads and highways offer by

far the largest and most extensive infrastructure to the automobile, most people choose to commute by car. This state of affairs, combined with some bottlenecks in the infrastructure – especially the Hollandse Brug, the only connection to the west – contributes much to the current traffic problems around Almere, varying from serious congestion problems to global warming and air pollution in the region.

The strategic choice to develop Almere as a polynuclear city, in order to provide a green suburb for the Randstad, has resulted in a relative abundance of green and natural areas within and around the residential districts. The original development plans for Almere started from a clear design hierarchy that put landscape above the urban districts, meaning that the green landscape shaped the framework for the lay out of the city districts. In due course of time this design hierarchy has somewhat diluted. Buildings appeared more important than the founding fathers intended and some green areas have been removed to make place for new houses and businesses. This was also a consequence of the fact that there was no legal framework in place with which the original land-

scape structure could be enforced. The Structural Plan for the Green Areas of Almere (1978) was never officially accepted. Nevertheless, nowadays Almerians can enjoy substantially more green and blue landscapes within their neighbourhood than most other urban residents in the Netherlands (Feddes ed., 2008).

Power

For quite some time urban planning in Almere has been primarily focused on the production of houses. This planning was characterized by a strong top-down approach that emphasized quantity rather than quality. The development of the district of Almere Buiten in the 1990s presents a good example of this approach. The district was planned and developed entirely top down according to the traditional 'blueprint model'. Around 2000 the top-down approach slowly began to change into a more participatory approach with a stronger orientation on urban quality and sustainability. This change in approach is reflected in the developments of new districts and neighbourhoods like Almere Poort with the Columbus Quarter and Homerus Quarter (see also textbox Columbus Quarter) and, more recently, Almere Hout Noord. Participation has been brought to another level by the program *'I build my house in Almere'* that provides opportunities to residents to buy a plot and to design and build their own home in Almere.

The process of change eventually culminated with two events: the unanimous adoption of the Almere Principles (see textbox) by the municipality in 2008 and the articulation and endorsement of the 'City Manifest 2.0' (in Dutch: Stadsmanifest 2.0) by a large number of local and regional NGO's, public organizations and businesses in 2009. The Almere Principles are articulated and adopted as an 'inspiring framework' for the development of the city (see textbox), which now stands on the brink of yet another

jump of scale in the near future. The principles were formulated after the example of the Hannover Principles, in cooperation with William McDonough, one of the inventors of the Hannover Principles and also of the Cradle-to-Cradle concept. The Concept Structure Vision Almere 2.0 (Almere, 2009a), in which the municipal vision on the intended enlargement of Almere is outlined, can be viewed as a first translation of the Almere Principles. By signing the City Manifest a wide variety of public and private partners from civil society have confirmed their support for the Concept Structure Vision Almere 2.0 and thereby also for the Almere Principles. The municipality and the signatory parties have agreed that a representative group of the City Manifest partners is going to participate actively in the urban development processes of Almere.

With their strong emphasis on diversity, urban integration of nature, healthy systems and participation the Almere Principles certainly provide direction and inspiration for the next enlargement of Almere as is being outlined in the policy agenda 'Almere 2.0' (see also section 6.1). But the proof of the pudding is in the eating. The shift toward a more participatory approach with more emphasis on quality and sustainability for example is quite fresh. The municipality of Almere has a strong project-oriented organization and old top-down reflexes are still present. This can be a hurdle to the realisation of the sustainability ambitions, because the management style in general still seems to be more aimed at tempo and restriction of costs than at quality and sustainability. Within such a context participation can easily become an opportunistic tool to acquire public support for top-down visions and measures of the municipality. A big challenge is therefore to integrate the Almere principles into all the arteries and capillaries of the whole municipal organization.



People

Much due to the suburban character of the new town with many affordable, low-rise family homes, the demographics of Almere provide the opposite image of Canberra. While highly educated elites with relatively high incomes dominate the population statistics of Canberra, these groups are poorly represented in Almere. High numbers of young people, a relatively low education level and a large number of low middle incomes characterize the population of Almere. The overrepresentation of the lower middle-income groups in Almere is also a consequence of the equality ideal, which has been quite dominant among urban planners in the Netherlands during the second half of the last century. Building for the elites was 'not done' for a long time and the composition of the housing stock of Almere is one of the silent witnesses of this taboo.

While there's a limited diversity from a socio-economic point of view, Almere has a lot of cultural diversity to offer. The new town succeeded to attract various groups from the middle-income strata of the Randstad, a/o by offering a diverse supply of low-rise family homes and by communicating openness to diversity in PR-campaigns. As a result, Almere now is the second most cultural diverse city in the Netherlands with a rich corporate life and a high level of participation in the urban community (Feddes ed., 2008).

Prosperity

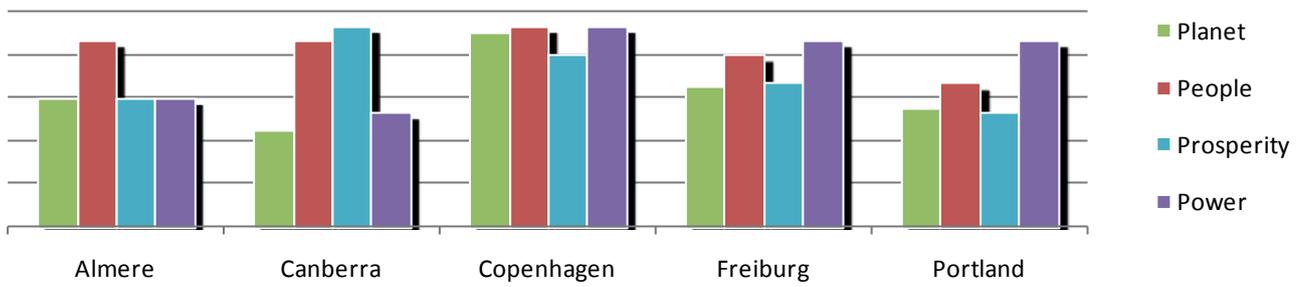
The current (2011) unemployment level of 7% of Almere is on average compared to the other cities described in this report but scores somewhat higher than the Dutch standard of 6%. A distinctive characteristic of the urban economy of Almere however, is the lack of employment within the municipal boundaries. While most cities are an economic attractor in the region, Almere is not: no less than 62% of the labour force works outside Almere, mostly in Amsterdam (33%). This proportion is unsustainable in the long term, especially with a view to the new enlargement plans for the city. Against this background the recent plans to enlarge the city with 60.000 new homes have consequently been attended with the ambition to create 100,000 new jobs in Almere.

Just like local employment Almere has to make up arrears in the field of amenities. Despite a fast growth of employment in amenities during recent years, the level of amenities in Almere is still relatively low as compared to Dutch standards. In 2009, the total number of people employed in amenities per 1000 residents was in Almere 19% lower than the Dutch average. This figure is related to employment in education, health care, human services, leisure, sports, commercial services, catering and retail. The backward starting position and the ongoing population growth has hindered Almere to catch up with the other cities in the Netherlands (Willems, 2010).



Comparing cities

Benchmark Results



3.8 Benchmark results

This figure summarizes the results of the benchmark. For each city it shows the final mark per capital domain (people, planet, prosperity and power). Unfortunately, insufficient data are available for Tampines to make a quantitative assessment of this city. Therefore, the city gets only a qualitative assessment and is not listed in the benchmark results.

The scores for the capital domains are based on the scores of the related stocks, which are in turn based on the values of the selected indicators⁷. See the spider diagrams of the cities in the previous sections and appendix 1 for more details.

Copenhagen is the overall-frontrunner, with highest scores on all domains except prosperity – where Copenhagen is second best. In Freiburg, power and people stand out because of the successful community-driven planning. Portland is often considered as the leading sustainable city in the USA, but the effect of their inspiring policies is compensated by the high average consumption of its citizens. So the picture of Portland is mixed: it scores really well for an *American* city, but because the American way of life is not very sustainable for the planet and people domains, the performance of Portland as compared to European frontrunners for urban sustainability is 'sub top'.

Canberra is a new town and an expat city: with rich inhabitants, offering a good quality of life but also causing a very high global impact because of for example high energy consumption and car use. Almere gets high scores in the people-domain, because of cheap housing, and high score in volunteering, but the results on the other domains are average.

To highlight some of the differences with the greatest impact on the final scores:

- Renewable energy production ranges from 4% (Freiburg) to 19% (Copenhagen);
- The per capita carbon emissions in Canberra increased with 4.3% in the period 1990-2010, while at the same time Copenhagen managed to reduce its per capita carbon emissions with 30%;
- Copenhagen and Canberra also differ most in density: Canberra 440 inhabitants per square kilometre, Copenhagen 5630.
- Copenhagen and Canberra are both rich cities: GDP/capita in Canberra is \$71k, in Copenhagen \$60k. In contrast, Freiburg's GDP/capita amounts only \$32k;
- Compared to Copenhagen, Canberra and Portland have 4 times as much CO₂ emissions per capita, Freiburg 3 times and Almere 2 times;
- Portland and Canberra are car-dependent cities, where over 80% of the working population travels to work by car. Almere performs slightly better: 70% travels to work by car. In Copenhagen and Freiburg, this is only 30 to 40%;
- The unemployment rate ranges from 3.5% (Canberra) to 10% (Portland).

The difference between Copenhagen and Canberra, both rich cities, shows that sustainability policy can compensate for the negative effects of high consumption. On the other hand, Freiburg and Portland show that a high prosperity level is not a necessary precondition for successful sustainability policies.

The scores in the benchmark are useful to compare the different cities. But in order to understand the differences and learn from the cities, one needs the additional information on the context, as described in the previous paragraphs.

⁷ The stocks represent the main properties (e.g. global impact and economic vitality) of the domains, the selected indicators make it possible to assign scores to the stocks. The values of the indicators are compared and scaled to scores between 0 and 5. The marks for the stocks equal a weighted average of the score for its indicators. The final mark per capital domain is defined as the average marks of its stocks.



Lake Point Tower, Chicago, Illinois

Chapter 4

Best practices in sustainable urban development

4.1 Introduction

Four themes are of special interest to Almere and are therefore elaborated further. These selected themes are: mobility & land use, energy efficiency & renewable energy, productive urban landscapes and water management & climate resilience.

For each of the themes best practices are identified and one case is described in detail. The following sections introduce experiences from Curitiba, San Francisco, Detroit and Chicago. Each section also lists a short overview of other good practices that relate to the theme concerned.

Curitiba

4.2 Mobility and Land Use

Introduction

The urban transportation and land use system of Curitiba is in many ways a fine example of sustainable urban development. It has proved to be a (cost-) effective solution in dealing with the typical 'growing pains' of Latin American cities in the twentieth century: high rates of urbanization, growing transport congestion problems, urban sprawl, mass unemployment, poverty and inflation. Curitiba nowadays is the ecological capital of Brazil with a level of prosperity that is well above the Brazilian average.

From 1950 to 1980 Curitiba was the fastest growing city of Brazil. The capital of Paraná State 'jumped' from a 150.000 people in the 1950s toward a scale of 1,6 million city dwellers today. During the 1950s and 60s the existing city plan, the Agache Plan from 1943, was not implemented fully. As a consequence the city began sprawling beyond its physical limits. At the same time Curitiba was confronted with a rapid expansion of auto mobility, which caused growing congestion problems (Lundqvist, 2007). The con-

ventional Brazilian way to deal with this problem was to accommodate the growing car traffic by making costly investments in heavy infrastructure. Nevertheless Curitiba took quite a different development path by adopting a visionary master plan in the early 1960s.

A visionary master plan and a visionary mayor

In response to the dominant trend of developing huge projects with borrowed money, a group of young architects led by Jaime Lerner began advocating for a new, low cost development approach for the city. The mayor appeared susceptible for this argument and sponsored a competition for a Curitiba master plan. He also organized a round of consultation with the city dwellers to discuss the best entries to the competition. After this he returned to the group of architects with the request to amend the best plan into a fully-fledged master plan, taking into account the views of the people. These architects formed the staff of the Curitiba Research and Urban Planning Institute, the IPPUC, which was established in 1965 to coordinate the implementation of the master plan.

The leader of the group of architects, Jaime Lerner, was appointed mayor for the first time in 1971. With interrup-



Just start!

The power of the 'just start' principle can be illustrated by the Curitiba experience with the introduction of 'pedestrianised' shopping streets in the 1970s. In 1972 mayor Jaime Lerner proposed to pedestrianise Rua 15 de Novembro by closing it for car traffic. Shopkeepers resisted out of fear for losing customers and reduction of profits, but they accepted Lerner's proposal to give it a try for thirty days. After closing the road at 6 pm on a Friday night workmen worked all weekend for a complete 'make-over' laying new pavements, installing street lighting, kiosks and planting thousands of flowers. The success was immediately visible. The next week the street was crowded with more customers than before and shopkeepers from the surrounding streets soon delivered a petition to the town hall to plea for inclusion of their streets into the scheme.

Source: Geo Factsheet, number 151

tions he served for three periods as mayor of Curitiba. In 1995 he became governor of Paraná, a large (435 km²) and predominantly rural state of which Curitiba is the capital. In both positions Lerner actively guided the process of implementation of the master plan, a/o by organizing on a regular basis think tank sessions with a selected group of experts to reflect on problems and solutions related to the development of the metropolitan area. 'Respect for people'; 'keep it simple'; 'no experiments'¹ and 'just start' became important guiding principles of Lerner and his team.

The third large development plan of Curitiba that was created in the 1960s, is still in effect. As a fruit of an, at the time yet embryonic school of integrative urban planning, it had four main objectives:

1. Changing the emerging urban sprawl pattern into a more sustainable urban growth path that builds upon a high quality and affordable public transport network;
2. Decongestion of the central urban area and preservation of the historic city centre;
3. Creation of large green areas within the city boundaries to improve the urban water management system as well as the liveability of the city;
4. Stimulating the local and regional economy, a/o by improving the infrastructure and accessibility of the city (Lundqvist, 2007).

A spider web structure to organize urban growth around public transport

One of the constitutional elements of the master plan was the designation of urban growth corridors along the five arterial roads that were constructed (60 km in total) between 1974 and 1982. As the adjective already suggests, these roads form the arteries of the urban transport system, which is characterized by a clear hierarchy between the different modes of transportation. Priority is given to affordable, high quality public transport, a/o by reserving the two central lanes of the arterial roads exclusively for the special Curitiba express buses that travel with a 'subway-frequency' from the outside of the city to the centre and vice versa. Local buses and cars are obliged to make use of the local lanes that are parallel to the central lanes. To promote safety and efficiency, all lanes on the arterial



¹ The underlying idea is that good ideas should not be implemented as an exception but as part of mainstream urban planning and development.

Public Transport: cheap, efficient and comfortable!

The spiders' web road structure is just one way of ensuring that everyone in Curitiba has easy access to public transport. The entire system is designed to provide efficiency, comfort and easy, affordable access to public transport. Passengers of the buses only need to buy one ticket at a low single price regardless the length of the journey they make or the number of times they change buses. The bi-articulated buses with their three compartments are specially designed for Curitiba, a/o to provide room for more passengers, up to 270 per bus. At the tube shaped bus stops passengers buy their ticket in advance and enter the buses through the doors that are at the same level as the platforms. At the same time passengers exiting the vehicle use the doors at the other end of the bus. Compared to conventional bus systems, the Curitiba system is 3.2 times more efficient. This efficiency saves lots of time and money.

Sources: Lundqvist, 2007 and www.curitiba.pr.gov.br/idioma/ingles/progressoonibus

Some figures:

- Curitiba's Public Transportation Integrated Network maintains 285 urban bus routes and 100 regional bus routes
- The network covers 5000 bus stops, 351 tube stations and 29 integrating bus terminals
- Some 1280 buses are operational on a daily basis within the urban area of Curitiba. Each working day these buses transport no less than 2,040 million passengers.
- 75% of all commuters in Curitiba makes use of the public transport system
- 28% of all bus passengers commuted before by car. Thanks to this modal shift, fuel consumption for commuting has decreased by 25%
- The bus transportation system is by far the cheapest system for urban public transport (about 0,2 mln US\$/km) compared to light railway (about 20 mln US\$/km) and underground metro (about 90-100 mln US\$/km).

roads only allow for one-way traffic in- or outward the city centre. The road system of Curitiba was completed into a 'spider web' by the addition of five concentric roads (covering 185 kms in total) around the city centre and a further 300 kilometres of feeder roads that connect to the regional (public) transport system.

A comprehensive framework of land use legislation effectively contained the urban sprawl and stimulated a more structured urban growth pattern around the public transport network. The framework was elaborated in 66 laws and decrees that were adopted between 1969 and 1992. Several zoning laws control the sprawling by limiting high-density developments to the urban areas near the arterial roads. Buildings along these structural axes are allowed to have a floor area six times larger than the plot size. In the areas close to the arterial roads densities rise up to 400 houses per hectare. The maximum density decreases with the distance from the arterial roads and the public transport network. It is clear that this road hierarchy stimulates the use of public transport within the city. The road hierarchy has been further elaborated by assigning special functions and priorities to:

- Roads which provide connections to the arterial roads (high priority)
- Collector streets that are designated for commercial activities
- Connector streets that provide linkages between the arterial roads and the industrial city.

The Curitiba way of mobilizing urban capital

One of the biggest challenges for the city planners in the early days was to find an affordable mode of public transport for Curitiba. The express bus system, which was specially designed for Curitiba, appeared to be by far the cheapest solution (see also textbox), particularly because it builds upon existing infrastructure. The operational costs of the public transport network are kept low by a smart public-private partnership. A municipal organization, the URBS, is responsible for the building and maintenance of the infrastructure of the bus system and also for policy development. Ten private companies who all have their own transport district are exploiting the bus routes. The URBS collects the revenues from ticket sales and divides these among the private companies on the basis of the number of kilometres driven by their buses. This is an important key to prevent the abolishment of bus routes due to lack of profitability. Curitiba's public transport system as a whole is profitable. No (federal) subsidies are needed for the operation and maintenance of the system.

Curitiba has shown to be quite innovative in mobilizing 'dormant', social and physical capital in the city for sustainable purposes. When mayor Lerner and his team began implementing the master plan Curitiba had a huge waste problem, especially in the 'favelas' where large amounts of waste accumulated because of bad accessi-

Sol criado

Another innovative example of mobilizing dormant, or better 'virtual', urban capital is the Curitiba market of 'sol criado', which means literally: created surface. This market has been created by the municipality utilizing the rules for maximum height of buildings in areas at a certain distance from the arterial roads. The municipality only acts as an intermediary that brings together supply and demand on the market place for 'floor surface' in urban areas with a certain scarcity of this 'commodity'. When an investor, e.g. a hotel owner, wants to add floors to her hotel beyond the maximum height in the area, she can buy the needed square meters on the market for 'sol criado'. The supply of these square meters is being provided by entities that are able to sell a virtual surplus of square meters because their objects do not (need to) raise sky high. One can think of a foundation that owns a monument with only one floor, or the administrator of a city park. The revenues of these sales of virtual surplus surface can thus be used to (co-) finance sustainable developments like the restoration of a monument or the development and maintenance of a city park. The extra costs for the hotel owner delivers value for money while the restoration of the monument or the development and maintenance of the park not only preserves or raises the quality of the neighbourhood but also the value of her real estate: the hotel.

The local market for sol criado has shown to be quite a successful strategy to enlarge the amount of green urban spaces that are easily accessible for residents and visitors. Curitiba has now 26 urban parks and woodland areas and some 1,5 million trees that promote the quality of the urban living environment. The access of the 'Curitibanos' to open green landscape has risen from about 0,5 m² in 1970 to ca. 54 m² per inhabitant nowadays; that's well over the WHO-standard of 16 m² per inhabitant.

Sources: Geo Factsheet, number 151

als for school children or food from farmers in the region. The programme appeared to be a big success: people soon began to collect garbage from the streets while at the same time learning to distinguish between the various kinds of solid waste (Lietaer, 1999). The programme is still in place. Nowadays there are even co-operations of 'waste hunters' who are able to get good prices in return for their collection of specific kinds of renewable garbage like iron, tin, paper, glass and plastic.

Sustainability Lessons from Curitiba

- The urban development of Curitiba is an example of inspiring, courageous and tenacious leadership by the former mayor Jaime Lerner and his team of experts of the Curitiba Research and Urban Planning Institute.
- They succeeded in elaborating a holistic and content-wise vision on the interaction between land use and (public) transportation *and* in translating this vision into clear and operational guidelines and measures for daily practice.
- Visionary and courageous choices like the spatial priority for public transport in the Curitiba infrastructure, the closing of shopping streets for car traffic and the development of the market for 'sol criado' paid off well in terms of efficient and high quality public transport, liveability, spatial quality and a relatively high level of urban welfare. These direct and indirect benefits have contributed much to a growing and currently high public support for the Curitiba transportation and land use policies and also to the proud identity of the city as 'the ecological capital of Brazil'.
- From a more technocratic perspective, especially the express bus system within the spider's web infrastructure stands out as a striking example of a low-cost, very efficient and high quality system for public transport: 2 million passengers per day at only 1 percent of the costs of a light railway system!
- Curitiba has showed to be very innovative and effective in the mobilization of urban capital for sustainable purposes. Especially the market for 'sol criado' has proved to be an effective innovation to mobilize urban capital – in this case: financial reserves of urban developers – for the purpose of improving the spatial quality of the city as a whole. It is a way to make potential 'free riders' contribute financially to the development and maintenance of urban commons (parks, monuments, social welfare schemes etc.) from which they also benefit.

bility of the slums and lack of money. To deal with this problem they introduced a programme that allowed city dwellers to collect garbage in their neighbourhood in return for special coins with which they could pay for products and services like a bus ticket (that allows for a day travelling by public transport in the city), writing materi-

Other examples – Mobility and infrastructure

- To reduce congestion and the use of cars, the cities of **London**, **Oslo** and **Stockholm** introduced a **congestion charge**. The result: a cut of existing traffic by 5% to 20%, less congestion, better air quality and less CO₂-emissions.
- **Stockholm** is seen as leader in environmentally friendly transport, by combining three important building blocks: the ability of residents to easily access public or private alternatives that are green, safe and convenient; government policy that encourages use of such alternatives; and the application of green technology solutions to vehicles and infrastructure.
- **Seattle** has a network of **High Occupancy Vehicle (HOV) lanes**. These are highway lanes reserved for commuters who share rides, in the form of multiple occupancy personal vehicles and buses. In addition to offering faster travel times, the system provides an incentive for taking the bus and carpooling. The network serves about 35% of commuters on the freeways in only 19% of the vehicles in the peak periods and directions. The average HOV lane carries about 1.5 times as many people as the average general purpose lane during the peak periods in the peak direction.
- **Calgary's electric light rail** is powered by wind. Strong westerly winds coming from the Rocky Mountains led to the development of a twelve 650 kW turbine wind farm to the south of Calgary. The council took the decision to buy commercial wind power as the primary source of the C-train's electricity at an additional cost of around CAN 0.005 per passenger trip. The greenhouse gas emissions from operating the train are now effectively zero.
- **PARK(ing) Day** is an annual global event where citizens and artists collaborate to temporarily transform parking spaces into 'PARK(ing)' spaces: temporary public places, like parks or playgrounds. The project began in 2005 when an art studio in **San Francisco** converted a single metered parking space into a temporary public park.
- **California** implemented the **Parking Cash Out** programme in 1992. It requires employers who provide subsidized parking for their employees to offer cash allowance in lieu of a parking space.
- **Budapest** held a '**Clever Commuting Race**' where local VIPs demonstrated the efficiency of travelling via public transport, by 'racing' from a suburban district to the city centre.
- **Brussels** supports 'Voiture avec Passagers', a formalised **hitch-hiking** scheme



San Francisco

4.3 Energy efficiency and renewable energy

Introduction

San Francisco was one of the first cities in the world with a Climate Action Plan (San Francisco, 2004). An important driving force behind the adoption of this plan in 2004 was the necessity to introduce alternatives to the old, large-scale and polluting power plants that had a big share in the energy supply of the city. The goals of the climate and energy plan are: reduction of greenhouse gas emissions by 20 percent below the 1990 levels in 2012, realization of energy self-reliance and improved air quality. These targets have to be achieved via promotion of:

1. energy efficiency in buildings
2. transmission alternatives
3. alternative vehicle fuels, and
4. generating electricity with renewable energy.

Climate and Energy Plans and Programs

Energy efficiency has been identified as one of the main problems of the 21st century and it has therefore been given a high priority in the climate and energy policy of the city. Next to a Sustainability Plan, a Climate Action Plan was made to reduce the use of electricity and natural gas in homes and businesses. In addition to that, San Francisco also drew up an Electricity Resource Plan for reducing energy use next to programs like the Power Savers Program and Peak Energy Program. The last one reduced peak electricity demand by 12 megawatts so far.

The electricity resource plan

An important focus of the energy resource plan is on reduction and management of energy demand through energy efficiency and load management. 'Peak shaving' appears to be a cost-effective way of reducing electricity load. Smart grids and renewable energy techniques are also used to reduce and manage energy demand. Smart grids are installed in large building complexes or shared between buildings. The smart grid makes the attached buildings less dependent from the central grid. Electricity that is produced by on site sources of renewable energy (or electricity that is bought for a low fixed price) is first 'shared' with others within the smart grid. This reduces the need to purchase extra, more expensive electricity from the central grid and sometimes it's possible to sell electricity back to the central grid.

Another line of action within the framework of the energy resource plan is the substitution of the old, large-scale and polluting power plants by small and mid-size power



Dismantling of the old polluting power plant.

er plants of about 50 megawatts. These kinds of power plants provide high levels of reliability and can be built at various locations. This Plan provides for production of the required megawatts needed to help shut down for instance the old (1929) polluting electricity plant, Hunters Point by 2004 and the Potrero Unit 3 (250 MW) by 2008.

A third line of action in the energy resource plan is the stimulation of distributed generation (DG). This is about small-scale, on-site generation of electricity. On-site generation includes options like fuel cells, packaged co-generation and micro-turbines. DG generators typically range from 10 kilowatt to 5 megawatts in size and usually support single facilities. The objective of the energy resource plan is to install 72 MW of DG by 2012.

With respect to the grid the energy resource plan provides for an upgrade of an existing electricity grid line and a new transmission line to be built on the Peninsula to safeguard long-term reliability in the energy supply of San Francisco. The city is asked to support these improvements. The city is also requested to commit to the realization of a continually increasing percentage of renewable sources to feed into the transmission grid. Improved air quality as a consequence of the substitution of fossil fuels by renewables is seen as a measure of the success of the Plan. Air quality will therefore be more effectively monitored.

As part of the environmental justice policy of the company SFE takes responsibility for seeing that impoverished communities in the Southeast of San Francisco will benefit from the programs developed through the energy resource plan. SFE monitors and reports on bills for low-income residents and the dispersion of energy program benefits, including training, employment, and business development.

For the Medium Term (2006-2012) the energy resource plan proposes tailor made solutions for specific issues in the city, such as the development of sufficient new resources to permanently close the polluting power station Potrero Unit 3. Furthermore the plan provides for extra steps to meet the commitment to reduce greenhouse gas emissions by 20%. Key measures are:

1. improvement of the grid for the city through completion of the Jefferson to Martin transmission line;
2. accelerated development of solar electric generation with the target to install 50 MW by 2012
3. development of additional renewable energy, cost-effective co-generation, and clean distributed generation technologies.
4. mitigation of peak demand by maximizing investments in energy efficiency and demand reduction (a goal of maintaining peak demand at a level no higher than 909 MW, the average of 1996-2000).
5. development of at least 150 MW of new wind energy or other renewable energy capacity that can be imported into San Francisco.

Power Savers Program

In 2002-2003, with funding of the California Public Utilities Commission, SF Environment and its partners helped over 4,000 small business owners to reduce their lighting electricity loads by upgrading from older fluorescent and incandescent lighting to newer, energy efficient fluorescent lighting.

The Peak energy program

In 2003-2005, SF Environment (SFE) – in partnership with PG&E, the energy company – reduced 1 MW of electricity demand through serving residential customers by means of cost-saving measures in their homes and replacements of inefficient equipment in businesses throughout the city.

Renewable energy

San Francisco's policy objective for renewable energy in the city is to realize a supply of 50 MW by 2012. Several projects and programs in the city show that the city is seriously picking up the challenge. Examples in case are the 675 kW solar system on the roof of the Moscone Convention Center, the \$ 100 million solar bond initiative (see also textbox) and the support of the development of technologies like tidal power and cogeneration.

A Solar Energy Incentive Program (GoSolarSF) encourages residents and businesses to install more solar power on their properties. Combined with the Californian Solar Initiative and federal tax credits, GoSolarSF can cover up

Solar Energy Bond Initiative

'In November 2001, voters in San Francisco cast their ballots in favor of becoming a world leader in solar electricity. Seventy-three percent of voters approved of Proposition B to allow San Francisco to issue \$100 million in revenue bonds to finance enough renewable energy to supply about 25 percent of the government's needs. If fully implemented San Francisco will become the largest single producer of solar energy in the U.S.

In a separate and equally interesting initiative, voters also allowed the city to issue other bonds for renewable energy projects in the future without their approval at the ballot box. Proposition H allows general revenue bonds to be issued in order to finance additional renewable energy projects.

The goal is to have 10-12 megawatts of new solar energy and 30 megawatts of wind energy online in a year or two. According to recommendations solar arrays would be installed on schools and other city-owned facilities. Wind turbines would be placed on city- and county-owned properties. Of the \$100 million, \$50 million will go to solar energy projects, \$30 million to wind energy projects and the remainder will be dedicated to energy conservation and administrative costs. Because the bonds will be repaid through energy cost savings from these installations and from energy-efficiency improvements at city facilities, the measure is not expected to result in higher taxes.'

Source: <http://www.newrules.org/energy/rules/green-citizenship-vs-green-pricing/solar-energy-initiative-san-francisco-ca>

to half of the costs of a solar power system. Solar water heating systems are also eligible for (federal) subsidies.

Currently, there is a 30% Federal Renewable Energy Tax Credit (a tax advantage) that can be utilized to cut the costs of for solar water heating systems installed before the end of 2016.

Ocean power is a new and emerging option for renewable energy that San Francisco is seriously exploring. Expectations are high: ocean power is expected to play a large role in the supply of clean energy in the coming years.

In its role as a leader in the use of alternative transportation fuels San Francisco now has more than 800 alternative fuel (predominantly biodiesel) vehicles in its car fleet. Many more project are undertaken with biodiesel.



Solar energy site, San Francisco

Valuable applications of heat surpluses from cogeneration are the deliveries of steam to commercial canneries and of hot water to health clubs and commercial laundries. Energy from cogeneration is also used to power modern chiller and refrigeration technologies that use heat instead of mechanical energy to provide cooling.

Special energy projects in San Francisco

- *Debt-Financed Solar Water Heating Retrofits for Affordable Housing.* The city cooperates with Enterprise Community Partners in a pilot-project to keep housing affordable with the help of a new financing model for solar water heating. This model uses the energy savings to pay for the solar systems.
- *GreenFinanceSF Program.* The City conducts an out-reaching marketing campaign targeting previously untapped markets that could benefit from property assessed financing, for solar water heating systems in particular.
- *Commercial Solar Power Purchase Agreement Model.* The City develops a new solar PPA model to take advantage of federal incentives such as New Market Tax Credits and Community Reinvestment Act Credits and to expand the market for midsize solar system installations.
- *Solar Financing for Public Schools.* The San Francisco Unified School District, SF Public Utilities Commission and a third party cooperate in combining a unique blend of incentives for a new solar PPA structure for public schools at a per kW price below current PPA market rates.

Sustainability Lessons

- The issue of municipal Solar Energy Bonds in San Francisco proved to be a smart lever to mobilize dormant urban capital for a sustainable purpose (investments in renewable energy). The explicit support of voters for the issue of \$ 100 million in revenue bonds paved

the way for strong and consequent long-term policies on renewable energy.

- 'Peak shaving' appears to be a cost-effective way of reducing the energy load on the grid.
- By finding the right partners, San Francisco can offer a solar heating model that's financed by the energy savings it creates.
- Experience from cities around the world show that ESCo's are effective in bringing down energy use, and Climate Alliances can mobilize companies and citizens to seriously cut their CO₂-emissions.

Detroit

4.4 Productive urban landscapes

Introduction

A roof can be so much more than just the cover of a building. The empty space on top of the roof can be used for harvesting of food, biomass and solar energy or for cleaning the air. In this way, the urban landscape is made productive by adding extra functions. The same goes for open spots, gardens, squares, roads, soccer fields and other spaces: their potential added value is ready for harvesting. The most prominent type of productive urban landscapes is urban agriculture.

Many cities rediscover urban agriculture as an important element of their ambition for sustainable urban development. Vancouver, for example, sees urban agriculture as a way of "enhancing the City's food security and reducing the City's ecological footprint by reducing 'distance to fork' and of 'supporting and encouraging an environmentally and socially sustainable activity' (Morris & Tapp, 2008).

Urban green space, which can include urban agriculture, has been shown to generate numerous social and environmental benefits and has been posited as a key element of urban sustainability. Advocates of urban agriculture have argued that an increase in local food production would diminish a city's reliance on resource-consumptive imported foods (Colasanti, K. A., & Hamm, M. W., 2010).

Urban agriculture is nothing new. A few centuries ago, Paris had intensive farming within its city boundaries, using compost from the abundant horse manure. Now, an estimated 800 million people are growing vegetables and raising livestock in cities, especially in developing countries, harvesting no less than 15 percent of the world's food supply (Newman and Jennings, 2008). The Garden Resource Program Collaborative in Detroit is an inspiring example of the potential of Urban Farming nowadays.

Other examples – Energy

- **Upper Austria's** Regional Market for Third-Party Financing by **ESCOs** links municipal and private energy efficiency projects with financing in order to remove the barrier of high upfront investment costs. This programme originally linked municipalities with investors interested in financing energy efficiency renovations in public buildings, and was later expanded to link building, lighting and renewable energy projects in the public and private sectors with energy financing. TPF projects look to Energy Service Companies (ESCOs) to provide pre-financing energy-conservation schemes. ESCO guarantee that energy costs will be reduced by a certain percentage after energy improvements are made. Subsequent energy savings are then used to cover investment costs over an agreed pay-back period (typically 10 to 15 years). ESCOs are responsible for financing energy-saving measures as well as implementation, operation and maintenance. Several other cities have a similar model for energy-saving programmes in public and private buildings.
- **London** has a prescriptive planning policy regulation that requires developers of all **new buildings** in the Borough of Merton to plan to generate at least 10% of their predicted future total annual energy demand (for heating, cooling and electrical appliances) using renewable energy equipment that is integrated into the building design or located on-site. The concept was deemed to be successful and has since been taken up by the Greater London Council and many other municipalities across the United Kingdom.
- Since the 1990s, a limited number of cities and metropolitan regions have introduced **emissions trading programmes**: Los Angeles in 1994, Santiago (Chile) in 1994 and Chicago in 2000. In these programmes a variety of objectives are targeted. The Regional Clean Air Incentives Market (RECLAIM) programme in Los Angeles targets reductions of NO_x and SO_x. The city of Taiyuan in China issued 'management rules' for Total Emissions Control, including a provision for 'permit exchange,' a form of emissions permit trading.
- In October 2008 the **Berlin Climate Alliance**, a joint initiative between the city and local companies, was launched with the aim of encouraging co-operation on climate change projects. Other cities, like Ghent and Tilburg, have started similar alliances.
- One of London's key energy ambitions is the **London Array**, a planned 1,000 mw offshore wind-turbine project in the Thames estuary. When completed, it will be the largest offshore wind farm in the world, occupying 233 square km. The project will supply enough power for 750,000 homes — about one-quarter of the homes in the Greater London area.
- **Energy scenario tools like GRIP and Quintell.** Changing the energy mix of a city or region is a crucial element in urban or regional strategies for a sustainable energy supply. Problem is that cities and regions only have limited influence on the energy mix. Quintell is a good tool for this. One other tool, which is in line with international standards and IPCC, norms is GRIP, the Greenhouse gas Regional Inventory Protocol (www.grip.org.uk). It is a tool to make inventories for yearly comparisons but also between regions. Many cities have used GRIP for planning their new energy mix. Once installed it is an easy accessible tool that can also be used by politicians and stakeholders to identify their ideal energy mix. It sets guidelines for future developments and can be adjusted as technology evolves. In EU 15 major cities are using this tool among them the city Rotterdam as well as cities in Asia and the US like Sacramento near San Francisco and it is spreading.



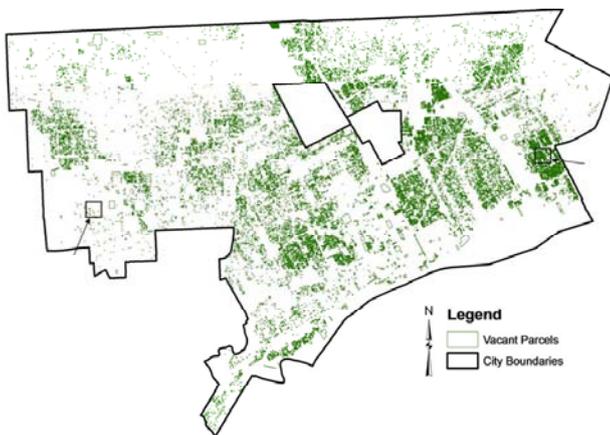
Case: Garden Resource Program Collaborative, Detroit

Detroit was once the 4th largest city in America and it held the title of 'Motown' (Motor Town) because most of America's cars came from there. 40 years later Detroit's population has dwindled from a high of 2 million people to just over 800,000, with a poverty rate of 26%. The average price for a home in Detroit is \$15,000, the lowest in the United States. With so many empty spaces, criminals have no shortage of hideouts and drug factories.

There are between 30 and 40 thousand abandoned lots in the Cities of Detroit, Hamtramck, and Highland Park, approximately 15,000 ha in area. The vacant property in Detroit covers nearly the same space as the entire city of San Francisco. New York, which has more than twice as much land as Detroit, has only an estimated 4,450 ha vacant area, according to its planning department. All of the vacant land in the city brought the founders of the Garden Resource Program Collaborative to the idea to turn the wasteland into free vegetable gardens and feed the poor people who live nearby.

The Garden Resource Program Collaborative

The Garden Resource Program Collaborative (GRPC) is a partnership of four organizations: Greening of Detroit, Detroit Agricultural Network, Michigan State University and Capuchin Soup Kitchen/EarthWorks Urban Farm.



Vacant parcels in Detroit (Colasanti, K. A., & Hamm, M. W., 2010).

These are diverse organizations that started to cooperate for a joined ambition. These organizations nowadays work in partnership with over 185 other organizations and hundreds of individuals to support urban gardening and farming initiatives in Detroit, Hamtramck, and Highland Park.

In 2003, the GRPC started off with 80 total gardens - 41 family gardens and 39 community and school gardens -



Eagle Street Rooftop Farm, Detroit

and has grown rapidly to 1300 gardens in 2010. Formerly unused family gardens are now being used for farming. Each garden has its own destination. Some are reserved for local gardeners, others are open to the public, and most are open for visits by other gardeners. This helps to create a bond between gardeners throughout Detroit. Some of the land is leased from the city on a year-to-year basis, while other land is privately owned or just used until the owner wants to develop.

The family and community gardens pay a small fee to join a cluster group that coordinates local resources, provides them with seeds and tools, and gives assistance and education. All through the growing season a campaign 'Dig In, Detroit' pairs volunteers to community gardens that need extra help or have a major expansion planned.

Actors involved

Because the GRPC is a collaborative project, each partner organization contributes to the success of the program. The Detroit Agricultural Network's board and other volunteers contribute many volunteer hours towards the GRPC. Approximately 3 full time Greening staff members do work for the Garden Resource Program Collaborative. In addition, there are 4.5 Americorps positions. Earthworks



Garden has 3.5 full time employees, each of whom dedicate a portion of their time towards the GRPC by growing plants and teaching workshops. Finally, MSU extension has approximately 1 full time position dedicated to GRP, between Extension, the Student Organic Farm staff, and the Mott Group for Sustainable Food Systems. The program evaluator is also from MSU.

Added value

Providing the population with food isn't the only benefit of Detroit's gardens. The urban farms are strengthening the community and can create new jobs. They're used for the education for youth, and form a possibility for activation of unemployed and rehabilitation of offenders. The farms have a positive impact on the liveability of the city: it prevents the depriving view of abandoned gardens and improves the cities biodiversity and air quality.

Financing

Similar to other food-for-the-poor-projects, the majority of the funding (80%) comes from foundations. About 12% comes from corporate sponsors and 3% from individual supporters. 5% of the income is earned, mainly by selling products at the market, the revenue of small fees paid by the gardeners and educational series (Chadderton et al., 2009). A Community Food Project grant helped fund the

beginnings of the Garden Resource Program Collaborative.

Potential for up scaling and mainstreaming

The approach has already rapidly grown towards a significant scale in Detroit. The success of the movement has even led to ideas of commercial farming possibilities, embraced by some, disputed by others. Hantz Farms – initiated by local real-estate millionaire John Hantz - is planning to create the world's largest urban farm in Detroit, owned, operated and staffed by Detroiters. It plans tightly packed rows and greenhouses, where it will raise fruit and vegetables as well as plants for landscaping.

Other cities learn from the approach, and start similar collaborations to support urban farming. Within shrinking cities in general, green infrastructure, including urban agriculture, is a way to 'revitalize urban environments, empower community residents, and stabilize dysfunctional markets' (Schilling & Logan, 2008).

A garden resource programme is not only relevant for shrinking cities. If residential yards and spaces around other buildings, as well as non-traditional cultivation sites like rooftops and balconies are considered, a significant level of production may well be achievable in other urban areas as well. (Colasanti, K. A., & Hamm, M. W, 2010). For example, Peters, Bills, Wilkins, and Smith (2002), find New York has the capacity to provide 37.5% of the state's total annual vegetable intake, while maintaining surplus levels of some crops.

Research from Germany points to community gardens as a good use of land in de-industrialized areas, not only because of the social and ecological benefits, but also because these uses require minimal up-front investment and do not impede later edificial development (Rosol, 2005).

In more general terms, the GRPC is a great example of the added value for different parties to join under a higher, joined ambition. In this case, the way of achieving the goal of feeding the poor has many other positive effects. Finally, it shows that a simple leading idea can motivate many people, by appealing to their interests, needs and abilities.

Sustainability Lessons

- Land in Detroit is abundantly available, which certainly contributed to the success. But regular cities also have high potential for harvesting in the yards, public spaces, rooftops and balconies.
- The leading idea is simple and inspiring. It fits the needs and abilities of many people and therefore it could mobilize so many participants.

- The partners already had experience in similar projects, but by working together they could make this collaboration flourish.

Other examples – productive landscapes

- **New York City** holds the example of **rooftop farming**: the Eagle Street Rooftop Farm is a 6,000 square foot green roof organic vegetable farm located atop a warehouse rooftop in Greenpoint, with a sweeping view of the Manhattan skyline. During the growing season, farmers at Eagle Street Rooftop Farm supply a community supported agriculture program, an onsite farm market, and bicycle fresh produce to area restaurants.
- More than 50 per cent of **Havana's** fresh produce is grown within the city limits. After the stop of the Soviet food imports in 1989, local food production has rapidly grown. The national and local government formed an **Urban Agriculture Department** in 1994, to support the upcoming grass-root initiatives. This department first focused on securing land use rights for urban gardeners and committed itself to provide land to all residents who wanted to grow food in the city. Now it advises and supports city farmers. In 2003, more than 200,000 Cubans worked in the expanding urban agriculture sector.
- **San Francisco's farmers' markets** serve as a success story in the sustainable food movement in the United States. Partnerships between the California Department of Food and Agriculture, small-scale farmers, county and municipal governments, and other organisations have made possible this more efficient, less wasteful, and fairer method of food distribution.
- Both **London** and **Gothenburg** used a participatory envisioning process to formulate a **food strategy** and action plan for the city, which is now the basis for strategic planning and food policies.
- Several regions and cities, including **Detroit** and **Portland**, have convened a **Food Policy Council (FPC)**. A FPC is an organization that aims to examine and improve a local food system through public policy interventions. A FPC is made up of many stakeholders from within a community's food system, including farmers, consumers, government officials, businesses, and non-profit organizations.
- **Vancouver** created 2,010 new **community shared gardens** as a legacy for the 2010 Olympics. Similarly, **London** announced a program to support identifying land and providing resources to create 2,012 garden sites by the 2012 Olympics.
- **Gussing** is a small town in a forest-area, and is an example of productive landscape for **energy production**. In the early 1990s, Gussing began building a district heating system fuelled by locally available biomass in the form of trees. As it became more successful, they expanded the system and incorporated technology to produce electricity and heat at the same time, through a process called co-generation. Because of this leadership in community-based renewable energy, they have become home to the European Centre for Renewable Energy and have also explored the use of solar cells, solar panels, and biodiesel. Gussing cut its green house gas emissions to 93% below its 1995 levels. Wanting to protect its forests, the once-sleepy Austrian village uses scrap wood as fuel and has explored both solar and bio-fuel for future renewable energy projects.





Chicago

4.5 Water management and climate resilience

Introduction

'Biking the boulevards in Chicago is a green pleasure rather than what it used to be: a daring ride through the asphalt jungle that the streets had become due to blight and lack of funding and civic responsibility. Now trees line the streets of Chicago, corners are bursting with native plants, and folks are picking up the trash in their communities.'

With these words Claudia Louise Presenti summarizes her impression of the metamorphosis Chicago (ca. 3 million residents) has went through during the 25 years that she has been living and working as a librarian/teacher in the West and South Sides of the city.² The metamorphosis Presenti refers to is the result of two decades of a well-orchestrated strategy that was developed by mayor Richard M. Daley and his Cabinet.

The greening of Chicago

'To remake Chicago as the greenest city in America,' that's the mission of mayor Daley since he took office in 1989. At that time, many of the green streets and parks that Daley knew from his childhood had not survived the development of Chicago into an industrial city. Learning about the environmental benefits of trees (see textbox) and encouraged by his wife, an enthusiastic gardener, he started his efforts to improve the quality of urban life in 1989 by launching the Green Streets Initiative. This program has since then produced some remarkable results, including the planting of 583,000 trees and the construction 73 linear miles of green medians using urban tolerant plants and trees. This contributed to an increase of the tree canopy coverage of Chicago from 10 to 13.8 per cent between 1994-2006.

A cabinet-level commitment to the greening of Chicago

The responsibility for the development and implementation of green infrastructure initiatives has been bestowed on the Department of the Environment (DOE). This cabinet-level agency operates with four divisions and a broad environmental mandate on the following policy areas.

1. The lead division within DOE, the *Natural Resources and Water Quality Division* works to protect, restore and enhance the natural resources of Chicago, a/o by means of public programming, greening neighbour-

² <http://www.sustainlane.com/us-city-rankings/articles/logan-square-resident-describes-greening-and-preening-in-chicagos-neighborhoods/ICP32ABR33WQ9HTV8COHB4IVRTOI>

hoods and testing and implementing sustainable storm water practices.

2. The *Urban Management and Brownfields Redevelopment Division* is mainly responsible for the redevelopment of urban brownfields, a/o by the introduction of sustainable storm water management and green infrastructure practices.
3. To advance compliance with the environmental provisions of the Chicago Municipal Code is the policy goal of the *Permitting and Enforcement Division*. Application of the best environmental practice is the bottom-line of all permits issued by this division, which has extensive enforcement authorities to ensure compliance.
4. As part of cabinet-level agency, the *Community Programming and Education Outreach Division* has peer relationships with partner agencies such as Planning, Parks and Public Works. These relationships coupled with the mayor's commitment safeguard a high visibility and priority for water management projects, for example in competition for funding with other municipal initiatives. It also helps finding public facilities to test new practices and technologies.

Chicago's Water Agenda

Building upon the success of various pilot projects Mayor Daley stimulated in 2003 the adoption of Chicago's Water Agenda, which was published by the Department of the Environment (DOE). This agenda makes a strong case of sustainable water management and outlines an action agenda. Below we analyze the main activities and results with respect to the four policy lines of the Water Agenda (Chicago, 2003).

- *Conserving water resources* – Conscious of the added value of having access to Lake Michigan as the resource that provides 95% of the fresh water supply in the US, the Water Agenda outlines several actions to neutralize and prevent the wasteful use and trade (!) of the local groundwater reserves that provide 40% of the yearly renewal of the lake. Among the implemented actions are water infrastructure upgrades, exemplary water reducing measures in city buildings (e.g. disconnection of downspouts from the sewer system) and helping businesses to save money by developing innovative water conservation plans.
- *Protecting water quality* – Although the water quality in Chicago has increased significantly during the last decades, serious concerns remain, a/o about the contamination of natural waters and beaches related to recreation and (international) shipping. Measures include an education program to protect the health and safety of people who recreate on the river and promotion of legislation to prevent discharges of polluted ballast water from ships into the Great Lakes. But the biggest concern with respect to the water quality is

Chicago's Green Roof Program

The use of green roofs got a big boost by the construction of a 20,300 square foot demonstration roof on City Hall in 2001. Besides setting iconic examples like this Chicago stimulates the application of green roofs with multiple incentives like the sponsoring of installations and demonstration sites, expedited permitting, density bonuses and Green Works Awards. Developers who cover more than 50% or more than 2,000 square feet of a roof with vegetation can get a density bonus. If a developer wants to save time in getting a permit from city hall he/she can submit a so-called Tier III project to the Green Permit Program. If the project is eligible for a LEED gold certification, the permit approving time is being halved. This appears to be a strong incentive while time is money for developers who must pay (high) interest on their construction loans. Every two years mayor Daley presents Green Works Awards to businesses, non-profit organizations, schools and public agencies for environmental achievements in the categories Green Buildings, Green Practices and Green Products.

Source: http://www.werf.org/livablecommunities/studies_chic_il.htm

the discharge of large quantities of untreated wastewater from the municipal sewage system into the rivers and canals and even into Lake Michigan during intense storm events. The strategies of the municipality to deal with particularly this problem have turned Chicago into a real frontrunner in the field of sustainable water management. This accomplishment is addressed in the next point.

- *Managing storm water* – 'The City of Chicago recognizes the importance of the built infrastructure in terms of managing storm water. [...] However, the City believes that the 'built' infrastructure alone will not meet all of our needs for managing wastewater and storm water. Managing storm water and protecting the quality of our water resources will require a combination of upgrading our 'built' infrastructure and creating a 'green' infrastructure.' This quote from the municipal Water Agenda (Chicago, 2003) describes the nucleus of Chicago's integrative water management strategy. This strategy is integrative, because it's about much more than just preventing sewers from overflowing into natural waters. The strategy is also motivated by several other aims varying from reducing air pollution to mitigating the heat island effect and from using rain water as a resource to beautifying streets and creating real estate value. All such aims come together

in municipal initiatives like the successful Green Roof Program, the Green Alleys Program and the Rain Gardens Program (See also textbox).

- *Outreach and Mobilization* – To promote stewardship among Chicago area residents Chicago implements a public outreach program that promotes sustainable water management through various media outlets and interpretive features. The municipal Greencorps program is an innovative concept to promote involvement of residents with this public cause. To 60 community groups Greencorps offers technical and organizational assistance (e.g. instruction in creating rain gardens) and also various plant and garden materials such as rain barrels, cedar benches and compost. Moreover, Greencorps constructs community gardens with native and drought resistant plants to increase and demonstrate the added value of onsite retention of storm water.

Sustainability Lessons from Chicago

- Chicago provides a stimulating environment for new ideas and innovations, with requirements that lift ‘the bottom line’ and rewards for those ‘who get it right’.
- The city works with action plans in which high ambitions are translated into practical actions and measurable outcomes.
- The municipality has an outreaching approach to mobilize the community not only with inspiring new ideas, but also with concrete technical, organizational and sometimes financial assistance
- Sustainable practices are smartly linked to green economics, e.g. by recognizing *and* measuring the positive financial impacts of a resilient, attractive, green infrastructure on a/o real estate value and public health.
- The mayor, his cabinet and DOE show inspiring leadership, a/o by ‘setting the example’ on city buildings and infrastructure.



Sheep Meadow, Central Park, New York City

Chapter 5

Critical success factors for sustainable urban development

On the basis of the analysis of the frontrunner cities and the best practices in the previous chapters we've determined the following critical success factors for sustainable urban development.

1. A holistic approach that puts people first
2. Inspiring and tenacious leadership
3. Operational sustainability guidelines that offer direction *and* room for initiative
4. A smart mobilization of urban capital for sustainable purposes
5. A radical approach to promote sustainable system innovations

5.1 A holistic approach that puts people first

Nearly all the examples analyzed in this report show the power of an inspiring vision on sustainable urban development. These visions start from a human perspective and address what is important to the people in the city. The visions are strongly linked to prominent societal issues like quality of life and healthy environment. Moreover, the visions are holistic because they also address less tangible needs: people also want a good place for their children to grow up, feel connected to their neighbourhood, enjoy culture, nature and attractive landscapes, et cetera. The general sustainability lesson here seems to be: put people first and bare in mind not to reduce urban development to meeting the so-called *basic* needs of residents; meeting all those other 'needs of the heart' *at the same time* is what makes an urban development sustainable.

Visions on urban development that start from this anthropocentric, holistic point of view are traceable in cities like Portland, Copenhagen, Freiburg, Tampines and

Curitiba. By putting people first in a holistic way, these cities succeed in changing the modern tradition of sectoral optimization into a more sustainable strategy directed at improving the quality of the city as a whole, that is: as an integrated system of people, planet, prosperity and power. Such approaches appear to be inspiring as well as resistant against socio-political changes and fashions for many years.

5.2 Inspiring and tenacious leadership

Realizing a sustainable urban development not only demands an inspiring leadership, it also demands courage, ambition and a huge amount of perseverance, mainly because it requires changing prevailing ways of working and resisting strong opposition from vested, short-term interests.

The stories in this benchmark frequently show leading characters that play a key role in inspiring and mobilizing large groups of people for sustainable urban development. Some of them were able to do this from a formal position of power like for example the mayors of Curitiba and Chicago. In other cases strong driving forces for sustainable renewal came from innovative individuals on lower levels, e.g. employees of local governments or NGO's. Without exception they are surrounded by a small group of frontrunners that is able to mobilize the platoon, a/o thanks to their shared passion for sustainability and complementary competencies, leading to a 'virtuous cycle' of motivation and synergy.

One key competence seems to be the ability to translate long-term goals into short-term actions that quickly produce visible benefits for the residents while they also contribute to the long-term goals. Various examples show the added value of this approach. In times of crisis residents in Detroit not only got the chance to use vacant gardens



Vauban , Freiburg

to produce their own food and earn a small living. They were also provided with seeds, tools, assistance and education. Not so difficult to organize, but very effective! In Curitiba the resistance of the shopkeepers of Rua 15 de Novembro against the closing of their street for car traffic changed into enthusiastic support because the transformation of the street was done almost overnight and with a designer's eye for spatial quality, which was promoted a/o by planting thousands of flowers in the street. The attractive new outlook of the street benefited them immediately thanks to the growing number of customers for their shops who apparently had great appreciation for the transformation. Instead of redeveloping the old brewery site of Carlsberg in 'one strike' this new district in the centre of Copenhagen is working strategically with temporary interventions that build upon the added value of the cultural heritage in the area. This strategy almost immediately adds up to the liveliness of the area and thereby contributes to the acceptance and enthusiasm of the stakeholders for the process of sustainable urban renewal.

5.3 Operational sustainability guidelines that offer direction and room for initiative

A common characteristic of successful sustainability visions is that they are translated into a few operational principles that provide clear guidelines for action in daily practice – guidelines that are so powerful that they hold for decades. Examples of such principles are provided by cities like Portland, Curitiba and Tampines where au-

thorities have set clear regulations to limit urban sprawl and to concentrate high-density developments near public transport transits. These guidelines serve as a source of creativity for sustainable design. The same cities have shown in many ways that clear priorities to public transport, cycling and walking and also to an abundant availability of green space within the city boundaries are genuine principles of sustainability: these principles have proven to be beneficial for people, planet *and* prosperity. Cities like Copenhagen and Freiburg not only attach high priority to participation and co-creation with residents and businesses in the urban development; they translate this priority into the clear principle that such participation is serious business that needs to be facilitated in a professional way, whether it is by means of citizen's dialogues (Copenhagen) or a special forum (Freiburg).

It appears essential that a vision and the corresponding principles for sustainable urban development leave room for flexibility. 'Stay away from prescriptive details' seems to be the adagio here; one must be able to tell 'the story' in an inspiring nutshell. Flexibility is a pure necessity while striving for sustainability, not only to be able to adapt to new developments and circumstances but also, even more important, to be able to welcome and support bottom-up initiatives. Detroit and Copenhagen present show cases to illustrate the added value of this kind of flexibility. The Garden Resource Program Collaborative wouldn't be such a success without the willingness of the city of Detroit to provide legal room to residents to cultivate the vacant gardens in the city. By moulding the famous Finger Plan of Copenhagen into a Metro loop the authorities are able to 'go with the flow' of economic and cultural differentiation that has gained strength in the urban nodes during recent years.

5.4 A smart mobilization of urban capital for sustainable purposes

Several cities have succeeded in mobilizing 'dormant' urban capital for sustainable purposes. They all identified potential sources of wealth within their city and subsequently found smart levers to activate these latent, social, physical or financial 'assets' in support of sustainable urban developments. In financial terms, the cities do not stick to the question 'what does it cost?' but also address the question 'what are the benefits? – and to whom?'. The

development becomes more feasible by making the benefits explicit and involving the parties that benefit.

- In the Clean Energy Works Pilot Project Portland identified the monthly payments of residents for their utility services as a dormant asset that can be mobilized to improve the energy efficiency of existing houses. The lever they used to mobilize this asset was a small charge on the utility bill in combination with the omission of upfront payments.
- In Singapore residents are allowed to use their current service pension as a collateral for a mortgage on their house. This has raised among residents the level of homeownership.
- When people in Tampines and Curitiba collect garbage separately from their neighbourhood they are rewarded in a local currency with which they can pay for local products and services like food, education or a bus ticket. The dormant asset here is a big working force that is able and willing to deliver this community service. The smart lever is the local currency.
- Curitiba has created the market for 'sol criado' where developers can buy extra floor surface (the latent asset) beyond the maximum building height in certain urban areas (a lever). The extra square metres can be bought from entities that have a virtual surplus of square metres like foundations that administer local monuments of urban parks. They can use the revenues for sustainable purposes like restoration of the monument or maintenance of the park. The paying parties benefit from their extra investments because the value of their real estate remains the same or rises (the other lever).
- The collaborative in Detroit is successful in facilitating people to grow food in vacant gardens, thus mobilizing 'dormant' sources of human (unemployed people) and physical (vacant gardens) capital to add sustainable values (a/o local food and a new source of income) to a city in crisis.

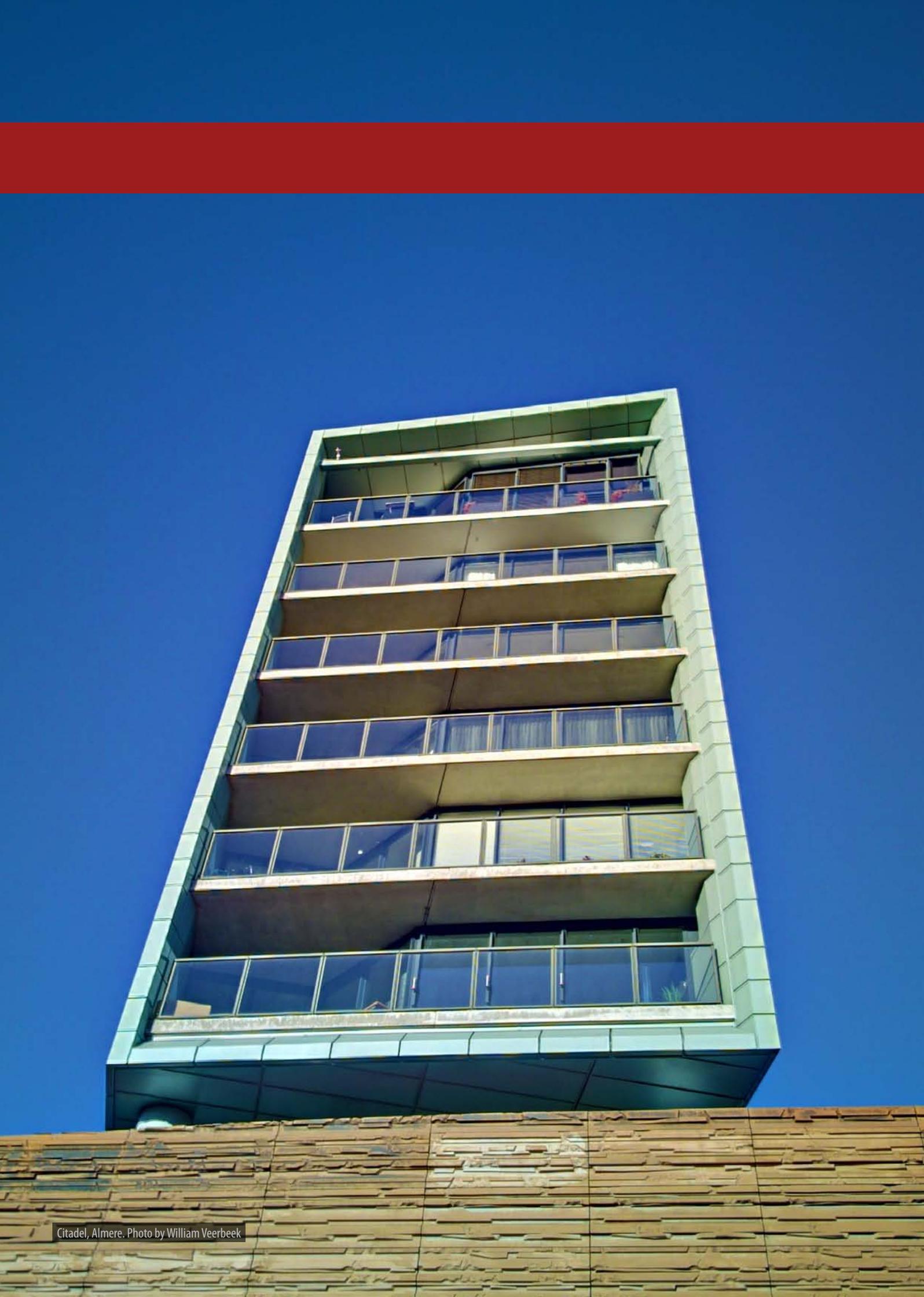
5.5 A radical approach to promote sustainable system innovations

A striking similarity between the most successful examples of sustainable urban development presented in this report (Copenhagen and Freiburg) is the radicalism in their aim for sustainable system changes. The usual pat-

terns of thinking and organizing need to be broken. This is not as obvious as it may seem. Due to the container character of the concept, a radical strive for sustainability does not obviously lead to more sustainability. There are still many choices to make. So we want to know what kinds of radical choices are needed to get a high performance in sustainable urban development. If we take a closer look at the best practices of Copenhagen and Freiburg, their approach can be characterized as follows.

- *Radically holistic putting people first.* Both cities show a fundamental change in the way of thinking, doing and organizing shifting from a short-term, mono-disciplinary and top-down approach toward integral cooperation between disciplines and co-productions with other parties. By shifting from doing things less bad toward bring about positive impacts in all domains of life (4P's) they create a both challenging and mobilizing movement. See also section 5.1.
- *Rather uncompromising about ecological sustainability objectives.* See for instance the high priority both cities attach to public transport, the serious investments in sustainable energy and the high, energy efficiency standards for buildings they legally impose.
- *Quite creative in linking ecological benefits to social and economic benefits.* The residents of the renewable energy producing houses in Vauban financially benefit from the selling of their energy surplus to the grid against the competitive feed-in tariff. With its high quality public transport, its well developed infrastructure for cycling, its focus on urban place making, its attractive green spaces and its identity as a sustainable city, Copenhagen functions as a regional magnet for highly educated residents and innovative companies.
- *And last but not least: Copenhagen and Freiburg are both very professional in involving frontrunners and stakeholders in the urban development process.* In both cities participation has moved to the highest levels of cooperation and 'co-creation'. With serious investments in professional participatory processes such as citizen's dialogues and Forum Vauban, Copenhagen and Freiburg are able to mobilize not only the multidisciplinary expertise of local residents, students, entrepreneurs and employees, but also their energy and commitment to the strive for a sustainable urban development.

It is this kind of radicalism that appears to be the most successful in realizing a sustainable urban development.



Citadel, Almere. Photo by William Veerbeek

6.1 The Almere Challenges

Since 2001 there have been extensive discussions on the further expansion of Almere. The underlying incentives are quite similar as in the early days when the founding fathers were drawing up the first development plans for the new town in the Flevopolder. The need to meet the growing demand for new homes in the Randstad has not yet dwindled and there is still quite a strong consensus that urban sprawl of the Randstad into valuable landscapes like 'het Groene Hart' and the 'Utrechtse Heuvelrug' should be prevented. And with ample space available, Almere still offers the opportunity to meet both demands. But unlike the old days, Almere is no longer satisfied with a subsidiary role as a suburb of the Randstad. The new town now wants to become a complete and sustainable city with an 'urban' level of amenities, good connections with the rest of the Netherlands and a healthy and valuable nature and landscape (Almere, 2010b).

Against this background, on January the 29th 2010, the Dutch national government, the municipality of Almere and the province of Flevoland signed an Integral Framework of Agreements on Almere (IFA) on a threefold increase in scale of Almere. The signatory parties want to reinforce the competitiveness and sustainability of the Northern Randstad by generating a quantitative *and* qualitative 'jump of scale' in the 1. nature, 2. accessibility and 3. urbanization of Almere.

1. The natural jump of scale entails the ambition to improve the green and blue infrastructure of the municipality, especially by improving the ecological and recreational quality of the Lake IJ/Lake Marker, which is now declining.
2. The pursuit of a jump of scale in accessibility is mainly directed at improving the regional connections of Almere with Schiphol (the national airport), Amsterdam, Lelystad and Utrecht.

3. The next jump of scale in the Almerian urbanization has been translated into the ambition to meet the still growing demand in the Randstad for new houses in a more integral way than in the past, that is: by creating not only 60,000 new homes but also 100,000 new jobs in the city. The growth of the municipal housing stock implies a similar growth in the number of residents from the current 190,000 to 350,000 in 2030. To prevent further congestion problems and to be able to offer an attractive living environment to the new residents, the IFA-partners have attached high priority to the creation of new jobs in Almere. Moreover the signatory parties have agreed that the expansion should build upon the polynuclear character of the city, providing new urban and suburban residential milieus that enhance the diversity of the housing stock of the Northern Randstad (IAA, 2010).

The pursuit of a threefold jump of scale conform the Almere Principles raises a number of serious sustainability challenges to Almere and the other signatory parties to the IFA. Below we identify four main sustainability challenges for Almere with reference to the analyses in the former sections. Without exception, each challenge raises a litmus test for the IFA-partners to bring the Almere Principles into practice.

1. *How to reconcile the ambition to become a complete, low-dense, polynuclear city with the aim for social, economic and ecological sustainability conform the Almere principles?*

Almere wants to grow into a complete city maintaining its polynuclear, suburban character with a low density. At the same time, Almere wants to design healthy systems utilizing Cradle-to-Cradle solutions that combine the urban and natural fabric and that promote social, economic and ecological vitality and diversity of the city. This dual ambition raises serious sustainability challenges while low-dense, suburban cities in wealthy countries like the Netherlands are

notorious for their relatively squandering use of fossil energy and other (non-)renewable resources, contributing to global warming, air pollution and exhaustion of limited natural resources. This is to a large extent a consequence of the fact that low-dense, suburban cities tend to promote a relatively high level of car ownership and car use. Up till now the development of Almere has confirmed this common experience. As Newman and Kenworthy point out, car-dependency also has socio-economic disadvantages: cars waste space, make people spend more of the household income to transport and have a negative effect on the expenditures in the local economy (Newman and Kenworthy, 2007).

This is not to say that the challenge is unfeasible for Almere. On the contrary, low density has also some serious advantages as it offers more space and better access to resources for (semi-) autarkic living with the help of technologies like recycling of organic wastes and waste water, urban agriculture and production of renewable energy. The purpose here is merely to notify that low-density is a complicating factor, which deserves serious attention, knowing that the aim for especially ecological sustainability is already a huge challenge for every city whether they are dense or not. As such it is a challenge that demands visionary leadership and perseverance.

2. *How to create 60,000 new homes and 100,000 new jobs that add sustainable value to the development of Almere as a whole?*

The intended construction of 60,000 new homes offers the opportunity to apply state-of-the-art sustainable technologies with significant economies of scale. The challenge here is to cease this opportunity with both hands by utilizing the best renewable (local) materials and techniques to build smart houses that are able to deliver sustainable services to the community like production of renewable energy and food, purification of polluted air, conveyance of storm water and recycling of (organic) waste and waste water. This way Almere could become a frontrunner in harvesting sustainable products and services from its abundant spaces, instead of the traditional squandering suburb. And if there are financial and organizational bottlenecks that impede the application of state-of-the-art sustainable technologies, then it is the challenge not to drop the technologies but to look for financial and organizational solutions to these impediments.

A serious risk of the expansion strategy is that the existing neighbourhoods in Almere decline due to the migration of local residents and/or the relocation of (financial) resources to the newly constructed districts. Because of the scale of the intended expansion,

it can also threaten the quality and sustainability of the inner cities of the Randstad. Almere seems well aware of this risk and has already chosen for a strategy of gradual growth to prevent vacancy within the existing districts. Moreover the city council has identified the prevention of impoverishment of the existing city as a high priority to be addressed during the planning and implementation of the Scale Jump. The municipality takes the view that the upcoming expansion of Almere must benefit the city as a whole. This is a necessary precondition for the sustainable development of the city.

Almere's main strategy to create 100,000 new jobs is the development of economic clusters of (inter-)national importance. This strategy has two directions. On the one hand the city wants to attract traditional economic clusters that are hampered in their development by a lack of space in the Northern Randstad, especially aviation, logistics and trade. The ambition on the other hand is to stimulate new and upcoming clusters of activity in Almere like health, wellness and life sciences, ICT and media and sustainable area development (Almere, 2010b). From a sustainable perspective the challenge here is not just to create jobs, but first and foremost, to create *sustainable* jobs. Or, to put it in Cradle-to-Cradle terms: it is the challenge to create jobs that contribute *in all aspects* to the closing of ecological and technical cycles, to the integration of the natural and urban fabric and to the enrichment of the ecosystem, the economy and human society.

3. *How to maintain and enhance the added value of the green and blue infrastructure in Almere within the budgetary boundaries of the involved authorities?*

Almere has much to offer with a view to the natural environment. The city is surrounded by national reserves like the 'Oostvaardersplassen', Lake Marker, Lake IJ and the 'Horsterwold'. And the green and blue infrastructure within the city is, compared to Dutch standards, abundant. But there are important sustainability issues to be addressed. Firstly, the ecological quality of the Lake Marker and the Lake IJ is declining due to the suffocating enclosure by the dikes in the Lake IJssel. Secondly, the nature within the urban boundaries is diverse nor very attractive and also rather costly to manage. And thirdly, the ecological and esthetic quality of the nature in and around Almere is being threatened by various economic developments, which are closely connected to the intended expansion of the new town. To be sustainable in all aspects, the intended infrastructural connection to Amsterdam via the Lake IJ should therefore be based on an eco-design that enhances the ecological vitality and the quality of the scenery of the Lake IJ.



A cartographic image of Almere 2.0 (Almere, 2009a)

This state of affairs brings along a double challenge. The first challenge is to shape the urban developments in such a way that they enrich the local nature in all aspects without creating a need to 'compensate' elsewhere for damage to local ecosystems. The second challenge is to mobilize the public and private (financial) resources that are necessary to diversify and strengthen the natural resources of Almere.

4. *How to renew the cooperation between the involved governments and stakeholders from society in such a way that it strengthens and accelerates the sustainable development of Almere?*

Within the Integral Framework of Agreements on Almere (IFA) the signatory parties have organized several working groups and operating companies to develop projects and business cases on various parts of the Almerian jump of scale in consultation with representatives of trade and industry, science and civil society. On the national and regional level there are groups working on the expansion of the regional airport of Lelystad, the improvement of public transport on the corridor of Amsterdam, Schiphol, Almere and Lelystad and the strengthening of the ecological resilience of the Lake Marker / Lake IJ. On the local level three operating companies several thematic groups (a/o on sustainability) have been created to prepare

business cases and initiatives for the expansion within the framework of Almere 2.0. Such a 'circus of consultation' is actually quite a common phenomenon in the Netherlands, which has become widely known as the 'polder model'.

While the polder model has proved itself valuable to neutralize harsh and persistent conflicts of interests with constructive compromises that are supported by most interest groups, it has a poor reputation in bringing about long-term sustainability (See e.g.: Rotmans, 2003). In 'polder processes', long-term interests of especially ecological and social sustainability regularly taste defeat in competition with short-term economic interests. The mere foundation of the IFA-working group on the expansion of the regional airport of Lelystad already confirms this point, while such an expansion simply cannot be reconciled with the aim for ecological sustainability (especially because of the great impact of aviation on climate change and the lack of sustainable air transport alternatives)¹. Moreover, as stated before, the municipality of Almere has a strong project-oriented organization with many top-down reflexes and a focus on tempo and restriction of

¹ See for example: *Een prijs voor elke reis (A price for every journey); een beleidsstrategie voor CO₂-reductie in verkeer en vervoer*. Een gezamenlijk advies van de Raad voor Verkeer & Waterstaat, de VROM-raad en de Algemene Energieraad, Den Haag, 2008.

costs. Such conditions are generally not very favourable for realizing sustainable developments. This is why the renewal of the cooperation with stakeholders from society is a serious sustainability challenge in the power domain, not only for the Almerian municipality but also for the other IFA-parties.

6.2 Exploring some options for application of the 'lessons learned'

In this section some options for application of the 'lessons learned' in Almere and the Netherlands are explored with a view to the four thematic fields of activity for which Almere is now developing business cases for sustainable urban development. These fields of activity are:

1. Renewable energy and energy efficiency
2. Productive Landscape
3. Sustainable Mobility
4. Sanitation and water management

Lessons with respect to the other relevant themes – financial and organizational renewal – are partly woven into the story lines of the content themes. Some remaining lessons with respect to financial and organizational renewal are integrated in the recommendations in the next section.

Ad. 1

Renewable energy and energy efficiency

In the energy field important sustainability lessons from San Francisco, Freiburg and Portland can be translated to Almere and the Netherlands. The most successful approaches to promote sustainable energy have the following common features.

- Stakeholders – residents, local entrepreneurs, NGO's, schools, et cetera – are enabled to become shareholders who directly benefit from sustainable energy measures, a/o by sharing profits. This is an important way to remove split incentives between investments and operation and maintenance of sustainable energy installations.
- Serious efforts are being made to break down all sorts of barriers to 'step in', especially through the replacement of high upfront investments by various forms of staggering payments that are affordable to large groups of people.
- Motivated parties from different sectors join forces in cross-sectoral 'coalitions of the willing' to invest in sustainable energy.

Almere can apply all these lessons in a business case for a Local Sustainable Energy Company (LSEC). As the examples of Freiburg and San Francisco show, it is very important to enable local stakeholders to become shareholder in a LSEC. The perspective of having a share in the (financial) benefits from sustainable energy boosts the public support for investments in sustainable energy. See for example the enthusiastic public response to the issue of Solar Energy Bonds in San Francisco. This is also a smart lever to mobilize dormant urban capital for a sustainable purpose. The change from stakeholder to shareholder can also boost the willingness of people to participate actively in the development of a sustainable energy supply, delivering valuable inputs such as knowledge, experience and workforce at low or no costs.

To prevent high upfront investments and to break down various other barriers to step in, the LSEC can build upon the concept of the Energy Service Company (ESCO). Although not very new anymore, it remains a valuable concept to overcome the current split-incentive between the party that invests in sustainable energy techniques and the party that enjoys the financial benefits of these measures. Almere can seize the opportunity to travel along the learning curve of the ESCo-innovation by elaborating on the supply of real comfort services to households and businesses such as high quality spatial lighting, a pleasant climate control in buildings and tailor made energy services for industrial processes. This demands a multidisciplinary cooperation between experts on fields varying from energy techniques to interior designers and from marketing to end user friendly help desk services

In order to accelerate the application of sustainable energy in Almere it appears very important to 'just start' with a coalition of parties that are willing to put serious efforts and investments into the production of renewable energy as soon as possible. These parties can join forces in a LSEC and start with a few pilot projects in which valuable lessons from good practices (see above) are being applied. With a view to these kinds of coalitions and the Dutch 'polder tradition' it is worthwhile to mention the condition sine qua non for the success of a LSEC: it has to be and remain a lean and mean and very accessible public organization with a minimum of overhead and bureaucracy.

The option of Local Sustainable Energy Company (LSEC) can be lifted to an even higher sustainability level by introducing a Local sustainable *Surface* Development Company (a LSDC). This option is explored in the next section.

Ad. 2 & 4

Productive Landscape, sanitation and water management

With the relative abundance of surfaces within the borders of the municipality, a/o due to the high percentage of detached, low rise houses, Almere has multiple opportunities to make its 'landscapes' productive in a sustainable way. Learning from the experiences in Detroit the most obvious opportunity seems to be: facilitating local residents and entrepreneurs to grow food or to cultivate (public) gardens on 'vacant' lots in the municipality. Just like in Detroit this can easily be facilitated by a collaborative of local and/or regional stakeholders that provides seeds, tools, training and education and of course, by the municipality that allows (temporarily) the utilization of vacant lots for the production of food or the cultivation of (public) gardens. Such a collaborative could build upon the strong, but somewhat forgotten Dutch tradition of cooperatives.

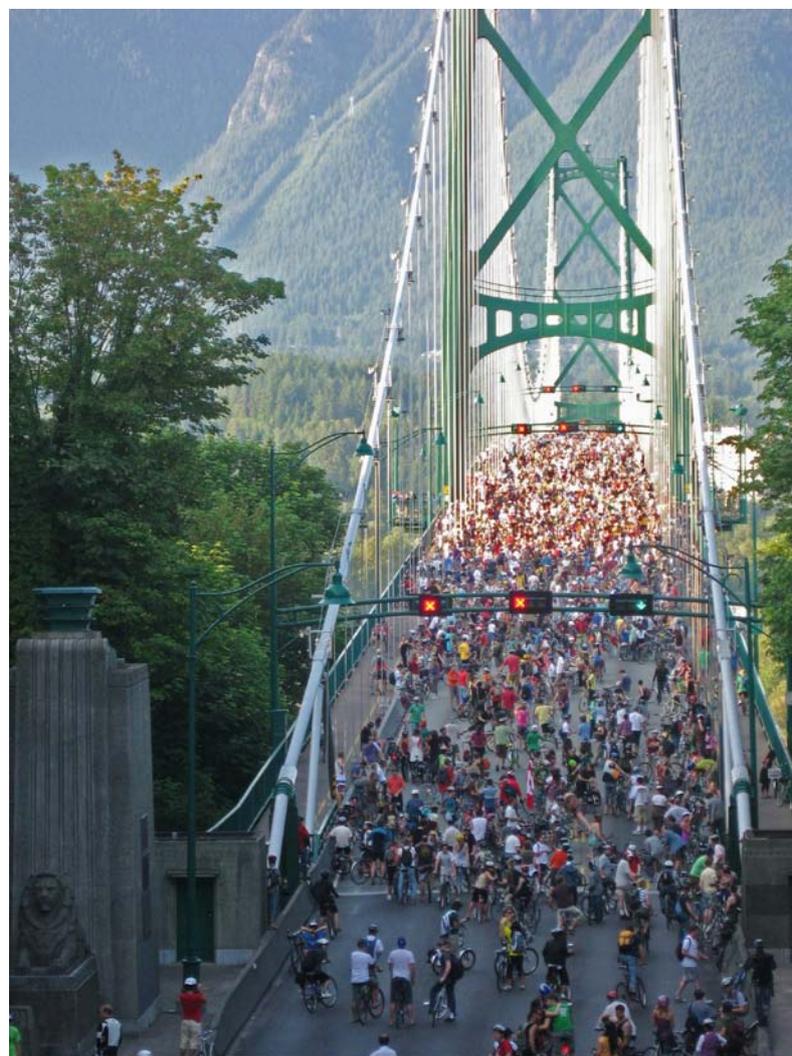
But with a view to some other best practices described in this report the concept of productive landscape can be raised to a higher level of sustainability. Learning from experiences in especially Freiburg, Chicago and Curitiba the business case of productive landscape can be strengthened by:

- stretching the definitions of 'landscape', 'vacant' and 'productive'
- mobilizing surfaces for sustainable purposes by introducing rewards on making them productive in a sustainable way and penalties on letting them unutilized.

Stretching the definitions of 'landscape' and 'vacant' is about identifying a very important, dormant source of urban capital: surfaces! All cities, Almere in particular, have huge amounts of surfaces that are now vacant, that is: insufficiently productive for sustainable purposes. These surfaces vary from roofs, windows and walls of buildings to surface water, roads, tiled gardens and vacant (building) sites waiting to be developed. All these surfaces can be made more productive in various sustainable ways as is shown best by the examples of Vauban, Freiburg, Chicago and Detroit. Roofs and walls can for example be used to cultivate vegetation, to grow food and to 'harvest' renewable energy, for example by means of solar panels. Roads and surface waters can be used to provide renewable heat and cooling for buildings in the city. Tiled gardens, parking lots, vacant (building) sites and also public green spaces can be made more productive in a sustainable way, e.g. by cultivating them to produce local food and attractive green urban landscapes.

Such forms of 'surface development' can deliver all kinds of sustainability services to the community, varying from producing renewable energy to enlarging the water conveyance capacity of urban areas and from mitigating the urban heat island effect to preserving and increasing the value of the real estate in the city. In spite of this huge potential, the utilization of surfaces for sustainable purposes is, in Almere as in most other (Dutch) cities, very poor. To be more specific: most surfaces in (Dutch) cities are being used to fulfil only one function and that's not enough. This is why it is quite urgent to find smart levers to mobilize this dormant source of urban capital.

At this point lessons can be drawn from the experience in Curitiba with the market for 'sol criado'. To mobilize dormant urban capital for sustainable purposes such as the maintenance of public parks and monuments Curitiba introduced smart levers in the form of 'sticks' and 'carrots' – a/o: a maximum density (stick) and increase of real estate value (carrot) due to improvements of spatial quality (see also section 4.1). While there is still a relative abundance of space available in Almere, it will not be very fruitful to introduce rules for maximum densities in the municipality. Much smarter levers can be found by creating a market in Almere for sustainable surface development. In the textbox below some practical suggestions are given to create such a market.



Critical Mass at Vancouver's Lion's Gate Bridge. Photo by Dustin Sacks.

How to create a local market for sustainable surface development?

The municipality of Almere could create a market for sustainable surface development by doing the following.

1. Take up the role of a market superintendant and create a supply of surface units on the basis of a yearly measurement of all available surfaces – walls, roofs, roads, parking lots, gardens, building lots, etc. – within the municipal boundaries that can be made productive in a sustainable way.
2. Introduce a legal obligation (a stick) for all owners of such surfaces to buy a minimum amount of surface units on the newly created market for sustainable surface development.
3. Fix prices for these surface units depending on the sustainability performance of the surface development that the owner wants to realize. When the owner of a building for instance wants to do nothing else with his/her roof and walls, he/she pays a relatively high price (another stick). But the owner can get significant rebates (a carrot) when his/her roof and walls are developed more sustainably, for example by attaching vegetation and/or by installing solar panels. Much more important of course is the opportunity the owner gets to benefit directly from the surface development on his/her roof and walls, a/o by earning an income (a carrot) as a reward for e.g. the production of renewable energy or local food, or for the creation of additional capacity for storm water conveyance.
4. Provide a broad array of legally recognized opportunities to develop surfaces in a sustainable way. This is where the indispensable flexibility comes in. In the interest of mobilizing support, cooperation and creativity of all 'surface owners' it is very important to provide them with lots of opportunities to promote sustainability with their surfaces. These opportunities can best be identified in terms of sustainability objectives such as renewable energy production, adaptation to climate change, local food production, cyclic water management, preservation/ enrichment of local nature and cultural heritage, et cetera. The price fixing can then be based upon the total potential impact of the planned surface development with respect to the various sustainability goals. In this way the owners can make their own choices on to what way(s) they want to develop their surfaces, using all their creativity to maximise the benefits for themselves and the community. To promote long-term commitment to the realization of the planned surface developments, it's recommendable to add other carrots, e.g. in the form of (more) rebates on the prices that the owner paid to acquire his/her units for sustainable surface development. The height of these rebates can be based upon 'proven' performances with respect to the various sustainability goals that have been legally recognized. To prevent bureaucracy, it's important to make it easy to 'prove' sustainability performances with surface development.
5. Invite local/regional frontrunners – residents, entrepreneurs, NGOs, etc – to found a Local sustainable Surface Development Company (a LSDC) that acts as a Service Company, providing the following services to the owners of surfaces within Almere.
 - a. If owners do not want to develop their surfaces by themselves – e.g. because it's not their core business – the LSDC can take over the whole surface development process by buying or renting the surface units from the owner to develop them by installing solar panels, roof gardens, wall vegetation, et cetera. The LSDC is in this case of course also responsible for the operation and maintenance of the surface development techniques and installations. The benefit for the owner is that he/she is freed from the 'burden' of surface development. In return the LSDC gets the opportunity to maximise its profits from the sustainable exploitation of the surfaces. To maximise the sustainable surface development in the municipality, the LSDC can be obliged to buy the surface units from the owners.
 - b. If owners do want to develop their surfaces by themselves the LSDC can provide technical and organizational assistance to help owners to develop their surfaces in the most sustainable way. One can think of technical assistance for the operation and maintenance of renewable energy techniques or for the cultivation of roof gardens, et cetera. The LSDC can provide organizational assistance, e.g. by providing training and education to owners with similar development plans, or by giving owners access to the financial resources needed for investments. Learning from San Francisco the LSDC could for example issue sustainable surface development bonds to collect investment funds for the owners. The costs of the technical and organizational assistance can be covered by the payments that owners have to make to buy their surface units. In this way the owners can always get something in return for their obligation to buy surface units.
 - c. For all owners, the LSDC can develop new business models for sustainable surface development. This is in fact a continuous exercise in mobilizing dormant, urban capital for sustainable purposes. Learning from the experiences described in this report the LSDC can 'dive' into questions like: In what way and to what extent can the current food, energy and water budgets of households, businesses and organizations be used to finance a more sustainable supply of food, water and energy, utilizing vacant surfaces for sustainable local production? Which entity can best act as the 'owner' in cases of public property such as public parks, green fields, parking lots and surface waters? To what extent can locally available resources like, roofs, walls, roads, fertile soils, human faeces and organic wastes be used as a collateral for (commercial) loans from banks for investments?

Ad. 3

Sustainable mobility (and land use)

With a view to the aim for sustainable mobility much can be learned from the best practices in Portland, Copenhagen, Freiburg, Tampines and Curitiba. Before we translate the lessons from these examples to Almere it's important to notice the specific character of Almere as a 'suburb' of the Randstad and the metropolitan region of Amsterdam. With a view to the scale and regional function Curitiba for example is more comparable to Amsterdam than to Almere. Tampines is also a suburb (of Singapore), but it has a much higher density than Almere. With this in mind we can now resume the common features of the most successful policies for sustainable mobility.

1. A clear priority to public transport, cycling and walking *above* private car transport; this is the indispensable push-side of effective mobility policies which is often translated into a spatial (on roads) hierarchy that offers the biggest and best spaces to non-car transport modes.
2. A strong policy linkage between land use and mobility, especially by means of regulations that limit urban sprawl and concentrate high-density developments near public transport transits.
3. An integral and coherent policy to offer a relatively abundant supply of efficient, low cost and high quality alternatives to private car transport, varying from high quality cycle lanes in Copenhagen and Portland to car sharing and express buses in respectively Freiburg and Curitiba. This is the, also indispensable pull-side of effective mobility policies.

When we try to apply these lessons to Almere as part of the metropolitan context of the Randstad and Amsterdam, we're immediately confronted with the reluctance of most Dutch politicians and policy makers in the past decades to introduce effective push-measures to discourage the use of private cars. Despite all good intentions and many lip services to more sustainable alternatives the dominant tendency in Dutch politics until now has always been to accommodate the ongoing growth of car traffic at the expense of the other modes of transport. To a certain extent Almere has distinguished itself from this tendency with the choice for exclusive bus lanes, but the city hasn't been able to reverse the dominant trend in favour of individual car traffic. On the contrary, Almere stands out even in the Dutch context for a relatively high possession and use of private cars for transportation contributing to big congestion problems and a large array of high welfare costs.

This is the unsustainable past and present. So let's now look at the future with a view to the best practices pre-

sented in this report. They provide hope and some really alluring perspectives; especially because the examples make clear that even a relatively small or 'poor' municipality (Freiburg, Curitiba) can make a big difference in realizing a more sustainable mobility and land use. Below we explore some options building upon the described experiences, starting from the small scale of the inner city moving toward the big scale of the metro region.

- Learning from Vauban in Freiburg, Almere could start with making the city quarters and neighbourhoods 'semi permeable' or difficult to penetrate for private cars, e.g. by introducing paid parking in the whole of the city, by substantially reducing the number of public parking lots and/or by multiplying the number of dead-end streets.
- Such push-measures are quite necessary, but they won't be effective without a simultaneous introduction of a number of complementary pull-measures. The best practices mentioned above offer a rich array of effective pull-measures, to mention a/o:
 - » Improvement and expansion of the existing network of sidewalks and bicycle paths, e.g. by doubling the lanes and decorating them with ornamental (green) elements
 - » All sorts of services and facilities to support cycling: free access to public city bikes (such as the NS-bikes), ample parking lots for bicycles, bicycle taxi, etc.
 - » Low-cost-flat-rate tariffs for bus, tram or train tickets that give residents and visitors *easy* access (for a day/week/month) to high frequency and high quality public transport nearby
 - » Free access to (electric) car sharing for a period of time (e.g. 3 years) in exchange for 'sacrificing' the private car and the corresponding parking lot(s) near the house.
- These kinds of pull-measures can be combined into innovative package deals that can be offered to car owners. One can think of a Mobility Service Company that offers tailor made advice and support to residents, entrepreneurs and organisation managers that want to make a switchover from individual car-mobility to multimodal, sustainable mobility. Such companies can offer their services with the promise of lowering the current mobility budget of households, businesses and organisations. Almere could invite frontrunners in this field of business to co-create attractive package deals that can be offered to residents, entrepreneurs and organisations in the municipality. Vauban provides the alluring perspective here with a substantial reduction in individual car-possession (70%!) and the spacious, car-free neighbourhood with ample room for playgrounds and attractive and (productive) vegetation. It is these kinds of neighbourhoods that are

especially appealing to the elites that Almere wants to attract.

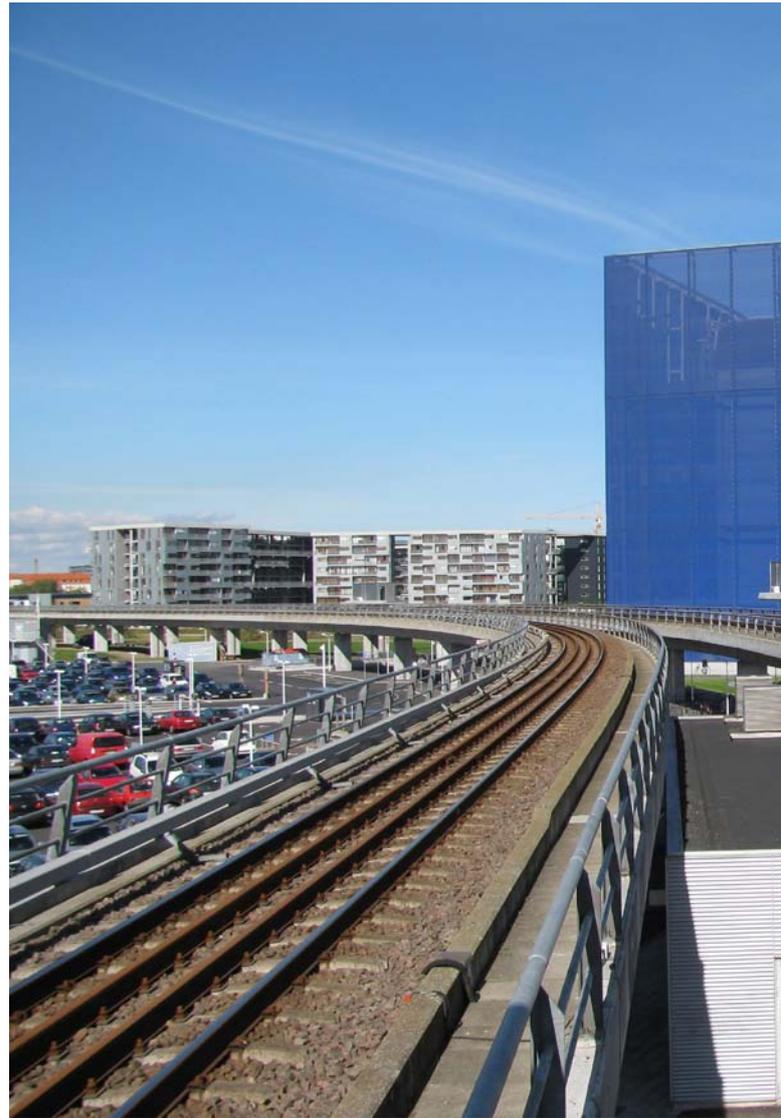
- With a view to the urban planning on a larger scale, Almere can follow-up the general lesson of coupling land use to public transportation by densifying the city near public transport transits and nodes. With the low density of buildings in Almere there seems to be enough opportunities not only to densify but also to diversify the urban development around public transport transits and nodes. Along with this densification it is important to enhance the quality and capacity of the public transport system simultaneously.
- With a view to the metropolitan context, Almere and all the other involved parties can draw important lessons from Curitiba. Instead of focusing on new infrastructure and expensive transportation modes (automobiles, railway systems) to accommodate (growing) traffic a/o for commuting, there is a sustainable world to win by the elaboration of an affordable, efficient and high quality bus system that smartly builds upon the existing infrastructure (A6, A27 and the existing bus facilities within Almere). This option does not necessarily exclude new infrastructural connections like the Lake IJ-connection, but it shifts the attention to add far more value to the resources that are already available. Limitations promote creativity!

6.3 Recommendations

On the basis of the analyses and explorations in the previous sections we identify below some recommendations for Almere in the form of answers to the sustainability challenges that are articulated in section 6.2. We particularly build upon the critical success factors from chapter 5:

- A holistic approach that puts people first
 - Inspiring and tenacious leadership
 - Operational sustainability guidelines that offer direction *and* room for initiative
 - A smart mobilization of urban capital for sustainable purposes
 - A radical approach to promote sustainable system innovations.
1. *How to reconcile the ambition to become a complete, low-dense, polynuclear city with the aim for social, economic and ecological sustainability conform the Almere Principles?*

With the Almere Principles, Almere does in fact have a holistic vision that puts people first. Although they are intended to function as an *inspiring* framework for the



Copenhagen Metro in front of Koncerthuset. Photo by Daniel Sparing.

development of 'Almere 2.0' it is precisely this function that seems to be flawed in daily practice. In daily discussions and decision making about all sorts of practicalities concerning the urban development the principles easily disappear into the background, especially those that are at odds with the dominant routines and views. Therefore, a radical approach is needed to make the Almere principles leading for the development of the city. This means on the one hand self-reflection to get a break-through in common practice and culture that hinders sustainable development (e.g. in organizational structure and finance.) On the other hand, the 'playing field' can be limited in order to stimulate the creativity and innovation needed for the successful application of the Almere Principles.

A lack of creativity seems present in the search for a better accessibility of Almere, while most improvements are currently being sought in the conventional direc-



tion of enlargement of infrastructure for public and especially private transport. This direction does not provide much perspective to a radical change to the high level of car ownership and car use in and around Almere. And continuation of the high car-dependency is not reconcilable with the aim for a 'healthy' mobility and land use system in Almere. That's why we recommend to the IFA-parties a few operational guidelines in addition to the Almere Principles that provide clear direction *and* room for creative action to promote sustainable mobility and land use.

- » Attach a clear priority to public transport, cycling and walking *above* private car transport within the framework of an integral push-/pull-policy and do not hesitate to adopt a few push-measures (see for some suggestions section 6.2), because in the end, as the examples in this report show, they also 'push' creativity and promote sustainable welfare
- » Stimulate densification in Almere near public transport transits, e.g. by introduction of some

clear municipal regulations for a minimum density level of buildings in these areas

- » Invite frontrunners in the field of sustainable mobility services to co-create attractive package deals for residents, entrepreneurs and organisation managers who want to make a switchover from individual car-mobility to multimodal, sustainable mobility, with the promise of lowering the current mobility budget of households, businesses and organisations
- » On the regional scale it is recommended to join forces with motivated parties to enhance the capacity, quality and efficiency – in a cost-effective way – of the public transport system for the metropolitan region of the Randstad. And with reference to the Curitiba example it is recommended to look especially into ways to optimize the usage of (existing) infrastructure and facilities, a/o by reserving free lanes on the national highways like the A6 and A27 for express buses with a large capacity (of about 250 passengers per bus).
- » Just start with a few pilot projects to elaborate *and* implement some straightforward business cases for sustainable mobility (e.g. related to car sharing and electric driving).

2. How to create 60,000 new homes and 100,000 new jobs that add sustainable value to the development of Almere as a whole?

In section 6.2 we identified three challenges with respect to this question:

- a. To cease the opportunity of the 'jump of scale' to apply state-of-the-art sustainable technologies with significant economies of scale
- b. To utilize the upcoming expansion of Almere for the sustainable benefit of the city as a whole
- c. To create 100,000 *sustainable* jobs that contribute *in all aspects* to the closing of ecological and technical cycles, to the integration of the natural and urban fabric and to the enrichment of the ecosystem, the economy and human society.

To take up these challenges we recommend the following actions to the IFA-parties.

- » Safeguard the adopted, operational policy targets for ecological sustainability in all segments of the 'Almere 2.0' organization. Almere has set some ambitious targets to promote ecological sustainability. For instance, the city wants to become 'energy neutral' in 2025 meaning that the *total* energy demand of Almere must be met completely by a local supply of renewable energy in 2025. Another

example: Almere wants to implement the concept of sustainable sanitation in all new city districts (Almere, 2010a).² While ecological interests in daily practice are quite vulnerable in competition with especially short-term economic interests, it's important to safeguard these operational targets in all parts of the organization. Such radical targets serve the interest of stimulating sustainable innovations that also attract new businesses, which are active in the field of sustainability.

- » Give the good example, a/o by (gradually) abolishing unsustainable activities and by testing new sustainable technologies and business models on municipal buildings and infrastructure. As mentioned earlier the ambition to create new jobs by expanding conventional aviation at the regional airport of Lelystad is clearly clashing with the Almere Principle of designing healthy systems on the basis of Cradle-to-Cradle solutions. Such an activity diminishes the credibility of the Almere Principles significantly and should therefore be abolished or replaced by a search for (employment in) sustainable aviation, e.g. by means of airships. The municipality can on the other hand increase its credibility, as the example of Chicago has shown, by setting sustainable standards on municipal buildings and infrastructure. E.g. let the town hall of Almere be the first building within the municipality that produces net renewable energy!
- » Create *sustainable* employment in Almere by:
 - creating a local/regional market for sustainable surface development; such a market can be started at a small scale of e.g. an existing city quarter like Almere Centre (see section 6.2 for more practical suggestions)
 - organizing innovative communities of practice (CoP) of local/regional frontrunners – residents, entrepreneurs, NGOs, etc. – to co-create new business models for sustainable services; besides sustainable surface development these CoPs can build upon the cradle-to-cradle concept of product services³ like car sharing and the 'public transport bicycle'.
 - Just start with a few pilot projects to elaborate *and* implement some straightforward business

cases for sustainable surface development (e.g. in the field of energy efficiency and renewable energy) and other sustainable (product) services.

3. *How to maintain and enhance the added value of the green and blue infrastructure in Almere within the budgetary boundaries of the involved authorities?*

This question has been subdivided into two challenges:

- a. to shape the urban developments in such a way that they enrich the local nature in all aspects without creating a need to 'compensate' elsewhere for damage to local ecosystems
- b. to mobilize the public and private (financial) resources that are necessary to diversify and strengthen the natural resources of Almere.

In order to take up these challenges properly it's important to realize that the technical issues are often relatively easy to solve, while the financial and organizational issues demand the most creativity and tenacity. With that in mind we recommend the following.

- » With respect to the plans for a new connection with Amsterdam through the Lake IJ it's important to live up to the Almere Principle of cherishing diversity by staying focused on the options that really *enhance* the ecological quality of the Lake Marker and the Lake IJ and invest all human and financial resources into realizing precisely these options.
- » Invite local/regional frontrunners – residents, entrepreneurs, NGOs, etc. – to found a Local sustainable Surface Development Company (a LSDC) that provides organizational and technical assistance to owners who want to develop their surface units in a sustainable way. This LSDC can help owners to develop their surfaces in many sustainable ways varying from the production of renewable energy to urban agriculture and the management of urban nature. The latter are of course important options to promote the diversity and quality of the green and blue infrastructure within the city. More inspiration can be extracted from the examples of Detroit and Chicago (see also section 6.2 for more practical suggestions).
- » Mobilize the urban demand for high quality local/regional food by co-creating innovative business models that build upon the numerous (international) examples of Community Supported Agriculture. Almere could for example develop business models around the concept of non-profit commu-

² This concept includes the separation of wastewater flows from buildings at the source and the 'upcycling' of valuable nutrients and raw materials and, if possible, production of renewable energy.

³ A 'product service' is a concept for doing business without selling products. The producer remains owner of the product, while consumers only buy services related to the product. They buy for instance 'access to a car nearby at any time' in case of car sharing, or 'a comfortable indoor climate' instead of electricity and heat, or the right to regularly renew the furniture and equipment at home and/or at the office instead of buying the products themselves. In this way producers have an economic interest to produce sustainable products and to close ecological and technical cycles of energy and materials.

nity restaurants to which residents can subscribe for a regular and affordable meal – e.g. a family dinner twice a week, or 5 lunches a week – that’s made of high quality, local and regional produce. Current food budgets of households and businesses could function as a financial starting point for the development of such business models.

- » Just start with a few pilot projects to elaborate *and* implement some straightforward business cases for sustainable surface development in the field of urban agriculture and management/development of (recreational) urban nature.

4. *How to renew the cooperation between the involved governments and stakeholders from society in such a way that it strengthens and accelerates the sustainable development of Almere?*

Examples from this benchmark have drawn the attention to several leading characters playing a key role in inspiring and mobilizing large groups of people for sustainable urban development. Leadership can’t be enforced – it’s a characteristic that people have or develop gradually – but the examples also showed that inspiring leaders were always surrounded by a small group of frontrunners that is able to mobilize the platoon, a/o thanks to their shared passion for sustainability and complementary competencies. Such a group can be organized learning also from transition practices. With this in mind and with reference to the earlier described polder processes around the Almerian jump of scale (see section 6.2) the main challenge seems to be to provide more room for frontrunners to accelerate sustainable urban developments in Almere.

We recommend to the IFA-partners the following actions to take up this challenge.

- » Organize a multidisciplinary group of frontrunners at the highest authoritative level of the RRAAM⁴ organization (including Almere 2.0) with the assignment to bring about sustainable breakthroughs in all regional and local fields of activity and provide them with all the necessary authorities and (financial) resources to make a big difference.
- » Invite a small but heterogeneous group of innovators and change-agents from private and public sector to work on the future of Almere. This group can bring in refreshing views, search for synergy in new partnerships and start up radical sustainability projects. The group can expand to become an inspiring network of people and organizations committed to the sustainable future of Almere.⁵
- » Improve and strengthen at the same time the running bottom-up processes of cooperation with stakeholders from society by inviting the real frontrunners among them to co-create and implement new and innovative business models and business cases for the sustainable expansion of Almere. Provide these groups with all the necessary (financial) resources to elevate these participatory processes to the highest level of co-creation.
- » Stimulate a new enriching ‘Almerian’ identity building upon the eagerness and curiosity of frontrunners to explore new roads to sustainability.
- » Just start to co-create some actions that quickly produce visible benefits for the residents while they also contribute to the long-term goal of a sustainable urban development.

4 RRAAM: Rijks Regio Programma Amsterdam Almere Markermeer (National Regional Program Amsterdam Almere Lake Marker)

5 An extensive example of such an approach is the ‘transition arena’, see: www.drift.eur.nl



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Additional sources

Section	Additional sources
3.2 Portland	http://smartercities.nrdc.org/ http://www.sustainlane.com http://www.portlandonline.com/ http://www.portlandonline.com/bps/index.cfm?c=49989& http://www.metro-region.org/ http://mkn.research.pdx.edu www.cleanenergyworksoregon.org/
3.3 Copenhagen	http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/InformationAndServices/ClimateAndEnvironment.aspx http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/InformationAndServices/ClimateAndEnvironment/ClimateSolutionsInCopenhagen.aspx http://www.urbanaudit.org http://www.kk.dk http://ec.europa.eu/environment/europeangreencapital/docs/cities/egc_analysis2010-2011.pdf http://www.cphx.dk/index.php?id=311641#/311641/
3.4 Freiburg	http://www.forum-vauban.de http://www.thefullwiki.org/Freiburg_im_Breisgau http://www.worldchanging.com/archives/011173.html http://madisonfreiburg.org/green/sustainablecity.htm http://www.solarregion.freiburg.de/solarregion/freiburg_solar_city.php http://www.vauban.de http://www.wwf.fi/wwf/www/uploads/pdf/sustainable_model_city_freiburg_in_germany.pdf http://www.c40cities.org/bestpractices/transport/freiburg_ecocity.jsp http://en.wikipedia.org/wiki/Vauban,_Freiburg http://ec.europa.eu/environment/europeangreencapital/docs/cities/egc_analysis2010-2011.pdf http://www.urbanaudit.org http://www.ecotippingpoints.org/our-stories/indepth/germany-freiburg-sustainability-transportation-energy-green-economy.html http://www.ice.org.uk/topics/community/Sustainable-Community-Development/Freiburg http://www.wwf.fi/wwf/www/uploads/pdf/sustainable_model_city_freiburg_in_germany.pdf
3.5 Tampines	http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=116 http://www.hdb.gov.sg/fi10/fi10333p.nsf/w/EcoTownHome?OpenDocument http://www.tampines.org.sg/ http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=116 http://www.doingbusiness.org/data/exploreconomies/singapore http://www.mercer.com
3.6 Canberra	http://www.environment.act.gov.au/__data/assets/pdf_file/0015/200175/ACT_Greenhouse_Gas_Invent_ory_2008.pdf http://www.environment.act.gov.au/climate_change/greenhouse_gases_in_the_act http://www.actnrmcouncil.org.au/files/NRMplan.pdf http://www.abs.gov.au http://www.cmd.act.gov.au/__data/assets/pdf_file/0020/130088/canberra-quickstats-2009-10.pdf http://canberra2030.org.au/ http://www.actpla.act.gov.au/ http://www.environment.act.gov.au/pv_obj_cache/pv_obj_id_2F9A1839C028E5E1F39B84EC7A2C989304173800/filename/SustainableWaste_Strategy_WEB.pdf http://www.tams.act.gov.au/live/recycling-waste/about_ACT_NOWaste/the_no_waste_strategy http://www.mercer.com/press-releases/quality-of-living-report-2010

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- 3.7 and 6.1 Almere** http://www.almere.nl/de_stad/stadsprojecten
<http://almere20.almere.nl/gebiedsontwikkeling>
http://www.almere.nl/leven_en_werken/verkeer_en_vervoer/openbaar_vervoer
 Interviews with Henk Meijer (City of Almere), Erwin Lindeijer (City of Almere), Alex van Oost (City of Almere), Vera Dam (Stadsmanifest Almere 2.0), Wim Heiko Houtsma (Ministry of Infrastructure and the Environment).
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- 4.1 Curitiba** <http://www.curitiba.pr.gov.br/idioma/ingles>
<http://www.sthelens.oxon.sch.uk/Geography/Downloads/Geopress%20Factsheets/Geo%20factsheets/151%20Case%20Study-%20Curitiba.pdf>
 Verslag studiereis Nationaal Dubo Centrum met als thema: *Curitiba: duurzame stedelijke en regionale ontwikkeling*. Utrecht, 16-30 oktober 1999.
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- 4.2 San Francisco** <http://www.grip.org.uk>
<http://www.newrules.org/energy/rules/green-citizenship-vs-green-pricing/solar-energy-initiative-san-francisco-ca>
http://solaramericacommunities.energy.gov/solaramericacities/san_francisco
<http://www6.sfgov.org/index.aspx?page=109>
<http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org>
<http://www.sfenvironment.org/downloads/library/climateactionplan.pdf>
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- 4.3 Detroit** http://www.detroitagriculture.org/GRP_Website/About_Us.html
<http://www.sustainlane.com/us-city-rankings/articles/from-vacant-to-verdant-the-garden-resource-collaborative-in-detroit/TV2YYPQMDRTOIKFIU2AX8Z9FDN8>
<http://news.bbc.co.uk/2/hi/7495717.stm>
<http://www.csmonitor.com/The-Culture/Gardening/2010/0428/Detroit-leads-the-way-in-urban-farming>
<http://www.hantzfarmsdetroit.com/press.html>
http://www.detroitfoodpolicycouncil.net/Page_3.html
<http://www.realdetroitweekly.com/detroit/garden-resource-program-collaborative/Content?oid=1204884>
<http://www.treehugger.com/files/2009/08/self-sufficient-detroit.php>
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- 4.4 Chicago** http://www.werf.org/livablecommunities/studies_chic_il.htm
<http://www.sustainlane.com/us-city-rankings/articles/logan-square-resident-describes-greening-and-preening-in-chicagos-neighborhoods/ICP32ABR33WQ9HTV8COHB4IVRTOI>
http://www.cityofchicago.org/city/en/depts/dae/supp_info/chicago_s_urban_forestagenda.html
<http://www.cityofchicago.org/city/en/progs/env.html>
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Appendix I: Indicators

Benchmark methodology

The benchmark methodology developed in this study assesses four domains – People, Planet, Prosperity and Power – of urban development by evaluating a number of ‘stocks’ that represent its main properties. These stocks can be quite generic, such as ‘human resources’ (People) or ‘environmental quality’ (Planet). The generality of the stocks decreases the tendency to favour stocks in the selection for which quantitative data are readily available. (see: Grosskurth, J. and Rotmans, J., 2005)¹.

The condition of the stocks can be evaluated with quantitative indicators, as listed in the tables below. The choice of indicators is inspired by the rankings and indicator sets as discussed in chapter 2.2. In some cases, the indicators are ranked by assessments (“expert judgement”) due to limitations of comparable data.

After retrieving data from various sources, the values of the indicators are compared and scaled to scores between 0 and 5. In general, 0 represents the worst possible result, 5 the best result among the cases. The worst possible result is not always obvious, e.g. for the CO₂ emissions pathway and GINI-coefficient arbitrary choices had to be made by the researchers.

The marks for the stocks equal a weighted average of the score for its indicators. Most weight factors are set to 1, only few indicators are chosen to have a three times higher impact on the respective stock (marked in the tables with “h”). For example this means that the score for the stock “mobility” is for 20% determined by “cycling lanes”, 20% by “car ownership” and 20% by “use of non-car transport”.

In chapter 3, the marks for the stocks are represented in spider charts for each city. For the bar chart comparing

the cities, a final mark per capital domain is defined as the average of the marks of its stocks.

An Excel-sheet with all data, scaling and weight factors and links to sources is available on request.

¹ Grosskurth, J. and Rotmans, J. (2005). The SCENE Model: getting a grip on sustainable development in policymaking, *Environment, Development and Sustainability* 7 (1), pp. 133-149.

Indicators - Planet domain

Stock	Characteristic	Indicator	Parameter	w
Resources	Renewable energy production	% Renewable energy in total energy production	%	h
	Energy consumption	Annual energy consumption per capita	GJ/cap/yr	
	Energy intensity	Annual energy consumption, in MJ per unit GDP	MJ/\$/yr	
	Materials	Percentage of the city's solid waste that is recycled	%	
	Materials	Municipal waste per capita	kg/cap/yr	
	Water use	Water use per capita	l/cap/day	
	Land use - Population Density	Number of inhabitants per km2	cap/km2	
Global impact	CO2 emissions	CO2 emissions, in tonnes per head	tonne/cap/yr	
	CO2 emissions pathway	Growth/reduction of per capita CO2-emissions, in 1990-2010	%	h
	Ecological footprint	Ecological footprint	ha/cap	
Nature and biodiversity	Green public area	Green public area per capita	m2/inh	
Mobility	Cycling lanes	Length of cycling lanes per km2 city area	km/km2	
	Car ownership	Number of cars per capita	#/cap	
	Use of non-car transport	The total percentage of the working population travelling to work on public transport, by bicycle and by foot.	%	h

Indicators - People domain

Stock	Characteristic	Indicator	Parameter	w
Evolution	Volunteerwork	Avg # hours of volunteering / capita / yr	h/cap/yr	
	Unemployment	Unemployment rate	%	h
Human resources	Education	Mean years of schooling	yrs	
	Education	Rank education level (assessment)	-	h
	Population aging-degree	% of population that are senior citizens (>65)	%	
Social quality	Housing	Avg house price / avg annual income	-	
	Life expectancy	Life expectancy at birth	yrs	

Indicators - Prosperity domain

Stock	Characteristic	Indicator	Parameter	w
Economic vitality	R&D spendings	R&D expenditure in % of GDP	%/GDP	
Classical economy	Added value	City Product per capita	PPP 2008 \$	
Social equality	Income distribution	Gini coefficient	-	

Indicators - Power domain

Stock	Characteristic	Indicator	Parameter	w
perseverance	An assessment of the ambitiousness and comprehensiveness of strategies to realize and monitor sustainability ambitions	Assessment - based on policy documents and interviews	-	
	An assessment of the implementation of ambitions	Assessment - based on policy documents and interviews	-	
integrated management	Existence and quality of overall long term vision for sustainability	Assessment - based on policy documents	-	
	Assessment: is it going to be the new way of working and does it cut through all the sectors or does it linger in separate projects?	Assessment - based on policy documents and interviews	-	
participation	An assessment of the strategy to mobilise other parties	Assessment - based on policy documents and interviews	-	
	Participation; citizens, NGOs & business participation in policy making and responsibility in city development	Assessment - based on policy documents and interviews	-	



Appendix II: Longlist

In order to identify 'frontrunners on the road to sustainability', a broad range of recent studies and rankings on sustainable cities has been reviewed (see chapter 2.3). The top-performing cities and the cities that perform quite well on multiple rankings are added to a long-list of inspiring examples. These cities show – each in their own way – examples of (more) sustainable urban development. A few cities stand out. These 'usual suspects' keep popping up in the highest ranks of several studies. Extra attention is paid to 'new towns' – for comparison to Almere.

The 'usual suspects'

City	Sustainability achievements
Copenhagen	Energy, spatial quality, green, health, buildings, transport
Freiburg	Community involvement, renewable energy, holistic development
Portland	Hydropower, green economy, green, electric/bike/public transport, farmer's markets
San Francisco	Renewable energy, local food, urban gardens, transport, waste, compact
Stockholm	Buildings, transport, air
Vancouver	Spatial quality, multiple area use, green, water, economy, productive gardens

Other top cities

City	Sustainability achievements
Aarhus	Local green business, mobility, sustainable MBA
Amsterdam	Energy, transport, physical quality, water, waste
Berlin	Berlin Climate Alliance, mobility, communities
Brighton and Hove	Quality of life, future proofing
Curitiba	Transport, sol criado
Edmonton	Green economy, bikes, shop local
Gent	CO2, energy, water
Gussing	Small town, biomass production, renewable energy centre
Hamburg	Technology, quality of life, public space
Honolulu	Air quality, housing, low footprint
Leicester	Local Strategic Partnership, energy, buildings, low waste
London	Building regulation, wind power, Food strategy,
Malmö	Neighbourhood development, energy
Melbourne	Livable, public space
Muenster	CO2, mobility
New York	PlaNYC, low CO2, transport, urban agriculture
Newcastle	All-round, highest UK
Oslo	CO2, energy, transport
Ottawa	Green, water
Rotterdam	CO2, energy, climate proof, clean tech
Seattle	Hydropower, Wind power, CO2
Toronto	Transport, buildings, energy, mobilisation of citizens
Turku	CO2 (district heating, energy saving), mobility
Vienna	Quality of life, livable, green, transport, heating

Interesting new towns

City	Sustainability achievements
Almere	New Town, energy, green
Dongtan	New Town (planned), Eco-city.
Masdar City	New Town (planned), CO2, transport, economy.
Sino-Singapore Tianjin	New Town (planned), Eco-city, energy, buildings, transport
Canberra	New Town, waste policies, liveability,
Milton Keynes	New Town, sustainable community strategy, transport
Tampines	New Town, high density, green fingers, green economy, mobility
Canberra	New Town, waste policies, liveability, climate ambitions



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