

INTERNATIONAL  
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## **Eco-Cities — A Global Survey 2011**

### **Eco-City**



### **Profiles**

**Simon Joss, Daniel Tomozeiu and Robert Cowley**  
**University of Westminster**  
**[www.westminster.ac.uk/ecocities](http://www.westminster.ac.uk/ecocities)**

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**Simon Joss<sup>1</sup>, Daniel Tomozeiu and Robert Cowley**

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# **Introduction**



## Introduction

### ***Eco-cities – an emerging global phenomenon***

Efforts to render cities environmentally and socially sustainable are not new. Urban planning and regeneration over the last one hundred years or so have been significantly influenced by attempts to redress the perceived detrimental effects of large-scale urbanisation, such as environmental degradation, social inequalities and urban sprawl. The Garden City, the New Town and the Techno-City are 19<sup>th</sup> and 20<sup>th</sup> century exemplars of such attempts to reinvent the city in the (post)industrial era.

More recently, these efforts have culminated in a new phenomenon – the so-called eco-city. The term can be traced back to the mid-1970s, when it was first coined in the context of the rising environmental movement. Throughout the 1980s and early 1990s, it remained mainly an innovative concept, with practical examples few and far between. The United Nations *Earth Summit* (Rio de Janeiro, 1992), and the resulting sustainable development programme (*Agenda 21*), formed the background to a first wave of practical eco-city initiatives. Curitiba (Brazil), Waitakere (New Zealand) and Schwabach (Germany) are examples of the first-generation eco-cities.

It is only in recent years, however, that the eco-city phenomenon has become truly global and mainstream, against the background of a majority of people now living in cities and the growing international recognition of the scale and severity of climate change. Thus, China<sup>2</sup> and India are currently at the forefront of eco-city development in Asia, with international projects such as Tianjin Binhai Eco-city and the four eco-cities planned in the Delhi-Mumbai Industrial Corridor with input from Japan; in the United Arab Emirates, Masdar is being developed as a brand-new zero-carbon city to be emulated elsewhere in the Middle East (and beyond); Hacienda Ecocities in Kenya is promoted as a model sustainable city for Africa; and Växjö (Sweden), Freiburg (Germany) and St. Davids (United Kingdom) are vying to be the 'greenest city' of Europe.

For a full discussion of the history and recent international development of eco-cities, see: S Joss (2011), *Eco-Cities: The Mainstreaming of Urban Sustainability: Key Characteristics and Driving Factors*, *International Journal of Sustainable Development and Planning*, vol 6 (3), 268-285.

### ***Eco-Cities Survey 2011***

In 2009, the International Eco-Cities Initiative<sup>3</sup> published its first global survey, covering some 79 initiatives (see [www.westminster.ac.uk/ecocities](http://www.westminster.ac.uk/ecocities)). Building on this, the present study includes the results of the second, extended global survey. As with the first survey, its primary aim is to identify and document the scale and diversity of current eco-city initiatives from an international perspective.

### **Methodology**

The survey was compiled based on a comprehensive 'horizon-scanning' of recent eco-city initiatives carried out between March and August 2011. It builds on the data set of the

<sup>2</sup> According to the World Bank (Technical Assistance Report No 59012/2009), there are an estimated 100 Chinese eco-city initiatives under development. According to a recent study by the Chinese Society for Urban Studies, there are 259 cities above prefecture level that have declared the intention to become an 'eco-city' or 'low-carbon city' (China Architecture and Building Press, 2011; ISBN 978-7-112-13272-0). For this present survey, 25 Chinese eco-cities were included according to the methodological criteria outlined in this section.

<sup>3</sup> The International Eco-Cities Initiative is a joint programme between researchers at Johns Hopkins University (Baltimore), the Smithsonian Institution (Washington DC) and the University of Westminster (London). See [www.westminster.ac.uk/ecocities](http://www.westminster.ac.uk/ecocities)

original (2009) survey, which was substantially extended and revised. The sources consulted included: academic literature, conference proceedings, policy documents, websites of individual eco-city initiatives, and websites of relevant international networks and interest groups (including Eco-Cities; Ecocity Builders; Ecocity World Summit; Sustainable Cities). The search terms/descriptors used were primarily 'eco-city' and 'eco-town' (for more detailed information, see Table 3, below). (The terms 'urban regeneration' and 'urban sustainability' proved to be too broad as analytical categories for the purpose of this survey).

For each identified eco-city initiative, the survey data was triangulated through cross-referencing and the verification of information and sources. Only where information could be verified through such triangulation were eco-city initiatives considered for inclusion in the survey. (This in part accounts for the fact that this survey includes a smaller number of initiatives than some of the estimates found in the literature; in many cases there is no available/verifiable data – see, for example, footnote 2.) As this survey focuses on the recent period, earlier initiatives which did not go beyond conceptual stage or were abandoned (such as the Halifax and Whyalla eco-city projects in Australia) were not included.

Eco-cities thus selected were then included if they met the following additional criteria: (i) scale of development – initiatives of substantial scale, at least at neighbourhood/district level and extending to city-region level; (ii) multiple policy areas – initiatives encompassing several policy areas, such as urban transport, energy, and housing; (iii) policy significance – initiatives that have policy status through, for example, municipal initiatives, national programmes or international co-operation agreements.

Using the above robust selection process, this methodology may not capture all eco-city developments (especially non-English, or local ones without international outreach). However, the survey results should nevertheless be sufficiently comprehensive to identify all major initiatives reported internationally. It should also be noted that the selection process did not include a substantive assessment of the relative quality and performance – in terms of, say, environmental criteria – of the eco-city initiatives identified, as this was not the remit of this study.

For each of the developments identified in this way, a brief profile was compiled, including information about the nature of development, key actors involved, and availability of data. Furthermore, in order to be able to identify various types of eco-cities and discern current trends and patterns, the sampled eco-cities were categorised according to the following variables:

Type of eco-city development	I—new development II—expansion of urban area III—retro-fit development
Development phase	1—pilot/planning stage 2—under construction 3—implemented
Key implementation mode	a—technological innovation b—integrated sustainability vision/planning c—civic empowerment/involvement

All profiles included in the original (2009) survey were reviewed; where more recently published information about these was identified in relevant sources, it was used to verify the original profiles and/or create a short update section for each.

## Key findings

Although the survey findings will be published in more detail elsewhere, a brief overview of key findings is provided below, in order to contextualise the information given in individual profiles:

1. The number of eco-cities profiled has increased from 79 (2009 survey) to 174 in the present survey. This increase does not, however, signify a sudden acceleration in the eco-city phenomenon worldwide. Rather, it reflects the extended data set available, mainly as a result of more initiatives being reported internationally and the authors having better access to various national sources.
2. Table 1 lists new eco-city initiatives, launched since the original survey of 2009:

	<b>Country</b>	<b>Profile no.</b>
<b>Europe</b>		
Neapolis Smart EcoCity (Paphos)	Cyprus	134
Brøset district of Trondheim	Norway	12
Sustainable Glasgow	United Kingdom	69
<b>Asia</b>		
French Government to facilitate development of 'éco-quartiers' in Chengdu, Chongqing, and Shenyang	China	15-17
Hongqiao Low-carbon Business Community (Shanghai)	China	88
Langfang 'Eco-Smart City' retro-fit	China	118
Yinggehai	China	173
Delhi-Mumbai Corridor Eco-Cities (Changodar, Dahej, Manesar Bawal, Shendra)	India	22-25
Fujisawa Sustainable Smart Town	Japan	68
<b>North America</b>		
Living City DC 14 <sup>th</sup> & U (Washington DC)	USA	119
Living City Denver LoDo	USA	120
Seattle 2030 District	USA	147

3. As Table 2 shows, the eco-city phenomenon is evidently a global one, and not just restricted to the 'Western' world. Indeed, the country with the largest number is China (with at least the 25 profiled here); Asia and Australasia combined have 69 - almost as many as Europe's 70. The Americas as a whole boast rather fewer than this (25) - though the USA is the country with the second largest number of eco-cities (17). (After China and the USA, the countries with the largest concentrations are the UK and Japan, both with 16, India with 14, and France with 13.) The region with the fewest eco-cities is Middle East/Africa (with only 10) - despite the presence of Masdar, one of the most high-profile projects internationally.

	<b>Asia &amp; Australasia (n.)</b>	<b>Europe (n.)</b>	<b>Middle East &amp; Africa (n.)</b>	<b>Americas (n.)</b>	<b>(Total):</b>
I - new development:	15	2	4	6	(27)
II - urban expansion:	17	45	4	6	(72)
III - retro-fit:	37	23	2	13	(75)
<b>(Total):</b>	(69)	(70)	(10)	(25)	

4. Globally, 'new development' eco-cities – those built from scratch as entirely new cities – are rather less common than those constituting either 'urban expansion' or 'retro-fitting'. Even in the Asia/Australasia region, greenfield development is rather less common than retro-fitting. In Europe, eco-cities most often take the form of urban expansions, with greenfield development very rare. The number of eco-city initiatives implemented to date (45) is rather less than the number still under construction (69); a further 60 are currently at the pilot or planning stage. This suggests that the eco-city phenomenon is still very much in a growth phase.
5. Eco-cities are most often conceived of or delivered primarily in terms of technological innovations - 105 of the 174 eco-cities exhibit this mode of implementation. This compares with 63 which prioritise a more integrated sustainability vision or planning approach. Those whose fundamental remit is to empower or involve citizens are relatively rare; only 6 fall into this category.
6. Despite the heterogeneity of purpose and form of the 'eco'-initiatives included in this survey, some clear patterns can be observed in the terminology commonly used to describe them. Table 3 summarises key eco-city descriptors and concepts:

<b>Term</b>	<b>Meaning</b>	<b>Examples</b>
Eco-city / eco-town	Synonymous terms, commonly used in four rather different ways: (i) to describe a sizeable mixed-use new sustainable development, which is not a direct urban extension. (ii) attached to the name of a particular area of (or extension to) an existing city which has been or will be developed or retrofitted in a sustainable way (iii) attached to the name of the city as a whole, to denote an eco-initiative in one particular area of that city (iv) by local authorities, as umbrella label for various sustainability initiatives which are taking place across a city (which do not necessarily involve building work).	(i) Dongtan (profile 28) (ii) Barcelona Trinita Nova (profile 46) (iii) Grenoble (profile 57) (iv) Aberdeen (profile 1)
Eco-district/ neighbourhood	Synonymous with the second meaning of 'eco city/town' above. The term is not used to describe stand-alone developments or the city as a whole.	Saint Jean des Jardins in Chalon-sur-Saône (profile 13)
Eco-community	Usually signifies a development in a suburban or rural location, built or aspiring to ideals of sustainability.	Eko-Viikki (profile 34)
Eco-village	Two meanings: (i) Similar to an 'eco district' (see above) – reflecting the notion of the 'urban village' (ii) A rural community with an eco-agenda, perhaps a commune – too small in scale/scope to be included in this survey.	(i) Green Village Philadelphia (profile 75)
Eco-region	Two common usages: (i) to denote an area encompassing human settlements of varying sizes (rather than just one city), across which collective efforts are made to minimise negative impacts on the environment (ii) to indicate an underlying perspective which foregrounds a particular city, but positions it in relation to a broader hinterland (defined by, for example, a river basin or bordered by a mountain range). It therefore prioritises an understanding of a city's sustainability as primarily dependent on its interaction with the natural flows and systems in its eco-region. This usage draws on earlier 'bioregional' schools of thought.	(i) Thames Gateway (profile 160) (ii) Cleveland Eco-City (profile 74)
Eco-(industrial) park	Eco-industrial parks are typically mixed-use developments with a significant residential presence; mono-zoned developments are rare in any type of 'eco-city'. Their promoters usually aim to attract hi-tech and/or green industries, often as part of a wider attempt to diversify a local economy away from traditional polluting industry.	Changxing (profile 14)

7. A variety of other terms contribute to, or draw from, the broader eco-city discourse, as shown in Table 4. They may be used effectively as a synonym for 'eco-city', or collocate with the 'eco-' prefix. Individual terms overlap in meaning, but still signal different emphases in terms of aspirations, technologies and governance. Some, furthermore, are associated with specific institutional (governmental or non-governmental) programmes.

<b>Term</b>	<b>Comment</b>
Sustainable city	Synonymous with 'eco-city/town' (in any of the four meanings in Table 3). The UN-Habitat <i>Sustainable Cities</i> Programme has been promoting this concept since the early 1990s.
Sustainable community	Synonymous with 'eco-community' (see Table 3).
Smart city	Used to emphasise hi-tech aspects of development – smart energy grids, IT networks, and related efficiencies in utility and service provision.
Slim city	World Economic Forum knowledge transfer initiative to encourage cities to increase efficiency across a variety of sectors, eg energy, transport, construction work.
Compact city	Use of this term typically implies an opposition to urban sprawl. It is an influential urban design concept whose guiding principles include high residential density and the discouragement of private car use.
Zero energy city / zero net energy city	Uses no more energy than it is able to generate locally. This is achieved through a combination of measures to reduce current consumption and the introduction of new renewable energy sources.
Low carbon city	The reference to carbon (in this and the following two terms) may reflect national aspirations to create 'low carbon economies' – often as part of policies designed to mitigate climate change. The focus is on the physical aspects of cities: energy, transportation, infrastructure and buildings. 'Carbon' is sometimes used as shorthand for all greenhouse gases.
Carbon neutral city / net zero city	Similar to 'low carbon city' – except defined more strictly as a city which offsets carbon /greenhouse gas emissions such that its net emissions are zero.
Zero carbon city	More specifically still, a city which produces no greenhouse gases and is run exclusively on energy from renewable sources.
Solar city	May have a relatively narrow focus on replacing fossil fuels with solar energy, and is in some cases limited in its ambitions. The Indian Government's <i>Solar Cities</i> programme aims to reduce conventional energy use by 10%, with solar energy being part of a mix of renewable energy generation to be promoted.
Oekostadt / Ökostadt	As well as being a direct German translation of the term 'eco-city', Ökostadt also refers more specifically to a series of Austrian, German and Swiss towns and cities which declared their intention to introduce principles of sound environmental management and sustainable development in the 1990s – often as part of an <i>Agenda 21</i> programme.
Transition town	The Transition Town movement, which originated in the UK and Ireland, is a growing international phenomenon. Transition Town activities are typically organised at grass-roots level rather than embedded in policies. The aim is to build up local communities' social and environmental resilience to the effects of climate change and fossil fuel shortages – both of which are assumed to be inevitable in future.
Eco-municipality	The label 'Eco-Municipality' describes a local authority which has adopted a particular series of values related to environmental and social sustainability, to guide policy making. The movement is most strongly associated with Sweden (where it has its roots in the 1980s), but has also gained recent ground in the USA.

8. Finally, it is important to emphasise that there is considerable variety in terms of the substantive environmental, economic and social sustainability elements of the surveyed eco-city initiatives. Some initiatives are clearly more explicit and/or more ambitious about targets and commitments than others. Assessing the substantive aspects of eco-city initiatives is going to become an ever more important task, as these initiatives move from planning stage to implementation. Defining appropriate international eco-city indicators and standards, as basis for such assessment work, has only recently begun to be addressed as an important research and policy agenda.



## **List of Eco-City Profiles – by Project**



## List of Eco-City Profiles – by Project

Project/City	Profile	Project/City	Profile	Project/City	Profile
Aberdeen	1	Clermont-Ferrand	56	Kampala	115
Alexandria	2	Grenoble	57	Kaohsiung	116
Almere	3	Marseille	58	Kawasaki	117
Amman	4	Metz EcoCité 128	59	Langfang Eco-Smart City	118
Arcosanti	5	Montpellier	60	Living City DC 14 <sup>th</sup> & U (Washington DC)	119
Auroville	6	Nantes/Saint-Nazaire: Eco-métropole	61	Living City Denver LoDo	120
Bahía de Caráquez	7	Nice	62	Loja	121
Barangaroo (Sydney)	8	Pays Haut Val D'Alzette: EcoCité Esch/Belval	63	Magok (Seoul)	122
BedZED (London)	9	Plaine Commune	64	Mahindra World City (Jaipur)	123
Bicycle City	10	Rennes	65	Malmö	124
Black Sea Gardens	11	Strasbourg/Kehl	66	Manchester	125
Brøset (Trondheim)	12	EcoCité insulaire et tropicale (La Réunion)	67	Masdar	126
Chalon-sur-Saône	13	Fujisawa Sustainable Smart Town	68	Mata de Sesimbra	127
Changxing	14	Glasgow	69	Meixi Lake (Changsha)	128
Chinese Eco-Quartiers	15-17	Glumslöv	70	Menlyn Maine (Pretoria)	129
Chengdu	15	Godrej Garden City (Ahmedabad)	71	Mentougou Eco Valley (Beijing)	130
Chongqing	16	Gothenburg	72	Missouri Green Impact Zone	131
Shenyang	17	Graz	73	Nanhe Jingwu (Tianjin)	132
Chongming Eco-Island	18	Green City Blue Lake Initiative (Cleveland)	74	Nanjing Eco High-Tech Island	133
Clonburris (Dublin)	19	Green Village Philadelphia	75	Neapolis Smart EcoCity (Paphos)	134
Coventry	20	Greensburg GreenTown	76	Nieuw Terbregge (Rotterdam)	135
Curitiba	21	Greenwich Millennium Village (London)	77	One Gallions (London)	136
Delhi-Mumbai Corridor	22-25	Guangming (Shenzhen)	78	Oslo	137
Changodar	22	Guiyang Tec-City	79	Panama Pacifico (Panama City)	138
Dahej	23	Gujarat Int'l Finance	80	Pedra Branca (Palhoça)	139
Manesar Bawal	24	Gwanggyo Ekonhill	81	PlanIT Valley (Porto)	140
Shendra	25	Hacienda Ecocities (Mombasa)	82	PlaNYC (New York City)	141
Destiny Florida	26	Hamburg-Harburg	83	Portland	142
Dockside Green (Victoria)	27	Hamm	84	Puerto Princesa	143
Dongtan	28	Hammarby Sjöstad (Stockholm)	85	Reykjavik	144
Eco City 2020 (Mirny)	29	Hanham Hall (Bristol)	86	Rizhao	145
Ecociudad Logroño (Montecorvo)	30	Heidelberg	87	Royal Albert Basin (London)	146
Ecociudad Valdespartera (Zaragoza)	31	Hongqiao (Shanghai)	88	Seattle 2030 District	147
EcoVillage at Ithaca	32	Huaibei	89	Segrate / Milano Santa Monica (Milan)	148
Eko Atlantic City (Lagos)	33	Incheon Eco-city	90	Sejong	149
Eko-Viikki (Helsinki)	34	Songdo IBD (Incheon)	91	SolarCity Linz-Pichling (Linz)	150
Elephant & Castle (London)	35	Indian Eco-Cities	92-97	Sonoma Mountain Village (Rohnert Park)	151
English Eco-Towns	36-39	Kottayam	92	Sseesamirembe	152
North West Bicester	36	Puri	93	Stockholm Royal Seaport	153
Rackheath	37	Thanjavur	94	Suzhou Industrial Park	154
St. Austell	38	Tirupati	95	Western Ecological City (Suzhou)	155
Whitehill-Bordon	39	Ujjain	96	Sydney	156
Erlangen	40	Vrindavan	97	St. Davids	157
EU CONCERTO Programme	41-44	Indonesian Eco <sup>2</sup> Cities	98	Tajimi	158
Helsingør/Helsingborg	41	Issaquah Highlands (Seattle)	99	Tangshan Caofeidian	159
Trondheim	42	Ivory Park EcoCity (Jo'burg)	100	Thames Gateway (London)	160
Tudela	43	Japanese Eco-cities	101-113	Tianjin Eco-City	161
Zilina	44	Chiyoda	101	Toronto	162
EU ECOCITY 2002-2005	45-51	Iida	102	Treasure Island (San Francisco)	163
Bad Ischl	45	Kitakyushu	103	Vancouver	164
Barcelona Trinita Nova	46	Kyoto	104	Växjö	165
Győr	47	Minamata	105	Victoria Harbour (Melbourne)	166
Tampere	48	Miyakojima	106	VicUrban@Officer (Melbourne)	167
Trnava	49	Obihiro	107	Waitakere	168
Tübingen	50	Sakai	108	Wanzhuang (Langfang)	169
Umbertide	51	Shimokawa	109	Weihai City	170
EVA Lanxmeer (Culemborg)	52	Toyama	110	Xiamen	171
Ferrara	53	Toyota	111	Yangzhou	172
Freiburg	54	Yokohama	112	Yinggehai	173
French ÉcoCités	55-67	Yusuhara	113	Zonk'izizwe Town Centre (Jo'burg)	174
Bordeaux	55	Kalundborg	114		



## **List of Eco-City Profiles – by Region & Country**



## List of Eco-City Profiles – by Region & Country

### Asia

Country	Project/City Name	Profile No.
China	Changxing (Beijing)	14
	Chinese Eco-Quartiers	15-17
	Chengdu	15
	Chongqing	16
	Shenyang	17
	Chongming Eco-Island	18
	Dongtan	28
	Guangming	78
	Guiyang	79
	Hongqiao Low-carbon Business Community (Shanghai)	88
	Huaibei	89
	Langfang Eco-Smart City	118
	Meixi Lake (Changsha)	128
	Mentougou Eco Valley (Beijing)	130
	Nanhe Jingwu (Tianjin)	132
	Nanjing Eco High-Tech Island	133
	Rizhao	145
	Suzhou Industrial Park	154
	Western Ecological City (Suzhou)	155
	Tangshan Caofeidian	159
	Tianjin Eco-City	161
	Wanzhuang (near Langfang)	169
	Weihai City	170
	Xiamen	171
	Yangzhou	172
	Yinggehai	173
India	Auroville	6
	Delhi-Mumbai Corridor Eco-Cities	22-25
	Changodar	22
	Dahej	23
	Manesar Bawal	24
	Shendra	25
	Godrej Garden City (Ahmedabad)	71
	Gujarat International Finance Tec-City (Ahmedabad)	79
	Indian Eco-Cities	92-97
	Kottayam	92
	Puri	93
	Thanjavur	94
	Tirupati	95
	Ujjain	96
	Vrindavan	97
Mahindra World City (Jaipur)	123	
Indonesia	Indonesian Eco <sup>2</sup> Cities Programme	98
Japan	Fujisawa Sustainable Smart Town	68
	Japanese Eco-cities	101-113
	Chiyoda	101
	Iida	102
	Kitakyushu	103
	Kyoto	104
	Minamata	105
	Miyakojima	106
	Obihiro	107
	Sakai	108
	Shimokawa	109
	Toyama	110
	Toyota	111
	Yokohama	112
	Yusuhara	113
Kawasaki	117	
Tajimi	158	
Philippines	Puerto Princesa	143

## List of Eco-City Profiles – by Region & Country (continued)

### Asia (continued)

Russian Federation	Eco-city 2020 (Mirny)	29
South Korea	Gwanggyo Ekonhill	81
	Incheon Eco-city	90
	Songdo International Business District (Incheon)	91
	Magok (Seoul)	122
	Sejong	149
Taiwan	Kaohsiung	116

### Australasia

Country	Project/City Name	Profile No.
Australia	Barangaroo (Sydney)	8
	Sydney	156
	Victoria Harbour (Melbourne)	166
	VicUrban@Officer (Melbourne)	167
New Zealand	Waitakere	168

### Europe

Country	Project/City Name	Profile No.
Austria	Bad Ischl	45
	Graz	73
	SolarCity Linz-Pichling	150
Bulgaria	Black Sea Gardens	11
Cyprus	Neapolis Smart EcoCity (Paphos)	134
Denmark	Kalundborg	115
	Helsingør (jointly with Helsingborg, Sweden)	41
Finland	Eko-Viikki (Helsinki)	34
	Tampere	48
France	Chalon-sur-Saône	13
	French Éco-Cités	55-66
	Bordeaux	55
	Clermont-Ferrand	56
	Grenoble	57
	Marseille	58
	Metz: ÉcoCité 128	59
	Montpellier	60
	Nantes/Saint-Nazaire: Éco-métropole	61
	Nice: ÉcoCité Nice Côte d'Azur	62
	Pays Haut Val D'Alzette: ÉcoCité Esch/Belval	63
	Plaine Commune	64
	Rennes	65
Strasbourg/Kehl	66	
Germany	Erlangen	40
	Freiburg	54
	Hamburg-Harburg	83
	Hamm	84
	Heidelberg	87
	Tübingen	50
Hungary	Győr	47
Iceland	Reykjavik	144
Italy	Ferrara	53
	Segrate / Milano Santa Monica	148
	Umbertide	51
Netherlands	Almere	3
	EVA Lanxmeer (Culemborg)	52
	Nieuw Terbregge (Rotterdam)	135
Norway	Brøset (Trondheim)	12
	Trondheim	42
	Oslo	137
Portugal	Mata de Sesimbra	127
	PlanIT Valley (Porto)	140

## List of Eco-City Profiles – by Region & Country (continued)

### Europe (continued)

Republic of Ireland	Clonburris (Dublin)	19
Slovakia	Trnava	49
	Zilina	44
Spain	Barcelona Trinita Nova	46
	Ecociudad Logroño (Montecorvo)	30
	Ecociudad Valdespartera (Zaragoza)	31
	Tudela	43
Sweden	Glumslöv	70
	Gothenburg	72
	Hammarby Sjöstad (Stockholm)	85
	Helsingborg (jointly with Helsingør, Denmark)	41
	Malmö	124
	Stockholm Royal Seaport	153
United Kingdom	Växjö	165
	Aberdeen	1
	BedZED (London)	9
	Coventry	20
	Elephant & Castle (London)	35
	Glasgow	69
	Greenwich Millennium Village (London)	77
	Hanham Hall (Bristol)	86
	Manchester	125
	North West Bicester	36
	One Gallions (London)	136
	Rackheath	37
	Royal Albert Basin (London)	146
	Thames Gateway (London)	160
	Whitehill-Bordon	39
St. Austell	38	
St. Davids	157	

### The Americas

Country	Project/City Name	Profile No.
Brazil	Curitiba	21
	Pedra Branca (Palhoça)	139
Canada	Dockside Green (Victoria)	27
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### Middle East & Africa

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# **Individual Eco-City Profiles**



**1****Aberdeen**

Location	Europe - United Kingdom
Website	<a href="http://www.aberdeencity.gov.uk/planning_environment/environment/your_environment/cma_Ecocity.asp">http://www.aberdeencity.gov.uk/planning_environment/environment/your_environment/cma_Ecocity.asp</a>
Size	214,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Aberdeen was the first Scottish Local Authority to adopt a *Climate Change Action Plan* (in 2002). It implemented *Sustainable Building Standards* in 2008 for council controlled buildings and developments, and seeks to reduce CO<sub>2</sub> emissions from its own operations by 42% by 2020, compared with 2008-9. Its *Aberdeen Ecocity* initiative aims to develop strategies and policies to promote sustainable development, and to spread awareness of climate change issues among residents, businesses and visitors. Campaigns have included 'Fantastic it's not Plastic' (to replace plastic bags with reusable cotton handbags) and 'Tree for Me' (handing out native tree species to residents to plant in their own gardens). Through the *Aberdeen EcoCity Awards* scheme, prizes are given annually to local people, businesses, schools and organisations that are particularly active in protecting and improving the city's environment.

**2****Alexandria**

Location	North America - USA
Website	<a href="http://alexandriava.gov/Eco-City">http://alexandriava.gov/Eco-City</a>
Size	140,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

In 2007, the City of Alexandria, Virginia formed a partnership with Virginia Tech's Department of Urban Affairs and Planning (UAP) to form the *Eco-City Alexandria* initiative. Following a review of current environmental behaviour in Alexandria as well as international best practice, which fed into a consultation with residents and business owners, its *Eco-City Charter* was published in 2008. This had a broad remit aimed at improving quality of life, covering land use and open space, water resources, air quality, transportation, energy, green building practices, solid waste, environment and health, and building resilience to unforeseen environmental threats. A more detailed *Environmental Action Plan 2030*, containing longer-term targets and actions, was adopted in 2009, followed by an *Energy and Climate Change Action Plan* in 2011. Within the *Eco-City* framework, Alexandria has already improved its air quality, expanded its recycling programmes, opened a new park, introduced new *Leadership in Energy and Environmental Design* (LEED) building regulations, and introduced

renewable energy in schools. It organises regular public events to raise public awareness of environmental issues.

**3****Almere**

Location	Europe - The Netherlands
Website	<a href="http://english.almere.nl/local_government">http://english.almere.nl/local_government</a>
Size	350,000 inhabitants
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Almere is Holland's newest city, established in 1976 on land reclaimed from the sea. Current plans for its population to grow from 190,000 to 350,000 by 2030 are based on the seven *Almere Principles*, which include: cultivating ecological, social and economic diversity; connecting place to context; empowering citizens; and supporting ongoing technical innovation. They build on the city's history of innovative environmental and technical projects, which the council describes as 'catalysts for others to follow'. In 2002-3, the city built its own broadband infrastructure, rented out to commercial internet providers. In 2007, it completed in-fill development of a high-density mixed-use city centre. Almere Solar Island provides 10% of the heating requirements of the Noorderplassen West district (the rest comes from residual heat from a co-generation plant). 500 houses in the Columbuskwartier district are either fitted with photovoltaic systems or have been built using the 'Passive House' concept. The council announced plans in 2011 to build a new carbon neutral district, Nobelhorst, over the next decade, in partnership with Ymere Housing Association. This will include 4,300 new homes (30% affordable or for social rent), 10 acres of office space, and an ecological education centre. On-site renewable energy sources will include windmills and photovoltaic cells.

**4****Amman**

Location	Middle East - Jordan
Website	<a href="http://ecocity.wordpress.com/2008/05/26/jordan-to-build-green-city-for-one-million/">http://ecocity.wordpress.com/2008/05/26/jordan-to-build-green-city-for-one-million/</a>
Size	1 million inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

The team behind the Masdar (UAE) project (profile 126) in 2008 announced plans to build a major new district for one million inhabitants in Amman, Jordan. The development aims to address the large demand for additional, mainly middle-class housing facing Amman. Some of the eco-solutions developed in Masdar will be applied here on a larger scale, although the new neighbourhood is not designed to be fully carbon neutral. Houses will be designed to maximise energy efficiency, while renewable energy will be generated on site through wind and solar power plants. Advanced water and waste recycling systems will be used to minimise waste. The project was scheduled to commence in 2010, with a construction end date not currently available.

*Update 2011*

The project does not yet appear to have progressed beyond the planning stage.

**5**

**Arcosanti**

Location	North America - USA
Website	<a href="http://www.arcosanti.org">www.arcosanti.org</a>
Size	5,000 inhabitants (currently 50-150)
Type	I - new development
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

The construction of this self-declared 'experimental town' built in the desert of Arizona began in 1970. The town is based on the vision of architect Paolo Soleri to realise his concept of 'arcology', combining architecture with ecology. Arcosanti's innovations include a town layout which follows the features of the surrounding landscape, and terraced greenhouses. Currently still a work in progress, the site serves mainly as an education centre offering accommodation and workshops for architecture students and visitors. The Foundation still plans to build a large new hillside greenhouse structure (the Teilhard de Chardin Complex) which is designed to generate solar energy and produce food.

**6**

**Auroville**

Location	Asia - India
Website	<a href="http://www.auroville.org">www.auroville.org</a>
Size	1,500 inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	c - civic empowerment/involvement

This self-styled 'universal city in the making' focuses on bringing together people from different countries and backgrounds to live in an ecologically friendly and harmonious way. Initiated in the 1960s by a group of volunteers inspired by Indian scholar Sri Aurobindo, Auroville has been endorsed by UNESCO and the Indian Government. The development consists of a series of small settlements where sustainable farming is practiced. Auroville has also participated in several reforestation campaigns in the region. The project has, however, been criticised by some for relying on a polluting, private transport system for goods and people.

*Update 2011*

To date, 400 houses are run solely on solar energy. Auroville is looking to expand the use of electric vehicles, in order to reduce car pollution.

**7**

**Bahía de Caráquez**

Location	South America - Ecuador
Website	<a href="http://www.ecuador.us/bahiadecaraquez.htm">http://www.ecuador.us/bahiadecaraquez.htm</a>
Size	30,000 inhabitants
Type	I - new development
Phase	3 - implemented
Key implementation mode	a - technological innovation

Bahía de Caráquez was devastated in 1997 and 1998 by El Niño and an earthquake, respectively. As a consequence, the city had to be completely rebuilt, for which the regional authorities of the Sucre region used an eco-city development model in collaboration with Japanese environmental NGO Action for Mangrove Reforestation (ACTMANG). Key characteristics include an advanced waste recycling system (including organic waste), permaculture allotments and farms in the surrounding areas, and community schools offering environmental training. More recently, a large scale reforestation project has been underway in the areas surrounding the city.

*Update 2011*

Planned additional projects include: a wetland system to treat waste water; a city-wide recycling programme including a plastic recycling plant; an eco-city information centre; and a model house running on renewable energy.

**8****Barangaroo (Sydney)**

Location	Australasia - Australia
Website	<a href="http://www.barangaroo.com">http://www.barangaroo.com</a>
Size	22 hectares
Type	II - urban expansion
Phase	3 - planning stage
Key implementation mode	a - technological innovation

Redevelopment is due to begin in late 2011 of the newly renamed Barangaroo industrial site, close to Sydney's CBD, to create a new residential and commercial area and a public waterfront park. Barangaroo will be 'climate positive': exporting more water than it uses; reusing and recycling from elsewhere more waste than it generates; and generating more renewable energy than it uses. Barangaroo was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.

For an overview of eco-city initiatives taking place in Sydney as a whole, see profile 156.

**9****BedZED (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.bioregional.com/what-we-do/our-work/bedzed">http://www.bioregional.com/what-we-do/our-work/bedzed</a>
Size	82 homes and 20 businesses
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

BedZED, short for Beddington Zero Energy Development, was opened in 2001 by Bioregional (a leading UK sustainable community development business) in Sutton (south-west London) as the largest mixed-use sustainable community in the UK. 50% of its houses are under private ownership, while the other half provides housing for 'key workers' (such as nurses and teachers) and social housing. The aim of BedZED is to combine technological innovation with behavioural change: buildings incorporate advanced insulation and ventilation systems, while inhabitants' resource consumption is automatically monitored. Thus, energy saving, locally sourced food, sustainable transportation and waste recycling are actively promoted. Although the planned biomass burner has to date proved difficult to implement, solar and wind energy are produced on site. In 2007, BedZED residents consumed 45% less energy and 50% less water than the average of residents of Sutton Council.

For other eco-city projects in which Bioregional is involved, see profiles 100, 127, 136 and 151.

*Update 2011:*

In co-operation with the Borough (i.e. local council) of Sutton, where BedZED is based, BioRegional is developing a *One Planet Living* initiative for the borough as a whole and involving various community organisations. Completion is expected by 2025.

**10****Bicycle City**

Location	North America - USA
Website	<a href="http://www.bicyclecity.com">www.bicyclecity.com</a>
Size	160 acres
Type	I - new development
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Bicycle City is a concept for a car-free city developed in the USA. It embodies a comprehensive vision for environmentally and socially sustainable cities and communities, with a strong focus on bicycling and walking. The initiative appears more conceptual than rooted in concrete plans, acting as promoter of new ideas and policy changes within existing cities across the USA and beyond.

*Update 2011*

In 2010, planning approval was given for the construction of the first Bicycle City in Lexington County (South Carolina), located 12 miles from Columbia. As well as an extensive bicycle and walking network, the car-free development includes new residential neighbourhoods, nature reserves, and a community centre. The first houses should come onto the market in 2011.

**11****Black Sea Gardens**

Location	Europe - Bulgaria
Website	<a href="http://www.blackseagardens.com/">http://www.blackseagardens.com/</a> [Update 2011: this url is now defunct]
Size	Unknown
Type	I - new development
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Black Sea Gardens aims to become the 'world's first carbon-neutral luxury resort'. The £780m, 540-acre resort, planned by Madara Bulgarian Property Fund Ltd with involvement of London-based architects Foster & Partners, was designed as a chain of five hill towns located on the coast of the Bulgarian Black Sea. The plan includes public transport using electric vehicles, with private cars

prevented from entering the resort. The layout of the resort closely follows the features of the local environment. There is no indication of the timescale of the project.

*Update 2011*

Work on the project was frozen in 2009 due to a lack of sufficient funding. Local environmentalists oppose the development, as it extends to sites protected by *NATURA 2000*, the European ecological network.

**12**

**Brøset (Trondheim)**

Location	Europe - Norway
Website	<a href="http://brozed.wordpress.com/br%C3%B8set-a-carbon-neutral-housing-settlement-in-trondheim-norway">http://brozed.wordpress.com/br%C3%B8set-a-carbon-neutral-housing-settlement-in-trondheim-norway</a>
Size	86 acres
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Brøset, a new district on the outskirts of Trondheim, was recently selected by the Norwegian government's *Future Cities* programme (Ministry of Environment). Situated on an 86-acre former hospital site, this carbon-neutral development will comprise 1,500-2,500 new units. The target is to reduce residents' carbon emission to 3 tons per person per year (from a Norwegian average of 8-11 tons). The project is being developed as an interdisciplinary research-into-action programme involving Trondheim University; it is not directly related to Trondheim's participation in the 2005-2010 *EU CONCERTO* eco-city programme (profiles 41-44). Completion is expected by 2015.

**13**

**Chalon-sur-Saône**

Location	Europe - France
Website	<a href="http://www.add-home.eu/docs/AMI_scheda_progetto_SAINTEAN_ADDHOME.pdf">http://www.add-home.eu/docs/AMI_scheda_progetto_SAINTEAN_ADDHOME.pdf</a>
Size	180 homes
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

The resort town of Chalon-sur-Saône in Burgundy developed one of its former farming areas into a new eco-neighbourhood, Saint Jean des Jardins. Opened in 2005, the new houses incorporate sustainable small-holding, in keeping with the tradition of the area. Public transport is encouraged by walking and biking routes and a bus service. A central heating plant and grey water system reduces energy and water consumption. The municipality also opened an 'ecomuseum' with a focus on the regional heritage.

**14****Changxing (Beijing)**

Location	Asia - China
Website	<a href="http://www.wannian.com.cn">http://www.wannian.com.cn</a>
Size	70,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Changxing Ecological City (aka Changxindian Low Carbon Community) – based on a masterplan published in 2005 by the Beijing authorities – is a private-sector initiative led by Vanion Group with international input including Arup. It aims to create a new cultural and science-based 'eco-industrial park' in the Fengtai district of south-west Beijing, three kilometres away from Changxindian Old Town. The development will include a mixture of residential units, office buildings, public facilities, and an artificial wetland park. The aim is to balance environmental, social and economic needs and, thus, to achieve 'energy efficiency, environmental friendliness, economic growth, and social harmony'. Energy consumption is to be reduced by 20% through energy efficient buildings. 15% of energy will be produced from renewable sources. Transport-related CO<sub>2</sub> emissions are to be cut by half (in comparison with existing cities) through an integrated public transport system.

*Update 2011*

The project is also to include: 100% rain water collection and re-use; bio-infiltration and low drainage impact development; 70% household waste recycling; and access to local services within a 500m radius for all residents. The concept won the International Society of City and Regional Planners *Excellence Award* in 2009.

15-17

### Chinese Éco-Quartiers (Chengdu, Chongqing, Shenyang)

Location	Asia - China
Website	<a href="http://www.eco-quartiers.fr/#!/fr/focus/agenda/2011/05/atelier-les-eco-quartiers-en-chine-83/">http://www.eco-quartiers.fr/#!/fr/focus/agenda/2011/05/atelier-les-eco-quartiers-en-chine-83/</a>
Size	7m / 30m / 7m inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

In November 2010, the French Ministry of Economy, Finance and Industry signed a cooperation agreement on eco-neighbourhoods ('éco-quartiers') with the Chinese Ministry of Foreign Trade, with a special focus on the three 'pilot cities' of Chengdu, Chongqing and Shenyang. All three cities had a previous history of sustainability initiatives.

The aim is to encourage French companies to invest in and provide technical expertise for local eco-enterprises and initiatives. The overall goal is to develop an 'éco-quartier' within each city, in line with the French principles of encouraging environmentally friendly forms of transport and building methods, reducing energy and water consumption, promoting renewable energy sources and better waste management, and encouraging biodiversity (see also introduction to profiles 55-67). The agreement will facilitate the exchange of information on environmental politics and regulation, energy efficiency strategies, new technical innovations, and financing opportunities. Meetings are to be organised between French and Chinese authorities and companies to identify and evaluate potential new projects.

#### Chengdu

Chengdu, the capital of Sichuan province, is one of key transport and economic hubs of Western China. Its pioneering attitude to environmental issues has been repeatedly recognised by state and national governments in the past. In 2000, it was awarded the *Dubai International Award for Best Practices to Improve the Environment*, and approved by the Chinese Ministry of Environmental Protection as a *National Model City for Environmental Protection* in 2006. Current plans involve reducing energy consumption and water and air pollution, while strengthening the economy through its promotional *Go West* scheme (which encourages foreign business investment in Western China). In 2011, Chengdu was one of 8 cities globally named by the UN as a 'role model for resilient development', following the successful rebuilding programme in the wake of the major 2008 Sichuan earthquake.

#### Chongqing

Having been one of the principal urban centres of heavy industry since the 1940s, Chongqing was selected in 2010 by the Chinese National Development and Reform Commission to be a *Low Carbon Pilot City*. Chongqing is keen to build on its industrial heritage by developing its hi-tech environmental industries. The *Five Chongqing* initiative was launched in 2009 to make the city more sustainable and liveable. It defines five groups of targets to be met by 2012, covering public health and physical exercise, workplace and public safety, ease of transport, and affordable spacious housing, as well as a commitment to increase the green areas

of the city to 45%.

### Shenyang

Shenyang, a major industrial centre, embraced the idea of sustainability earlier than many Chinese cities. In 1996, it became one of the first cities in the UN's *Sustainable Cities Project*. Since then, it has successfully implemented regulations to reverse problems of air pollution, water pollution, and domestic waste disposal, and was approved by the Ministry of Environmental Protection as a *National Model City for Environmental Protection* in 2004. Decisions during this process have been made following cross-sectoral consultative processes which are untypical for China. The city recently completed a 10 km long green ecological corridor along both banks of Hunhe River. In 2009, plans were announced to collaborate with IBM and Northeastern University (Boston) to create a 'smart eco-city' using hi-tech solutions to problems such as energy efficiency, water supply and use, and traffic flow.

18

### Chongming Eco-Island

Location	Asia - China
Website	<a href="http://www.cmx.gov.cn/cm_website/html/eng_cmzf/portal/index/index.htm">http://www.cmx.gov.cn/cm_website/html/eng_cmzf/portal/index/index.htm</a>
Size	700,000
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision / planning

The *Chongming Eco-Island* project is endorsed by the Shanghai administration and is to be implemented within the Yangtze River delta. Although part of the municipality of Shanghai, Chongming Island has remained relatively underdeveloped to date. This project aims to preserve natural habitats as well as revitalize local villages by improving quality of life through, communication, local business, public and domestic infrastructure. It plans to create links between urban and rural areas in order to facilitate social and economic exchanges. Ecological conservation activities include recycling city garbage into compost for organic agricultural production, recycling sewage water and oil. There are also plans to develop eco tourism and eco education within the region, with five low-carbon 'demonstration' projects due to be completed by 2015. The (delayed) Dongtan eco-city initiative – a separate development (profile 28) – is located on the southern tip of the island.

**19****Clonburris (Dublin)**

Location	Europe - Republic of Ireland
Website	<a href="http://www.clonburris.ie/index.php?option=com_content&amp;task=view&amp;id=26&amp;Itemid=0">http://www.clonburris.ie/index.php?option=com_content&amp;task=view&amp;id=26&amp;Itemid=0</a>
Size	15,000 homes
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Detailed planning for Clonburris, a new district of Dublin, was started in 2007. The focus is on implementing several technological innovations and encouraging behavioural changes among residents. In the building phase, recycled and sustainable materials will be used. Energy efficiency and renewable energy will be standard requirements for all new building. Local food production will be encouraged by providing allotments to all residents. A sustainable lifestyle will be further promoted by, for example, banning tumble dryers and providing communal areas for drying clothes.

*Update 2011*

In 2011, South Dublin County Council granted planning permission for the first 898 homes to be built – although it is unclear when/whether the developers (Shelbourne) will be going ahead, due to financial uncertainty. Public transport is to be improved by adding two new railway stations, and building two new metro lines into Dublin city centre by 2016.

**20****Coventry**

Location	Europe - United Kingdom
Website	<a href="http://www.coventry.gov.uk/info/200105/sustainability">http://www.coventry.gov.uk/info/200105/sustainability</a>
Size	300,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Taking its cue from the UK Government's 2008 *Climate Change Act*, Coventry City Council published its *Low Carbon Coventry 2020* report in 2010. This sets out a vision for the city's future in terms of transport, energy, employment, local food economy, climate change, the built environment, resource efficiency and waste management. As a participant in the Government's *Low Carbon Vehicle Procurement Programme*, Coventry runs 45 low-carbon vehicles. It has installed 18 electric charging stations in public places as well as one of the few hydrogen fuelling stations in the country. In 2011, Coventry was awarded *Living Labs* status by the Brussels-based European Network of Living Labs (ENoLL). *Coventry City Lab*, based in Coventry University's Technology Park, is a strategic

partnership between the University and the Council with input from private companies including Jaguar Land Rover, British Telecom, O2, Arup, Cisco and IBM. It aims to improve the quality of life for the city's residents and 'create an exemplar Low Carbon community', establishing Coventry as a 'test-bed, incubation hub and international showcase for low carbon innovations'.

**21****Curitiba**

Location	South America - Brazil
Website	<a href="http://www.curitiba.pr.gov.br/siteidioma/?idiomacultura=2">http://www.curitiba.pr.gov.br/siteidioma/?idiomacultura=2</a>
Size	Over 1.5 million inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Curitiba has a longstanding, international reputation as one of the first eco-cities, initiated in the 1970s under the then leadership of Mayor Jaime Lerner. Its reputation is mainly built on its pioneering integrated bus system, which has resulted in increased public transport and a reduction in traffic congestion. More recently, the city has piloted a recycling systems based on incentives (food-for-recyclables exchange system) and public education. The city's network of parks and green spaces has been expanded with the aim to enhance the environmental, social and cultural dimensions of urban living. Curitiba is currently considering the introduction of an underground public transport system.

*Update 2011*

In 2010, the city received the *Globe Sustainable City Award* from Globe Forum.

**22-25****Delhi-Mumbai Corridor Eco-Cities (Changodar, Dahej, Manesar Bawal, Shendra)**

Location	Asia - India
Website	<a href="http://delhimumbaiindustrialcorridor.com">http://delhimumbaiindustrialcorridor.com</a>
Size	Overall length of 1483 km passing through six states (Unknown)
Type	I - new development
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

In April 2010 India's Ministry of Commerce and Industry announced its plan to build four eco-cities within the Delhi-Mumbai 'Corridor'. Besides the eco-cities,

the Corridor will have 11 investment regions and 13 industrial areas. The four 'eco-friendly' communities will cost \$90 billion, with costs shared between India and Japan. The eco-town design is based on the Kitakyushu eco-town model in Japan (profile 103). The initiative follows a new system of urban planning to the area and will represent the biggest urban development programme since Chandigarh was built in 1953. Key features are compact, vertical developments, an efficient public transportation system, the use of digital technology to create smart grids for better management of civic infrastructure, recycling of sewage water for industrial use, reuse of industrial waste, green spaces, cycle tracks and easy accessibility to goods, services and activities designed to foster a sense of community.

The Delhi-Mumbai Corridor eco-cities are not the only urban sustainability projects taking shape in India. In 2008, the Indian Ministry of New and Renewable Energy (MNRE) announced a *Development of Solar Cities* initiative, to be implemented during the 11<sup>th</sup> 5-year plan (2007-2012). This set aside funding for 60 cities to work towards reducing conventional energy demand by at least 10%, through the implementation of solar and other renewable energy sources, along with energy and water conservation, and the use of solar passive architecture. The initiative has been developed with input from the US Department of Energy, among others. In 2010 the Japanese government expressed interest in collaborating on one city. As of September 2011, MNRE had given 'in principle' agreement for 36 *Solar City* programmes to go ahead.

Additionally, the Indian Ministry of Urban Development is working with the US Department of Energy and US-based Brookhaven National Laboratory to create eight 'Near-Zero Energy Satellite Towns'. Rajarhat, a fast growing new township near Kolkata, was selected in 2010 to be the first of these.

An earlier programme of pilot eco-city initiatives was launched in 2001 by the Ministry of Environment and Forest (profiles 92-97). This programme is unrelated to the current Delhi-Mumbai Corridor plans.

## 26

### Destiny Florida

Location	North America - USA
Website	<a href="http://www.destinyflorida.com">http://www.destinyflorida.com</a>
Size	250,000 inhabitants
Type	I - new development
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Plans for Destiny Florida, which aims to be 'America's first eco-sustainable city' were launched in 2008 by Pugliese Development Company. The new city will be located in the middle of the Florida peninsula and aims to offer its private residents an environmentally sustainable way of living. Based on projections suggesting that Florida's population will double by 2050 and that urban sprawl will replace most of the existing green space, Destiny Florida promises an urban environment in which green space is preserved. Much of its 64 square miles of territory will be protected from development – following its principles of '4Cs':

conservation, countryside, centres, and corridors. It is among the 16 cities included in the Clinton Climate Initiative's *Climate Positive Development Program*. It has signed up to a reduction of CO<sub>2</sub> emissions by 80% by 2050 compared with 1990 levels of a similarly sized US city. At least 50% of its energy requirements will be met by on-site renewable sources.

**27****Dockside Green (Victoria)**

Location	North America - Canada
Website	<a href="http://www.docksidegreen.com">http://www.docksidegreen.com</a>
Size	6 hectares
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Dockside Green is being built on a brownfield site as a carbon-neutral residential, office, commercial, and light industrial community in Victoria, British Columbia. The redevelopment strategy was designed by the City of Victoria in consultation with the local community, and is being developed jointly by Windmill West and Vancity, following purchase of the land from the city in 2005.

Buildings will have a passive solar design and be constructed from environmental-friendly materials, with Energy Star compliant appliances, LED lighting in corridors, occupancy sensors and solar lighting in landscape areas. A wood biomass gasification plant is to be introduced. All sewage will be treated on site, with water reused for flushing toilets and local irrigation. Rainwater run-off will be minimised through the use of green roofs and green waterways. The initiative as a whole was chosen as one of the Clinton Climate Initiative's *Climate Positive Development Program* projects in 2009.

**28****Dongtan**

Location	Asia - China
Website	<a href="http://www.dongtan.cn">http://www.dongtan.cn</a> <a href="http://www.arup.com/_assets/_download/8CFDEE1A-CC3E-EA1A-25FD80B2315B50FD.pdf">http://www.arup.com/_assets/_download/8CFDEE1A-CC3E-EA1A-25FD80B2315B50FD.pdf</a>
Size	Up to 70,000 inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

Dongtan was launched in 2005 as a flagship project of the Chinese government aimed at addressing the dual challenge of meeting the country's need for urbanisation while improving environmental performance. Located outside Shanghai at the mouth of the Yangtze river, the city is designed to consist of 'zero-energy' buildings (ZEBs); a 'greenhouse gas neutral' transport system; a self-sufficient water system; and a fully renewable energy system. In addition, Dongtan aims to increase biodiversity through the wetlands surrounding the city. As is the case for the proposed Wanzhuang eco-city (profile 169), the Shanghai Industrial Investment Corporation (SIIC) is collaborating with the British engineering firm Arup on this project. The first part was supposed to be finished in 2010 in time for the Shanghai World Expo, but has been delayed due to a combination of the world financial crisis and local political developments.

A separate initiative (profile 18) aims to encourage sustainable development across Chongming Island as a whole – Dongtan being located on its southern tip.

#### *Update 2011*

New tunnel and bridge connections between Chongming Island and Shanghai opened in October 2009. Work on Dongtan is reported to have resumed according to the original master plan and under the guidance of the Mayor of Shanghai.

## 29

### **Eco-city 2020 (Mirny)**

Location	Asia - Russian Federation
Website	<a href="http://www.impactlab.net/2010/11/16/100000-person-domed-city-could-be-built-in-siberian-diamond-mine">http://www.impactlab.net/2010/11/16/100000-person-domed-city-could-be-built-in-siberian-diamond-mine</a>
Size	100,000 inhabitants
Type	I - new development
Phase	1 - planning stage
Key implementation mode	a - technological innovation

The speculative domed eco-city development currently referred to as *Eco-city 2020* would be located in the abandoned pit of the Mir diamond mine in Siberia. The pit is over 500m deep, and over a kilometre in diameter, and would support a glass dome structure on top. The new city is planned to be divided into 3 main levels, containing a farm, forests, residences, and recreational areas. The glass dome will protect the city from outside temperatures and will be covered by photovoltaic cells harvesting solar energy for the development. The main floor will hold parks and recreation areas, with residential areas terracing up around the walls of the mine. The town is also meant to become a major touristic attraction.

**30****Ecociudad Logroño (Montecorvo)**

Location	Europe - Spain
Website	<a href="http://www.e-architect.co.uk/spain/logrono_eco_city.htm">http://www.e-architect.co.uk/spain/logrono_eco_city.htm</a>
Size	3,000 homes
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

In 2007, the regional government of La Rioja launched its plan to create Montecorvo, an extension of its capital Logroño. The new neighbourhood aims to achieve a CO<sub>2</sub>-neutral footprint by relying on renewable energy (solar and wind power). The linear urban layout is characterised by its compactness – occupying only ten% of the 56 ha site – and a close alignment with the surrounding environment. In addition to retail and leisure facilities, the new district will feature parkland and a renewable energy research centre and museum. The onsite production of renewable energy is expected to make annual savings of around 6,000 tons of CO<sub>2</sub> emissions. The planning process met with resistance from the municipal authorities. The first buildings were originally expected to be completed by 2013.

*Update 2011*

In 2010, planning permission was granted by the regional government. As originally envisioned, only 10% of the overall site will be used for housing (c. 3,000 units), retail and public facilities. The other 90% will form an eco-park, which will act both as public space and renewable energy production site (solar plants, wind turbines).

**31****Ecociudad Valdespartera (Zaragoza)**

Location	Europe - Spain
Website	<a href="http://www.valdespartera.es">http://www.valdespartera.es</a>
Size	9,500 houses
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

Ecociudad Valdespartera was initiated in 2001 through a co-operation between the municipal and regional authorities of Zaragoza with the aim to convert decommissioned military barracks into social housing and public facilities. The new district of Zaragoza is designed to meet current Spanish sustainable building criteria. The design incorporates the features of the surrounding environment. Buildings are oriented towards the sun to optimise natural heating and to allow the use of solar panels; grey water is used to water gardens; and vertical wind shields protect from prevailing winds. Green spaces containing native species have been interspersed with the dense network of streets. The first residents moved into the new district in 2004.

*Update 2011*

Several green spaces/ecological corridors have been created within the city, to improve both the microclimate and water conservation. A new tram line opened in 2011, between Valdespartera and the centre of Zaragoza.

**32**

**EcoVillage at Ithaca**

Location	North America - USA
Website	<a href="http://www.ecovillage.ithaca.ny.us">http://www.ecovillage.ithaca.ny.us</a>
Size	100 houses
Type	I - new development
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

Located in Upstate New York, *EcoVillage at Ithaca* promotes a more sustainable way of living for its residents and acts as an educational model. It aims to present an alternative to mainstream American urban living, by balancing a healthy and socially rich lifestyle with environmental sustainability. In addition to the residential dwellings, *EcoVillage at Ithaca* also includes organic farms, green spaces, offices and an education centre. Current projects under development include a wind power plant, biological waste water treatment and grey water recycling systems, bio fuel production, and a school.

*Update 2011*

In 2010, the Town Planning Board approved an additional neighbourhood (40 new homes, to be completed by 2012) and a new village green to connect all three neighbourhoods.

**33****Eko Atlantic City (Lagos)**

Location	Africa - Nigeria
Website	<a href="http://www.ekoatlantic.com">http://www.ekoatlantic.com</a>
Size	250,000 inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

'Eko' is the local (Yoruba) word for the city of Lagos; its use in this project's name is not primarily intended to signal the idea of 'eco' development. Nevertheless, *Eko Atlantic City* has a strong focus on environmental sustainability, and has been reported on internationally as an 'eco-city'. Developed with Chinese input, it is a large reclamation project, replacing land adjacent to Victoria Island lost over centuries of coastal erosion. Complex marine works engaging consultants and contractors to manage the impact of the Atlantic Ocean have already begun. The project aims to create and use infrastructure in order to create an environmentally balanced and efficient lifestyle. A pedestrian and transport strategy is designed to reduce road use, minimize traffic congestion and create off-street parking for all vehicles. A tramway system will circulate through the city allowing commuters to access all areas including public transport on Victoria Island. Reclamation of the Bar Beach area on Victoria Island was completed in April 2011.

**34****Eko-Viikki (Helsinki)**

Location	Europe - Finland
Website	<a href="http://www.hel.fi/static/ksv/julkaisut/eco-viikki_en.pdf">http://www.hel.fi/static/ksv/julkaisut/eco-viikki_en.pdf</a>
Size	1,700 inhabitants
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

The Finnish Ministry of the Environment chose the neighbourhood of Viikki as the pilot site for a new-build 'eco' (Eko) community in the mid-1990s, partly because of its urban location in north-east Helsinki. Building work took place between 1998 and 2004. As the owner of the site, the City of Helsinki stipulated minimum green building criteria much higher than the norm for Finland at the time. Innovation in this respect was encouraged through a building design competition, which led developers to experiment in different ways, with successes in the use of solar energy, natural ventilation, and a district heating network. Building plots were sold to a wide variety of developers, with some reserved for self-build projects, leading to architectural variety and further encouraging environmental innovation. The *Eko-Viikki* area as a whole includes 'green fingers' which manage run-off stormwater and provide all homes with easy access to open space, and a variety of measures to encourage biodiversity in gardens, allotments and the nearby urban wetlands.

**35****Elephant & Castle (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.elephantandcastle.org.uk">http://www.elephantandcastle.org.uk</a>
Size	170 acres
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	a - technological innovation

An agreement was finalised in 2011 between Southwark Council and developers Land Lease Europe to regenerate the Elephant & Castle area of inner south London. The development is expected to cost £1.5 billion, and take more than 10 years to complete. It is to provide thousands of new homes (of which a minimum of 25% affordable), a leisure centre, and an enlarged shopping centre, along with improvements to the local public realm and public transport infrastructure. The development is planned to be carbon neutral, with energy to be provided by a combined heat, power and cooling system. Non-potable water will be provided from boreholes already sunk on the site. The scheme was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.

36-  
39**English Eco-Towns  
(North West Bicester, Rackheath,  
St. Austell, Whitehill-Bordon)**

Location	Europe - United Kingdom
Website	<a href="http://www.communities.gov.uk/documents/planningandbuilding/pdf/pps-ecotowns.pdf">http://www.communities.gov.uk/documents/planningandbuilding/pdf/pps-ecotowns.pdf</a>
Size	Between 5,000 and 7,000 homes each
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

In 2009, the UK government announced plans for the first four in a series of new eco-towns across England to address the national shortage of housing. The decision to build four new towns (from originally twelve selected sites) followed a lengthy and at times controversial public consultation process. The new eco-towns are to be built on either brown- or green-field sites in Cornwall (St Austell), Hampshire (Whitehill-Bordon), Norfolk (Rackheath) and Oxfordshire (North West Bicester). The bulk of the funding (£60m spread across the four developments) is being provided by the Department for Communities and Local Government, with a further £2.5m from the Department for Children, Schools and Families set aside for the construction of a demonstration zero-carbon school in each town. Overall, the aim is to provide homes for around 30,000 inhabitants within a period of five years, and to create 2,000 additional jobs. The new eco-towns are mostly new-builds, although in some cases they will also incorporate some refurbished buildings. They are located in the proximity of nearby towns, in order to take advantage of existing public transport networks and amenities. The building process is supposed to involve 30% less greenhouse gas emissions than traditional building processes. The towns will incorporate renewable (wind/solar) energy production and transport systems (e.g. electric vehicles).

**North West Bicester**

North West Bicester will be built on the edge of the existing town of Bicester, with 1,500 out of the 5,000 planned homes providing affordable housing. In August 2011, detailed planning permission for the 'exemplar' first phase of the project was granted, paving the way for 393 homes and a renewable energy centre to be built by developers P3Eco and A2Dominion. The experience of planning and implementing the 'Exemplar' will guide the subsequent development.

**Rackheath**

Rackheath Eco-Community is planned as an extension of the existing village of Rackheath (approximately five miles from Norwich's city centre), on the site of a Second World War airfield which is now used for agricultural purposes. The project includes 4,000 new buildings designed to promote low carbon living. Local groups opposing the eco-town include SNUB ('Stop Norwich Urbanisation').

**St. Austell**

Supported with £9.5m of government funding, the *St Austell and Clay County Eco-town* initiative aims to create a sustainable community through the redevelopment of six decommissioned china clay pit sites owned by French mining group Imerys. The development will create over 5,000 carbon-neutral

houses, retail and leisure facilities, a sustainable transport system and green spaces. The plan has been opposed by the local No Eco Town group.

In 2011, St Austell, with a population of approx. 22,000, applied to government to be granted city status on the grounds of its 'eco-friendly' assets, including the eco-town project, the Eden Project and a new (BREEAM excellent rated) sustainable shopping centre development (White River).

### **Whitehill-Bordon**

This planned carbon-neutral development makes provision for up to 5,500 new houses, and two new schools, to be built mostly on the 230-hectare site of decommissioned military barracks in this garrison town (this land is expected to be released in 2015). The project will be developed through a public-private partnership, with completion expected by 2026-2028, assuming suitable private investors are found. Retro-fitting of existing buildings is also taking place at present. A public consultation over the masterplan is taking place between October and December 2011, amid ongoing local opposition from the Bordon Area Action Group.

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### **Erlangen**

Location	Europe – Germany
Website	<a href="http://www.erlangen.de/en/desktopdefault.aspx">http://www.erlangen.de/en/desktopdefault.aspx</a>
Size	100,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Located in Bavaria with just over 100,000 inhabitants, the university town of Erlangen is considered one of the most eco-friendly cities in Europe. Following the lead of other German cities, in particular Freiburg (see profile 54), Erlangen introduced new policies during the 1980s to bring about more environmentally friendly transport and energy production. Under the leadership of the city's mayor, an extensive bicycle network was implemented, resulting in an increase in bicycle use of 75%. Several areas of the city have been pedestrianised, while the tram network has been extended. In 1989, the Japanese National Eco-City Contest Network gave Erlangen its *Top-Ecocity* award.

41-  
44**EU CONCERTO Eco-City Programme  
(Helsingør/Helsingborg, Trondheim,  
Tudela, Zilina)**

Location	Europe - Denmark/Sweden, Norway, Spain, Slovakia
Website	<a href="http://www.ecocity-project.eu">http://www.ecocity-project.eu</a>
Size	Various (30,000 - 170,000 inhabitants)
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

This European Commission-funded initiative (2005-2010) aimed to demonstrate innovations in energy reduction, under the umbrella of the Europe-wide *CONCERTO* sustainable energy programme. The cities participating were Helsingør in Denmark and Helsingborg in Sweden (jointly), Trondheim in Norway, Tudela in Spain, and – as an associate – Zilina in Slovakia. This initiative was separate from the earlier *ECOCITY - Urban Development Towards Appropriate Structures for Sustainable Transport* research project (profiles 45-51).

**Helsingør and Helsingborg**

The first phase of the project in neighbouring Helsingør and Helsingborg focused on increasing the energy efficiency of existing buildings. The second phase entailed the building of several new developments according to strict energy efficiency norms. Various technological applications, such as solar panels and heat pumps for water heating, were tested and compared. A new education centre with focus on renewable energy was opened in Helsingborg, alongside a new cultural centre in Helsingør. Future plans include a large biomass boiler.

*Update 2011*

Helsingborg has reported significant drops in energy consumption, water use, and CO<sub>2</sub> emissions compared with 1990.

**Trondheim**

Trondheim implemented a programme of retro-fitting residential and public buildings and designing new buildings according to stringent sustainability standards. 'Intelligent' meters in all new buildings help monitor energy and water consumption. Solar and biomass plants have been installed to produce renewable energy. A waste to energy system with an efficiency of over 75% is in place.

*Update 2011*

Bus use in the Trondheim area has increased by 27% in the last year, following the introduction of toll booths for cars and reductions in bus fares. Through a separate government initiative, a new sustainable residential district (Brøset, profile 12), is being planned on the site of a former hospital on the outskirts of Trondheim.

**Tudela**

Tudela focused on improving energy efficiency and generating renewable energy. The latter includes an advanced, mixed energy system that concurrently harnesses wind, photovoltaic and thermal energy. Apart from retro-fitting many existing buildings, a new neighbourhood is under construction

using sustainable building materials. Energy efficiency in the new buildings is to be achieved through the use of a sophisticated monitoring and demand-supply system.

### **Zilina**

Zilina's association with the programme served to encourage knowledge transfer from eco-city development taking place in Helsingör/Helsingborg, Trondheim and Tudela. Zilina has initiated the construction of a new eco-neighbourhood.

**45-51**

### **EU ECOCITY 2002-2005 Research Project (Bad Ischl, Barcelona Trinitat Nova, Győr, Tampere, Trnava, Tübingen, Umbertide)**

Location	Europe - Austria, Spain, Hungary, Finland, Slovakia, Germany, Italy
Website	<a href="http://www.eurosolaritalia.org/pubblicazioni_dett.php?id_pubblicazioni=12">http://www.eurosolaritalia.org/pubblicazioni_dett.php?id_pubblicazioni=12</a>
Size	various
Type	II - urban expansion / III - retro-fit
Phase	various
Key implementation mode	a - technological innovation / b - integrated sustainability vision/planning

The *ECOCITY - Urban Development towards Appropriate Structures for Sustainable Transport* research project (2002–2005) aimed to identify the obstacles and success factors for eco-city development. It included seven 'action research' case studies around Europe, where a variety of sustainability initiatives were taking place, and subsequently reported on implementation successes and failures in each case. Although the project had a particular interest in transport issues, it also studied urban structure, energy and material flows, and socio-economic development. It was separate from the 2005-2010 European Commission-funded *CONCERTO* eco-city programme of initiatives in Helsingør/Helsingborg, Trondheim, Tudela and Zilina (profiles 41-44).

#### **Bad Ischl – Austria**

##### **(II - urban expansion; 1 - planning stage; a - technological innovation)**

This project aimed to demonstrate an alternative to sprawl by planning homes for approximately 2,000 new inhabitants. A new settlement was planned around an existing train station, along with an expansion of an industrial estate, and a small in-fill residential development. Open green areas were to be preserved. The new settlement would be built to a high density, with high level of thermal insulation, solar orientation of buildings, and heating energy produced from renewables. Pedestrian-oriented public spaces are envisaged in the masterplan, with cars kept out of the centre.

#### **Barcelona Trinitat Nova - Spain**

##### **(III - retro-fit; 3 - implemented; b - integrated sustainability vision/planning)**

The need to renovate this area on the north-eastern outskirts of Barcelona was

first officially recognised in the 1999, but local residents themselves suggested that regeneration should follow eco-friendly principles and contributed extensively to its planning. Old poorly-built housing was replaced with new energy-efficient higher density units, with materials from demolitions being recycled and reused. Local amenity spaces were retained and a sustainability education centre created. Improvements were made to public transport connections with the rest of Barcelona.

### **Győr – Hungary**

**(II - urban expansion; 2 - under construction; a - technological innovation)**

This was a long-term development proposal for approximately 6,000 new flats in 10 new neighbourhoods and retail facilities, in a 100-hectare ex-industrial site close to the city centre and Danube River. Housing is denser than the average for the city, with passive solar orientation used. A network of cycle paths has been introduced along with traffic calming measures. 'Green fingers' connect the residential areas to the Danube, provide public amenity space, and serve as rainwater collectors. Development of this new 'Városrét' area is ongoing, but has recently run into problems due to the economic recession.

### **Tampere – Finland**

**(II - urban expansion; 2 - under construction; a - technological innovation)**

A new residential area for approximately 13,400 people is being developed in Vuores, a woodland area to the south of Tampere. Varied housing is being built at easily walkable distances from a series of mixed-use centres. The project has been designed to have minimal impact on the fragile local environment, with stormwater runoff delayed and absorbed in flood meadows, depressions, and underground gravel-filled trenches. Buildings will be energy efficient, with research currently taking place into possibilities for on-site exploitation of wind and solar power and geothermal heat. A tram or light rail line may be implemented in future. The first residents have moved in already, but the development as a whole is not expected to be complete until 2020.

### **Trnava – Slovakia**

**(III - retro-fit; 1 - planning stage; a - technological innovation)**

This project aimed to regenerate Trnava's town centre. Planned initiatives in the historic centre, where physical and technological changes to the built environment were restricted due to preservation orders, focused on tree planting, revitalisation of the river, traffic calming and pedestrianisation measures. A major thoroughfare was reinvisioned as a pedestrian friendly boulevard. Adjacent ex-industrial land (the site of an old sugar factory), meanwhile, was earmarked for new housing.

### **Tübingen – Germany**

**(II - urban expansion; 1 - planning stage; a - technological innovation)**

Tübingen's main goal in participating in the *ECOCITY* project was to draw up a masterplan to relieve its housing shortage, while protecting the surrounding environment. The masterplan drew on a comprehensive citizen participation process, and provided for densification around public transport stops and in-fill housing as well as some new-builds at the edge of the city (in total, enough for around 3,300 inhabitants). High quality pedestrian-friendly public spaces were planned, with traffic-calming measures and car-free zones expected to be introduced. Plans were made for district heating systems, water heating and PV solar panels, and biomass generators.

**Umbertide – Italy****(II - urban expansion; 1 - planning stage; a - technological innovation)**

The project focused on the planning of a new district around the local railway station linked with the historical city, creating homes for approximately 1,300 people. Plans to reduce the high local dependency on private cars included the introduction of a new light railway line. The development was designed to promote 'urban comfort' – defined in terms of green amenity areas, water features and 'bioclimatic wind tunnels' to provide cool breezes in summer.

**52****EVA Lanxmeer (Culemborg)**

Location	Europe - The Netherlands
Website	<a href="http://www.eva-lanxmeer.nl">http://www.eva-lanxmeer.nl</a>
Size	24 hectares
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	c - civic empowerment/involvement

EVA Lanxmeer, in the town of Culemborg (near Utrecht), was completed in 2009. Community participation has been a fundamental principle of its development; residents and users contributed to every stage of its design and management, in collaboration with the local authority and the EVA sustainability foundation (EVA stands for 'Ecological Centre for Education, Information and Advice'). It contains approximately 250 houses and flats, office space, a city farm, and an ecological education centre. It has aimed to move towards closed material and energy cycles, and prioritised sustainable water management and renewable energy. A diversity of housing types was actively sought – both architecturally and in terms of tenure – with home-working spaces encouraged. Houses are energy efficient, most having solar panels for water heating and electricity generation, and there is a biogas production plant on site.

**53****Ferrara**

Location	Europe - Italy
Website	<a href="http://ferrara.comune.fe.it">http://ferrara.comune.fe.it</a>
Size	130,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Ferrara, located in the province of Emilia-Romana, has mainly focused on one area of what it calls 'urban eco-transformation': using advanced technological innovation, the town has implemented a highly efficient waste recycling system, covering both waste separation and recycling. Ferrara won a *European Sustainable City Award* in 2003, along with Heidelberg (profile 87) and Oslo (profile 137).

**54****Freiburg**

Location	Europe - Germany
Website	<a href="http://www.freiburg.de">www.freiburg.de</a>
Size	220,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Since the 1970s, Freiburg has developed a reputation as Germany's 'ecological capital'. In 1986, the city adopted a master plan for a sustainable city based on environmentally sustainable energy supply, resulting in advanced (solar technology based) energy efficiency and public transport programmes. In 1996, Freiburg passed its *Climate Protection Protocol* aimed at reducing CO<sub>2</sub> emissions by 25% below 1992 levels by 2010. (In 2007, this was increased to 40% for 2030.) Over the first ten year period, CO<sub>2</sub> emissions were reduced by more than 10% per capita. There has been a 100% increase in public transport use, with up to 35% of residents being non-car owners. Several neighbourhoods are experimenting with passive energy houses using specially designed insulation and air-flow systems.

**55-67**

**French ÉcoCités  
(Bordeaux, Clermont-Ferrand, Grenoble,  
Marseille, Metz, Montpellier,  
Nantes/Saint-Nazaire, Nice, Pays Haut  
Val D'Alzette, Plaine Commune, Rennes,  
Strasbourg/Kehl, Territoire de la Côte  
Quest (TC0) - La Réunion)**

Location	Europe - France / Africa - French Territories
Website	<a href="http://www.dialogue-ecocite.fr">www.dialogue-ecocite.fr</a>
Size	cities of >100,000 inhabitants
Type	II - urban expansion / III - retrofit
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

In 2008, the French government launched two major eco-city initiatives as part of the national Urban Sustainability Plan (*Plan Ville Durable*) within the legislative programme on sustainable development (*Grenelle Environnement*). The *ÉcoQuartier* initiative is aimed at medium-sized towns and cities of 20,000-100,000 inhabitants. In the first programme phase (2008-2009), applications from 160 cities were considered following an open call for proposals, with 14 initiatives selected for funding. As part of phase 2, a national forum (*Club National EcoQuartier*) was set up to encourage dissemination of ideas and practices among these and other cities.

The second initiative, *ÉcoCité*, is aimed at larger cities of more than 100,000 inhabitants and with expected population growth of approx. 30% over the next 20-25 years. In its first phase, 13 cities were selected from a total of 19 applications. Phase 2 (2010-2011) includes the development of technical and financial feasibility plans between the French government and the individual cities concerned. The third, operational phase will involve developing and implementing specific projects. Both initiatives are characterised by their focus on (i) transforming existing cities, (ii) promoting environmental and economic innovation to achieve sustainable development and economic growth – funding comes from the €1bn national economic stimulus programme – and (iii) supporting dialogue and co-operation between central government and participating cities. The 13 eco-cities are:

### **Bordeaux**

#### **(II – urban expansion)**

This *ÉcoCité* initiative aims to counteract urban sprawl and revitalise the inner city area. It stretches across approx. 12.5 square miles along both banks of the Garonne river and includes the 3.8 square mile urban development zone *Opération d'Intérêt National (OIN) Bordeaux-Euratlantique*. Plans entail 20,000 new residential units (including social housing), 15,000 new jobs, and improvements to the urban river habitat.

### **Clermont-Ferrand**

#### **(II – urban expansion)**

This initiative, described as an 'urban laboratory', centres upon the regeneration and densification of the 50-acre inner city district of Saint-Jean, including plans for 1,000 new residential units, 3,000 additional jobs, and improved transport infrastructure through a new TGV station.

### **Grenoble**

#### **(II – urban expansion)**

The 618-acre peninsula development, *Presqu'île Scientifique*, in the city centre includes plans for 1,800-2,200 family dwellings (with 20% social housing), onsite renewable energy generation, and the consolidation of an area of 74 acres of research and university facilities. The eventual aim is to transpose the experience gained to the southern, western and north-eastern parts of the urban area.

### **Marseille**

#### **(II – urban expansion)**

The Marseille project, which emphasises its Mediterranean distinctiveness, focuses on the 420-acre extension of the national urban development zone *OIN Euroméditerranée*, including plans for improved public transport, 14,000 new residential units (of which 20%-30% social housing) and the creation of 20,000 additional (environmental technology) jobs.

**Metz ÉcoCité 128****(II – urban expansion)**

*ÉcoCité 128* is centred upon the regeneration of the 865-acre decommissioned airbase BA 128 and aims to interconnect eight surrounding agglomeration areas. Plans include the construction of a new cultural centre (Centre Pompidou-Metz), 8,000 new dwellings, the regeneration of existing buildings (approx. 49 acres), plus the creation of 5,000 additional jobs.

**Montpellier****(II – urban expansion)**

The project for the fastest growing French city focuses on the interlinked development of four towns/31 communities along the 8 km agglomeration corridor from the city to the sea (*De Montpellier à la Mer*). Core elements are the extension of public transport through five tramlines by 2020, and promoting mixed-use densification and urban agriculture.

**Nantes/Saint-Nazaire Éco-métropole****(II – urban expansion)**

The *Éco-métropole* initiative entails a chain of 17 projects along the Loire river estuary including: the protection of wetland and river habitat; water quality improvement; enhancing recreational park land; 3,000 new dwellings in Ville-Port (Nantes); and new buildings and activities on 247 acres in Ville-Gare (Saint-Nazaire), with a total of 15,000 new jobs to be created.

**Nice****(II – urban expansion)**

*ÉcoCité Nice Côte d'Azur* forms part of the national urban development zone *OIN Plaine du Var* and incorporates an *ÉcoQuartier* project, with the objective of improving the integration of infrastructure, habitat and socio-economic activities and addressing natural (flooding) and technological risks. It includes plans for 25,000 new dwellings on an area of 556 acres, and the creation of 30,000-50,000 jobs in 'eco-industries'.

**Pays Haut Val D'Alzette: ÉcoCité Esch/Belval****(II – urban expansion)**

The *ÉcoCité Esch/Belval* project aims to create an 'eco-agglomeration' along the border with Luxembourg. Against the background of year-long socio-economic decline in this former mining/steel industrial area, the initiative aims to forge a new cultural identity, with plans to regenerate 822 acres of mainly brown field land, and to create 5,000 new jobs.

**Plaine Commune****(III – retro-fit)**

This agglomeration project centres upon the regeneration of the old industrial districts of Cristino Garcia Landy and Tartres Sud (to the immediate north of Paris), with plans for the creation of 44,000 new jobs and new residential units on an area of 667 acres, of which approx. 20% consists of retrofitting existing buildings, as well as improvements to the water and land habitats.

**Rennes****(II – urban expansion)**

The plan focuses on the north-eastern quadrant of the city and aims to preserve the surrounding environmental and agricultural assets, and to improve the connectivity (through public transport) within the agglomeration area as well as with the wider metropolitan area. 40,000 new jobs are to be created.

**Strasbourg/Kehl****(II – urban expansion)**

Some 24 projects are to be developed along the trans-border area ('Eurodistrict') formed by the Rhine river between Strasbourg and the German city of Kehl, including 17,000 new housing units and an extension of the tram line. The initiative is based on six eco-city criteria (sustainable transport, urban biodiversity, post-carbon urbanity, mixed-use development, socio-economic attractiveness, spatial conservation) with agreed development goals set for 2030.

**Territoire de la Côte Ouest (TCO) - La Réunion : ÉcoCité insulaire et tropicale****(II – urban expansion)**

The *ÉcoCité insulaire et tropicale* initiative aims to develop a conurbation area by connecting the island's districts of Saint-Paul, La Possession, and Le Port (an area of 2,100 acres in total), with development focusing on urban densification (100 units per ha), car-free public transport, and attractive public spaces.

**68****Fujisawa Sustainable Smart Town**

Location	Asia - Japan
Website	<a href="http://panasonic.co.jp/corp/news/official.data/data.dir/en110526-3/en110526-3.html">http://panasonic.co.jp/corp/news/official.data/data.dir/en110526-3/en110526-3.html</a>
Size	3,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Panasonic's former factory site in Fujisawa, to the west of Tokyo, is to be redeveloped as an eco-friendly 'smart town' at a cost of £463m. Panasonic is working with the City of Fujisawa and a group of developers, manufacturers and service providers to build around 1,000 homes. The town will serve to showcase Panasonic's sustainability solutions ('Eco Ideas'), but is also intended as a blueprint for urban reconstruction following the March 2011 earthquake/tsunami. Every home will have solar power generator units with battery storage, heat-pump hot-water systems, energy-saving air conditioners and sensor-controlled lighting. Every building will be connected to a 'smart grid', providing real-time information on electricity use so that supply can be exactly matched to demand. The aim is to reduce CO<sub>2</sub> emissions by 70% compared with typical levels for the city in 1990. The project is due to be completed by 2018.

**69****Glasgow**

Location	Europe - United Kingdom
Website	<a href="http://www.sustainableglasgow.org.uk">http://www.sustainableglasgow.org.uk</a>
Size	590,000 inhabitants
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

In 2010, *Sustainable Glasgow* (a partnership initiative between Glasgow City Council, the University of Strathclyde, Scottish Enterprises, and private sector companies including utility providers, BT, IBM and Siemens) announced plans to 'make Glasgow one of Europe's most sustainable cities within 10 years'. It aims to reduce CO<sub>2</sub> emissions by 30% by 2020, strengthen the local economy, and tackle fuel poverty. The UK's largest district heating network will be created, fuelled from various low-carbon sources including the city's sewage and municipal waste, and using waste heat from industrial processes. Trees will be planted on derelict land to create urban forests which will also produce timber for energy. Wind turbine areas will be created, and the use of low-emission vehicles incentivised. *Sustainable Glasgow* builds on Glasgow's 2010 *Climate Change Strategy and Action Plan*, which had a broad agenda, covering environmental education, energy, waste recycling, transport, sustainable procurement, cultural and natural heritage, water, and the built environment – one key goal being a 20% reduction of Glasgow's carbon emissions by 2012.

**70****Glumslöv**

Location	Europe - Sweden
Website	<a href="http://advantage-environment.com/byggnader/passive-houses">http://advantage-environment.com/byggnader/passive-houses</a>
Size	2,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Glumslöv has become internationally known for its patented passive – or 'self-heating' – houses, which capture and retain heat based on design and insulation technology. Electricity and warm water are generated from renewable sources, mainly solar panels. Energy consumption per unit is approx. half of a comparable regular house. The Glumslöv 'Passive House' system has been used as a model by city authorities elsewhere, such as the London regional authorities (including Thames Gateway, profile 160).

**71****Godrej Garden City (Ahmedabad)**

Location	Asia – India
Website	<a href="http://www.godrejgardencity.com/plan.aspx">http://www.godrejgardencity.com/plan.aspx</a>
Size	250 acres
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Plans by Godrej Properties for a mixed residential and commercial development within the city limits of Ahmedabad in Gujarat were endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. The development will feature 40 acres of public green space. Green technologies will include water treatment and recycling facilities, with the overall goal of producing net zero greenhouse gas emissions. There will be an emphasis on residents being able to walk to work or school.

**72****Gothenburg**

Location	Europe - Sweden
Website	<a href="http://www.inhabitat.com/2009/03/16/swedish-super-city-envisions-gothenburg-as-ecotopia">http://www.inhabitat.com/2009/03/16/swedish-super-city-envisions-gothenburg-as-ecotopia</a>
Size	500,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

In 2009, plans were unveiled to transform Gothenburg into a 'super sustainable city', prompted by predictions of a significant population growth by 2020. The aim is to both 'green' and grow the city, while preventing urban sprawl. The dense, interconnected urban landscape would feature rooftop gardens providing locally sourced food, 'intelligent' water- and energy-harvesting roads, as well as solar panels and wind turbines. A zero-carbon 'personal rapid transit' system is envisioned together with rain-protected cycling 'highways'. Gothenburg has a history of energy efficiency, having first installed a district heating system in 1953; in 2009, had 90% of its apartment blocks and commercial premises (and 20% of houses) were connected to district energy heating. The city government has yet to decide how and when to adopt its 'super sustainable city' plans.

**73****Graz**

Location	Europe - Austria
Website	<a href="http://www.graz.at/cms/dokumente/10022468/2ade5f6b/eval1_97.pdf">http://www.graz.at/cms/dokumente/10022468/2ade5f6b/eval1_97.pdf</a>
Size	290,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

In adopting a *Local Agenda 21* sustainability programme, Graz declared itself an 'Ökostadt' (eco-city) in 1995, setting targets for the year 2000 for reducing air, noise and water pollution, waste, traffic levels, energy use, and preserving green areas. Its efforts were recognised with a *European Sustainable City Award* in 1996. Since 2005, its bus fleet has been running on biodiesel produced from waste cooking oil. Graz positions itself as a leading European centre of renewable energy and environmental technology; it is the hub of the so-called 'Green Tech Valley' in which over 150 green-tech companies participate in the *Eco World Styria* network. Its *Ökoprofit* programme, which advises small and large companies on saving operational costs by reducing energy use, has been copied in other Austrian cities. In 2008, the city agreed new energy use and climate protection targets for 2020 (*KEK 2020*).

**74****Green City Blue Lake Initiative (Cleveland)**

Location	North America - USA
Website	<a href="http://www.gcbl.org">http://www.gcbl.org</a>
Size	North East Ohio
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

The *Eco City Cleveland* project was set up in 1992 to promote sustainable redevelopment of urban areas, oppose urban sprawl, and preserve open spaces and ecological habitats in rural North East Ohio. Its work is now continuing as part of the *Green City Blue Initiative* (GCBI), which works to advance sustainability in 11 areas of practice: water, energy, economy and sustainable business, regional food systems, land and conservation, transportation, green building and neighbourhood development, health, arts, education, and 'spirit'. There are currently four pilot *LEED Neighbourhood Development* projects in the Cleveland area: East College Street (Oberlin Project), Flats East Bank Neighborhood, St Luke's Pointe, and Upper Chester. GCBI's *Sustainable Cleveland 2019* initiative, backed by the city authorities, sets out a 10-year plan to 'build economic, social and environmental well being for all'.

**75****Green Village Philadelphia**

Location	North America - USA
Website	<a href="http://www.greenvillagephiladelphia.org">http://www.greenvillagephiladelphia.org</a>
Size	Unknown
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability/planning

Green Village Philadelphia is a sustainable neighbourhood development initiative which promotes the 'green marketplace' concept and aims to close the gap between affluent parts of the city and high poverty areas. Founded in 2008 by local business and interest groups as a non-profit organisation, the initiative aspires to be the first 'Urban Ecovillage' (UEV) in Philadelphia – although a suitable area has yet to be identified. The area being retrofitted will host a green business incubator that will act as a catalyst for other companies. It is envisioned that the redesigned environment will generate renewable energy, conserve, clean and reuse water and provide space for urban agriculture. Furthermore the redevelopment aims to be inclusive and diverse, to ensure equitable access to housing and to create a number of green collar jobs.

**76****Greensburg GreenTown**

Location	North America – USA
Website	<a href="http://www.greensburggreentown.org">http://www.greensburggreentown.org</a>
Size	777 inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	c - civic empowerment/involvement

After a large part of Greensburg, Kansas was destroyed by a Tornado in 2007, the local population decided to rebuild the area as a sustainable eco town. This is a grassroots community effort bringing funds from outside the community to support innovative programmes that involve sustainable development. In addition, the local city council passed a resolution calling for all city buildings to be built to *LEED* standards, with several public buildings already having achieved *LEED* 'Platinum' standard. The entrance of Greensburg boasts a wind farm of 10 turbines, providing electricity for the town. A 'chain of eco homes' contest was organized, resulting in twelve model homes being built at different prices, sizes, and energy efficiency features to demonstrate different green living options. The town also seeks to grow its eco-tourism industry.

**77****Greenwich Millennium Village (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.gmv.gb.com/home.htm">http://www.gmv.gb.com/home.htm</a>
Size	3,000 houses
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Greenwich Millennium Village, located in South East London, is a *Millennium Communities* initiative launched by the UK government in 1997. The sustainable housing programme, led by English Partnerships (the UK's national regeneration agency), has transformed Europe's largest former gasworks into a new residential district. It opened in 2000, and by 2008 approx. one third of the total of 3,000 houses was completed. The aim is to cut 80% of primary energy use in its buildings by using modern materials and building techniques, with renewable energy provided from solar panels and wind turbines. The project, scheduled for completion by 2015, includes a school, hospital and retail facilities.

*Update 2011*

The next phase of development, designed by Jestico & Whiles, includes 1,800 homes, plus commercial and community buildings and public spaces, for which outline planning permission has been obtained. Detailed planning for the first 500 of these new homes is currently underway.

**78****Guangming (Shenzhen)**

Location	Asia - China
Website	<a href="http://www.austria-architects.com/pirker">http://www.austria-architects.com/pirker</a>
Size	8 km <sup>2</sup> / 200,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Guangming, a new district of Shenzhen created in 2007, is earmarked for a low-carbon mixed-use eco-city development. These plans follow Shenzhen being named by the Ministry of Housing and Urban-Rural Development as the first *National Eco-Garden Model City* in 2006. Shenzhen has benefited economically from its close proximity to Hong Kong, and the establishment of China's first *Special Economic Zone* in 1980. Its rapid economic development has resulted in steep population growth, placing pressure on infrastructure and the environment. The 2007 Guangming town centre design competition was won by Austrian architect Rainer Pirker. The centre will function as the hub of a future hi-tech innovation cluster. It will be built around the needs of cyclists, pedestrians and public transport users. Urban agriculture will be encouraged.

**79****Guiyang**

Location	Asia - China
Website	<a href="http://www.china.org.cn/english/2002/Jul/37048.htm">http://www.china.org.cn/english/2002/Jul/37048.htm</a>
Size	77,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

In 2002, Guiyang declared its intention to become a 'Circular Economy Eco-city', where urban development would be guided by the ideal of a closed system of economy-environment interactions. The project was expected to be completed within 15-20 years. The plan has seven focal areas: urban infrastructure and public facilities; industry (traditional and hi-tech); ecological preservation and eco-agriculture; developing renewable energy sources (including marsh gas); public health; green housing; and governance to support the above and foster research and development. As the capital of the relatively undeveloped province of Guizhou in South-West China, Guiyang has retained much of its urban greenery (42% of the city was forested in 2009), yet faces problems of air pollution and desertification in the nearby countryside. Unlike many high-profile Chinese eco-city projects, there is little emphasis here on urban expansion or land-use planning generally; rather, Guiyang aims to take better advantage of its existing assets in an environmentally sustainable way.

**80****Gujarat International Finance Tec-City (Ahmedabad)**

Location	Asia - India
Website	<a href="http://giftgujarat.in">http://giftgujarat.in</a>
Size	500 acres
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

Envisioned as an eco-city, this new development on greenfield land near Ahmedabad will form the world's largest international finance centre. Just under a quarter of the land area will be given over to residential buildings, housing up to 50,000 people. It will incorporate solar and wind power, energy-efficient buildings and district cooling, with residential neighbourhoods located to encourage walking to work. Its green space will include a waterfront park. The project is a joint venture between the State Government of Gujarat and Infrastructure Leasing and Financial Services Ltd (IL&FS). Construction of the city has been delayed due to the global recession, although preliminary work is complete, and the first phase is currently due to be finished in 2014.

**81****Gwanggyo Ekonhill**

Location	Asia - South Korea
Website	<a href="http://www.mvrdiv.nl">www.mvrdiv.nl</a>
Size	77,000 inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

The plans for the central area of Gwanggyo new town, which were launched in 2008 as a joint venture between Daewoo Consortium and Gwanggyo municipality, are based on Dutch architects MVRDV's concept of densification and multiple space use. Arup is involved as engineer. At the centre of Gwanggyo (a self-sufficient city of 77,000 inhabitants located 35 km south of Seoul), the *Ekonhill* project will consist of a series of 'termite-shaped' buildings aimed at creating vertical green spaces to improve natural ventilation and reduce energy and water usage. The design follows the 'power centre' strategy used in contemporary Korean town planning, providing a centre for mixed public housing, retail, offices, and leisure/cultural facilities, linked in a nodular network to other urban centres.

*Update 2011*

Project financing has been agreed and construction is due to begin in November 2011.

**82****Hacienda Ecocities (Mombasa)**

Location	Africa - Kenya
Website	<a href="http://www.haciendakenya.com">http://www.haciendakenya.com</a>
Size	6,250 housing units
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Hacienda Ecocity is currently being developed near Mombasa containing 6,250 housing units, with completion expected by approx. 2015. The project is a blueprint for a series of other developments catering mainly for middle class residents planned across Kenya, with the second to be located near Nairobi. Hacienda Ecocity Mombasa is designed to be entirely self-sufficient in both its residential and commercial areas in terms of renewable energy (including a solar power station producing 12 MW) and water supply. Waste water will be recycled using a special wetland and filtration system. The town is promoted as offering price stability, service reliability and security for its residents.

*Update 2011*

Construction work has commenced, and an agreement has been signed with the African Conservation Trust to plant 10,000 trees.

**83**

**Hamburg-Harburg**

Location	Europe - Germany
Website	<a href="http://www.inhabitat.com/2009/08/19/eco-city-seeking-highest-rating-from-the-three-major-major-green-rating-systems">http://www.inhabitat.com/2009/08/19/eco-city-seeking-highest-rating-from-the-three-major-major-green-rating-systems</a>
Size	200,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

The Hamburg-Harburg harbour is the site of a large scale eco-city retro-fit project, which involves adapting the former port facilities and creating new office and residential space. The project, designed by international firms Tec Architecture and Arup, was launched in 2009, and styles itself as 'Germany's first entirely sustainable creative-industrial corporate development'. Energy consumption is to be cut by 30% (compared with 2010 levels) through use of renewable energy (including wind turbines and solar water heating systems) and energy saving technologies and materials. Most buildings will feature green rooftops.

*Update 2011*

Greenhouse gas emissions are to be reduced by 40% by 2020, and by 80% by 2050. More than 16% of the development area is to consist of green spaces, including urban forests. The project is the first European large urban development to receive *LEED Platinum* certification. In 2011, the city of Hamburg took over from Stockholm as the *European Green Capital* (an annual award made by the European Commission). To mark the award, a wide variety of events promoting sustainable living took place throughout the year in the harbour area and elsewhere in the city.

**84****Hamm**

Location	Europe - Germany
Website	<a href="http://www.hamm.de">http://www.hamm.de</a>
Size	180,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

The town of Hamm in North-West Germany is known within the country as an eco-city pioneer, going back to the 1990s when it was chosen by the regional government as a model city for sustainable policy planning. In 1998, it was awarded the title of *National Capital for Environmental Protection*. The town has implemented a comprehensive sustainable transport system including bicycles, electric buses, trains and riverboats. It is also known for its stakeholder and public involvement in local decision-making.

**85****Hammarby Sjöstad (Stockholm)**

Location	Europe - Sweden
Website	<a href="http://www.homesandcommunities.co.uk/eco-towns-hammarby-sjostad-stockholm-sweden">www.homesandcommunities.co.uk/eco-towns-hammarby-sjostad-stockholm-sweden</a>
Size	35,000 inhabitants
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

The sustainable regeneration of the Hammarby Sjöstad brownfield site close to Stockholm was part of the city's 2004 Olympic Games bid. While the bid itself failed, work on Hammarby Sjöstad has continued, with completion expected in 2015. Building across the 12 neighbourhoods is based on co-operative effort between investors, architects, developers and land owners. The project includes an integrated transport system aimed at achieving 80% public transport by 2010 with the support of free ferry transport and a bio fuel carpool scheme. Solar panels on most buildings, and water and waste recycling systems are other features of this new district.

*Update 2011*

By July 2011, 8,700 flats were completed out of the total of 11,500 flats to be built by 2018. Partly as a result of the Hammarby Sjöstad initiative, the European Commission named Stockholm *European Green Capital 2010*.

**86****Hanham Hall (Bristol)**

Location	Europe - United Kingdom
Website	<a href="http://www.hanhamhall.co.uk/">http://www.hanhamhall.co.uk/</a>
Size	170-220 houses
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

The regeneration of the area around a former hospital in suburban Bristol was hailed by its developers English Partnerships (the UK's national regeneration agency) as 'England's first zero carbon development', serving as a blueprint for the government's eco-towns (see profiles 36-39). Building firm Barratt was awarded the contract to build the development on the basis of its 'Green House' design, which meets the government's zero-carbon house building criteria for 2016. Hot water and electricity are to be produced by a community biomass boiler; waste collected and sorted in a nearby recycling centre; garden allotments made available to all the residents; and a car-share club scheme put in place. Work began in 2009, and the first residents were scheduled to move in at the beginning of 2011. The design incorporates lifestyle features aimed at achieving carbon emission cuts through designs that encourage behavioural change in the use of electrical appliances, public transport, waste collection and food delivery.

*Update 2011*

The first homes are now due to be completed in winter 2012.

**87****Heidelberg**

Location	Europe - Germany
Website	<a href="http://www.icdmuenchen.um.dk/en/service/menu/News/GermanysEcoCities.htm">http://www.icdmuenchen.um.dk/en/service/menu/News/GermanysEcoCities.htm</a>
Size	150,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Heidelberg is among the pioneers in Germany in terms of promoting urban energy efficiency and energy saving. Through the implementation of a rigorous CO<sub>2</sub> monitoring scheme, the old university town managed to cut greenhouse gas emissions in public buildings by 35% by the early 2000s compared with 1993. Since then, new, more ambitious targets have been set with focus on encouraging residents and private businesses to cut CO<sub>2</sub> emissions. In 2003, Heidelberg received the *Sustainable European City* award along with Ferrara (profile 53) and Oslo (profile 137), having also previously won it in 1997.

**88****Hongqiao Low Carbon Business Community (Shanghai)**

Location	Asia - China
Website	<a href="http://www.sba-design.eu/3169-Hongqiao-Low-Carbon-Business.html?lang=1">http://www.sba-design.eu/3169-Hongqiao-Low-Carbon-Business.html?lang=1</a>
Size	1.4 km <sup>2</sup>
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Hongqiao business district, located near the new Shanghai-Hongqiao airport, is planned as the Chinese government's first 'Low Carbon Business Community'. The goal is to reduce CO<sub>2</sub> emissions by 45% (to reflect its aspiration for the nation as a whole), compared with other similar developments. German company SBA Design prepared the masterplan for the core area which won an international competition announced in 2009; construction began in 2011, and is expected to be complete in 2013. Over half the land area will be given to office use, but retail and leisure facilities will also be provided. The compact urban design will include green public spaces, shaded pedestrian walkways, and bicycle paths (with bicycle rental points provided). A district heating and cooling system will be included. A 'Low-Carbon-Index' (LCI) developed by the University of Duisburg-Essen, will be used to evaluate the project both for energy use and CO<sub>2</sub> emissions. Targets will be set for various aspects of urban design (e.g. walking distance to green space), architectural design (e.g. proportion of green roofs), transport (e.g. proportion of journeys made on foot or by bicycle), and energy/resource utilization (e.g. percentage of rainwater recycled).

**89****Huaibei**

Location	Asia - China
Website	<a href="http://www.robortedsonswain.com">http://www.robortedsonswain.com</a>
Size	900,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Fifty years of coal mining in and around Huaibei in Anhui province have caused significant environmental problems. In addition to suffering from poor air and ground water quality, the city has lost more than 100 km<sup>2</sup> of land to subsidence. From being known as 'coal city', its 2008 eco-city masterplan aims to rebrand it as 'water city'. The subsided areas will be reclaimed for new developments and recreational areas, or turned into lakes and wetlands. The city plans to build on its industrial heritage by diversifying into alternative energy, building a new 'Alternative Energy Park'. Projects to help develop its tourism industry include a

new eco-friendly golf course, a reforestation programme, and restoration of canals and nearby villages. Urban agriculture will be encouraged, as well as improvements to the local transport network (including new light railway lines). Energy efficiency standards have been put in place for all new builds, with waste mining products being converted into building materials.

**90-91**

**Incheon Eco-city / Songdo International Business District (Incheon)**

Location	Asia - South Korea
Website	<a href="http://www.inhabitat.com/2009/08/31/foster-partners-to-design-south-korean-eco-city">http://www.inhabitat.com/2009/08/31/foster-partners-to-design-south-korean-eco-city</a> <a href="http://www.songdo.com">http://www.songdo.com</a>
Size	300 km <sup>2</sup> / 6 km <sup>2</sup>
Type	I - new development / II - urban expansion
Phase	1 - planning stage / 2 - under construction
Key implementation mode	a - technological innovation

Two eco-city developments are taking shape in the vicinity of Incheon, near Seoul.

**Incheon Eco-city  
(I - new development; 1 - planning stage)**

Plans for Incheon Eco-city were unveiled in August 2009 following a national competition. The integrated residential and industrial development will serve to expand the *Incheon Free Economic Zone* across three sites, interconnected by a Light Rapid Transit system, to the north west of Seoul. The scheme aims to attract technology firms and research laboratories specialising in environmental sustainability, especially developers of photovoltaic cell and wind turbine technology. As the city will be built on green field sites in an agricultural region, rooftops have been designed as gardens to substitute for lost land and to maintain biodiversity. The project, led by architects Foster & Partners, is due for completion within the next 10-15 years.

**Songdo International Business District  
(II - urban expansion; 2 - under construction)**

Work began on this mixed-use development on Incheon's waterfront in 2004, with completion expected by 2015. The land on which it is being built was reclaimed from the sea, and forms part of the *Incheon Free Economic Zone*. The eco-city is a private initiative by New Songdo International City Development (NSIC; 70% owned by US and 30% by Korean companies). Some 40% of the overall area of 1,500 acres will consist of green space, including a large central park modelled on New York. Other echoes of famous city features will include Venice-style canals. Environmental features will comprise: an integrated public transport system; rooftop gardens; LED (Light Emitting Diode) public lighting; renewable energy generation; an advanced recycling system; and the enhancement of biodiversity through protected green spaces. The Songdo International Business District aims to become the largest *LEED* (Leadership in Energy and Environmental Design) certified private development in the world,

with over 120 certified buildings.

*Update 2011*

In 2010, Songdo's convention centre (finished in 2008) was the first such development in Asia to receive *LEED* certification (*New Construction and Major Renovation 2.2* 'certified' rating). It includes various energy saving measures, provides multiple public transport access, and incorporates landscape design that does not require irrigation.

**92-97**

**Indian Eco-cities  
(Kottayam, Puri, Thanjavur, Tirupati,  
Ujjain, Vrindavan)**

Location	Asia - India
Website	<a href="http://www.ecocities-india.org">http://www.ecocities-india.org</a>
Size	166,000 inhabitants
Type	III - retro-fit
Phase	various
Key implementation mode	b – integrated sustainability vision/planning

In 2001, as part of its 10<sup>th</sup> 5-year plan (2002-2007), the Indian Ministry of Environment and Forest (MEF) chose Kottayam as the first of six pilot eco-city initiatives, which aimed to make various retro-fit adaptations to established cities. Puri, Thanjavur, Tirupati, Ujjain, and Vrindavan were subsequently selected.

All six MEF eco-city initiatives were established with the same key objectives, which included: improving sanitation in public spaces; making public transport more efficient and environmentally sustainable; improving urban management; and improving facilities and conditions for tourists. The programme was developed jointly with Germany-based sustainability consultancy GIZ (Gesellschaft für Internationale Zusammenarbeit). Funding for individual projects was administered by the Indian Central Pollution Control Board (CPCB). Overall, relatively little progress appears to have been made in the MEF eco-city programme, with many recommendations in each city not getting beyond the planning stage.

India has more recently seen several other eco-city initiatives sponsored by government ministries, which are unrelated to the Ministry of Environment and Forest's pilot initiatives. See profiles 22-25 for outlines of the Delhi-Mumbai Corridor eco-city programme administered by the Ministry of Commerce and Industry, the Ministry of New and Renewable Energy's *Solar Cities* initiative, and the Ministry of Urban Development's *Near-Zero Energy Satellite Towns*.

**Kottayam  
(2 - under construction)**

One of the key objectives of the Kottayam project was to improve the areas around the city, and in particular the sustainability of the city's rivers. Work began in 2005 to clean up the rivers and the adjacent swamps, to develop aquacultures, and to create more recreational areas. In addition, the aim was to

implement advanced grey water and waste management systems across the city. A series of environmental indicators were developed, in order to be able to measure the rate of improvement. There were plans for the city to serve as a site of learning and training for (federal) civil servants as well as specialists in water and waste management. An integrated Solid Waste Management Treatment and Disposal system has been established, and the CPCB reported in 2006 that desilting work had been completed in the Mundar River and Kacherrikadavu Boat Jetty and Canal. As of 2011, however, it is unclear whether any other initiatives have been completed.

### **Puri**

#### **(1 - planning stage)**

Although funding was approved for improvements to drainage, public drinking water and toilet facilities, these projects do not appear to have been completed. Other planned improvements, such as the relocation of the main car repair workshops from the centre of Puri to a new 'Eco Automobile Park', were not taken forward.

### **Thanjavur**

#### **(1 - planning stage)**

The eco-city programme recommendations here focused on the improvement of four of the city's 'theerthams' (holy tanks of water believed to have medicinal properties). CPCB, however, did not sanction funding for the work to take place.

### **Tirupati**

#### **(3 - implemented)**

Following the project recommendations, drains were desilted and covered in the main tourist area of Tirupati, and a new water pipeline was built. Other improvements, however, relating to improved transport, ornamental landscaping and the provision of public toilets and drinking water were not implemented.

### **Ujjain**

#### **(2 - under construction)**

Work began here on environmental improvements to Rudrasagar lake, but was halted after Madhya Pradesh's State Pollution Control Board judged progress to be unsatisfactory. Other recommended improvements to tourist facilities and local traffic flows were not taken forwards. A municipal solid waste recycling demonstration programme was set up in 2008, to segregate domestic waste for composting and resale.

### **Vrindavan**

#### **(3 - implemented)**

The local authority has introduced a demonstration Municipal Solid Waste management programme, and improved rubbish collection and street cleaning in the eco-city project area. Other recommendations in the eco-city development plan for Vrindavan, for environmental improvements to key pilgrim routes in the city, Banke Bihari temple, and Gandhi Park, have not been realised. These recommendations were approved by the CPCB, and funding was released in 2003. However, Vrindavan Nagar Palika Parishad (local authority) was unable to fulfil its commitment to match the CPCB funding.

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**Indonesian Eco<sup>2</sup> Cities Programme  
(Jakarta, Surabaya, Makassar,  
Palembang, Balikpapan)**

Location	Asia - Indonesia
Website	<a href="http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/6925944-1288991290394/Day1_P8_1_WBIndonesia.pdf">http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/6925944-1288991290394/Day1_P8_1_WBIndonesia.pdf</a>
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

A series of pilot 'catalyst' initiatives are taking place in five Indonesian cities (Jakarta, Surabaya, Makassar, Palembang, Balikpapan) within the World Bank's *Eco<sup>2</sup> Cities* programme, which was launched in 2009. This umbrella initiative aims to encourage urban sustainability and resilience in the face of increasing urbanisation. In Jakarta, new bus corridors and flood mitigation measures are being introduced. In Surabaya (East Java), new green spaces and parks will be created across the city, including public areas and bicycle tracks along the Kalimas river, and a community composting programme has been introduced. In Makassar (South Sulawesi), environmental improvements have been made to Losari Beach, and drainage has been improved in the vicinity of the airport and in the east of the city. Palembang (South Sumatera) is introducing river buses, promoting a *Reduce, Reuse, Recycle* programme, creating an environmentally friendly village (Kampong Ramah Lingkungan), and creating a landfill and waste water management system in its industrial area. Similar pilots under the World Bank's *Eco<sup>2</sup> Cities* programmes are being considered for the Philippines and Vietnam.

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**Issaquah Highlands (near Seattle)**

Location	North America - USA
Website	<a href="http://www.issaquahhighlands.com">http://www.issaquahhighlands.com</a>
Size	2,200 acres
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

This mixed-use 'urban village' in the suburban town of Issaquah has been built according to 'New Urbanist' principles. Effective integration with the rest of the city, in terms of transport, utilities and political annexation, was facilitated by a public/private partnership comprised of the developer (Port Blakely Communities), the state of Washington, the City of Issaquah, and King County. The developer sells plots to construction companies and individuals. The Community Association then supervises new building work, guided by principles including environmental sustainability, pedestrian-friendly design, social

diversity, community values/social interactions, and high quality public buildings and spaces. The Community Association also provides environmental education and support for residents. Issaquah Highlands aims for every home to be *Built Green* with a 4-Star level of efficiency, and certified by the *Energy Star* scheme or equivalent, and for all public and commercial buildings to meet *LEED* standards. The City of Issaquah has sponsored the creation of a demonstration energy- and carbon-neutral 'Z home' in the area.

**100****Ivory Park EcoCity (Johannesburg)**

Location	Africa - South Africa
Website	<a href="http://www.joburg.org.za/index.php?option=com_content&amp;task=view&amp;id=933&amp;Itemid=52">http://www.joburg.org.za/index.php?option=com_content&amp;task=view&amp;id=933&amp;Itemid=52</a>
Size	Initially 30 houses, with a further 60 planned
Type	I - new development
Phase	2 - under construction
Key implementation mode	b – integrated sustainability vision/planning

Located in Ivory Park near Johannesburg, this programme was launched in 1999. It consists of a series of activities and projects which aim to offer alternative strategies to mainstream development approaches and to showcase practical, community-based sustainability innovations combining environmental, social and economic elements. The 'EcoVillage' project itself comprises three eco-houses (out of a total of 30 in phase 1) completed to date with support from BioRegional (see profile 9). The project promotes indigenous gardens and permaculture, and grey water recycling (using a solar-powered pumping system) for land irrigation. Traditional local brick production promotes both economic and environmental sustainability, by creating employment and reducing reliance on imported cement. The completed project will feature a traditional African Kraal (homestead).

NB: in an unrelated initiative, a new eco-friendly town centre has been planned for Zonk'izizwe to the north of the city (see profile 174).

*Update 2011*

A pilot project led by BioRegional and Eskom, a South African electricity public utility company, aims to develop energy efficiency measures, including ceiling and chimney stack insulation, long-life/low-voltage light bulbs, and solar water heaters.

101-  
113**Japanese Eco-cities  
(Chiyoda, Iida, Kitakyushu, Kyoto,  
Minamata, Miyakojima, Obihiro, Sakai,  
Shimokawa, Toyama, Toyota,  
Yokohama, Yusuhara)**

Location	Asia - Japan
Website	<a href="http://www.gov-online.go.jp/pdf/hlj_img/vol_0015et/04-17.pdf">http://www.gov-online.go.jp/pdf/hlj_img/vol_0015et/04-17.pdf</a>
Size	Various (13 cities)
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

In 2009, the Japanese government (Ministry of Environment; Ministry of Economy, Trade and Industry) selected Kitakyushu, Minamata, Obihiro, Shimokawa, Toyama and Yokohama from a total of 82 applications for eco-city development. The choice was made both on the basis of the six cities' track record as sustainability champions and their future plans. A further group of seven eco-cities were recognised later in 2009: Chiyoda, Iida, Miyakojima, Kyoto, Sakai, Toyota, and Yusuhara. The initiative aims to encourage other cities to follow the example set by these thirteen.

This current eco-city initiative is rather broader in scope than the earlier *Eco-town* programme launched in 1997 by the Ministry of Economy, Trade and Industry and the Ministry of Health, Labour and Welfare (now the Ministry of Environment), which was primarily aimed at reducing industrial waste and emissions. Kawasaki is a notable example of these earlier *eco-towns* (profile 117).

**Chiyoda**

Chiyoda is home to many of the country's major political and economic institutions; three-quarters of its electricity is consumed by workplaces. It aims to reduce its CO<sub>2</sub> emissions significantly through the use of district heating systems, retro-fitting of existing buildings, stricter controls on new building, and encouraging car sharing and use of electric cars among workers.

**Iida**

The focus in Iida is on making much better use of solar energy. It has introduced a scheme to install solar generators on households at no initial expense, aiming for 80% of households to have solar generators by 2050. It has also introduced district heating systems and a bike-sharing scheme.

**Kitakyushu**

This former industrial centre is in the process of transforming itself into a renewable energy centre, by turning its industrial base into solar farms. Several former industrial buildings have been turned into environmental sustainability training centres.

**Kyoto**

Improvements to public transport have been coupled with restrictions on the flow of cars into the city centre, and the introduction of policies to deter the use

of private cars for commuting. Kyoto provides subsidies for the installation of residential photovoltaic systems, and promotes the use of locally sourced and certified building materials.

### **Minamata**

After being known for many years as Japan's most polluted city, since the 1990s, Minamata has embarked on a concerted sustainability action programme. It now has the country's most advanced waste separation and recycling system, with household waste separated into more than twenty categories.

### **Miyakojima**

Miyakojima aims to produce all local electricity from renewable sources, in particular biofuels produced from the abundant local sugar cane. It is encouraging the use of more energy efficient air-conditioning and solar powered water heating, and developing a 'South East Asian eco-house' model for local developers to follow. Already a popular visitor destination, it aims to encourage eco-tourism.

### **Obihiro**

Situated in a biodiverse area, Obihiro has initiated a reforestation programme around the city, including over 400 ha of previous agricultural land. Furthermore, the city's expertise in recycling agricultural and domestic waste will be used to create a regional waste recycling centre.

### **Sakai**

A new green technology industrial park is being developed. Sakai subsidises the installation of residential solar power generators and has introduced a cycle path network and sharing scheme. Its drive to become more sustainable has an emphasis on educating people to make lifestyle changes.

### **Shimokawa**

Shimokawa initiated a large reforestation programme, as well as installed a wood biomass boiler operated by the city council.

### **Toyama**

Toyama experienced a steep (30%) increase in CO<sub>2</sub> emissions between 1999 and 2003 – twice the national average. In response, an electrified public transport system, including a light railway, forms the centrepiece of the city's current emissions reduction programme.

#### *Update 2011*

Toyama plans to install a city-wide bicycle sharing scheme, with 150 bicycles to be installed across 15 self-service stations in the city centre.

### **Toyota**

Toyota is attempting to lead the way in changing car use. It is introducing a plug-in hybrid car sharing system, along with a solar powered recharging infrastructure, and educating car drivers to drive more efficiently. Still a very industrial city, it has obliged factories to publish emissions data. It plans to introduce a low carbon demonstration housing district.

### **Yokohama**

Yokohama began to implement the so-called G30 programme in 2003, which aims to reduce waste by 30% by 2010. Civil society actors coined the slogan 'less waste, no litter – that's Yokohama culture', which has since been adopted

by the city council.

*Update 2011*

Yokohama reached its 2010 target of 40% greenhouse gas emission reduction.

**Yusuhara**

As part of a plan to become 100% self-sufficient in electricity, heavy investments have been made in wind-, hydro- and solar power. Yusuhara has also introduced a sustainable forest management programme.

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**Kalundborg**

Location	Europe - Denmark
Website	<a href="http://www.symbiosis.dk">http://www.symbiosis.dk</a>
Size	3,500 houses + industry
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

Kalundborg pioneered the concept of the 'symbiosis industrial park', according to which businesses are co-located in such a way as to encourage the sharing of resources and, thus, increase resource efficiency. To date, 20 companies, including a fertilizer company, a pharmaceutical institute, and a gypsum and cement factory have set up business there. The industrial park and residential area are located around a clean-coal plant and a fjord. The companies draw on the by-products of the plant and the available sea water.

*Update 2011*

A new biomass refinery in Kalundborg is now operational, and will be integrated with the adjacent Asnaes power station. The biomass refinery operates using waste steam from the power station; residual biofuel is burned by the power plant. The Asnaes power station has pledged to switch to 50% renewable energy by 2020.

**115**

**Kampala**

Location	Africa - Uganda
Website	<a href="http://enviro.org.au/enews-description.asp?id=788">http://enviro.org.au/enews-description.asp?id=788</a>
Size	1,4 million inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

Kampala has experienced many of the problems facing fast-growing cities in developing countries, including traffic congestion, a lack of adequate housing and air and water pollution. In response, the municipal government initiated a programme of 'greening' the city. In the early 2000s, it introduced a series of bylaws – since implemented nationwide – promoting urban agriculture and food production, which transformed the local food supply system. The municipality also created national parks in and around the city, thus managing to control urban sprawl. Furthermore, it introduced a traffic congestion fee and an extensive bus network, in order to encourage public transport. More recently, plans have been made to refurbish two housing estates (Naguru, Nakawa) to provide modern, environmentally sustainable accommodation for 30,000 people. Kampala has become known as Africa's garden city.

*Update 2011*

Demolition of the Naguru-Nakawa estates began in 2011 amid media controversy over the fate of the evicted households.

**116**

**Kaohsiung**

Location	Asia - Taiwan
Website	<a href="http://taiwansustainablecities.blogspot.com/2011/01/kaohsiung-taiwans-eco-city-leader.html">http://taiwansustainablecities.blogspot.com/2011/01/kaohsiung-taiwans-eco-city-leader.html</a>
Size	2.9 million inhabitants
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Once heavily polluted due to rapid industrialization and development, Kaohsiung has a policy to transform itself into a sustainable city. It became the first Taiwanese city to try and achieve *Taiwan Environmental Protection Administration* air pollution quota levels and recently had its lowest level of pollution according to the scheme's 'Pollution Standard Index'. The city government aims to reduce its CO<sub>2</sub> emissions to 30% below 2005 levels by 2020. Because the city benefits from an abundance of sunshine, there are plans to incorporate solar energy into the city redevelopment. In February 2010 Asia's third largest HCPV (high concentration photovoltaic) solar power plant began its operations in the area. Kaohsiung also uses locally sourced methane in order to power 4,600 households. The city has made a concerted effort to discourage private transport, with new Mass Rapid Transport lines and a bicycle rental scheme and the creation of 150km of bicycle paths, along with subsidies for electric motorbikes and LPG cars. Its entire bus fleet uses a biodiesel blend. The city featured as an example of sustainability in a *National Geographic* documentary.

**117****Kawasaki**

Location	Asia - Japan
Website	<a href="http://gec.jp/gec/EN/publications/Eco_Towns_in_Japan.pdf">http://gec.jp/gec/EN/publications/Eco_Towns_in_Japan.pdf</a>
Size	2,800 ha (Kawasaki Coastal Zone)
Type	III - retrofit
Phase	3 - implemented
Key implementation mode	a - technological innovation

The national Japanese government named Kawasaki its first *Eco-town* in 1997, largely as a response to the serious air pollution problems it faced. Financial incentives were provided for industries based in the coastal area of the city; those operating in the main industrial park were encouraged to aim to produce zero emissions, with industrial symbiosis (echoing Kalundborg, profile 114) and joint recycling projects instigated. The entire industrial park achieved joint *ISO 14001 (Environmental Management Standard)* certification in 2005. Meanwhile, a project to monitor and reduce energy use in local schools has been implemented. Since the early 1990s, the municipal government has had a policy of encouraging cultural change by supporting citizens' groups with an environmental agenda (*Kawasaki City Guidelines to Support Civil Activities*). The city has recently worked with Tokyo Electric Power Co to build a large solar power plant in the coastal area, due to begin operations in December 2011.

**118****Langfang Eco-Smart City**

Location	Asia - China
Website	<a href="http://usgreentechnology.com/stories/eco-city-in-china-to-have-800-sq-mi-green-park">http://usgreentechnology.com/stories/eco-city-in-china-to-have-800-sq-mi-green-park</a>
Size	12 square miles
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

An eco-city development is planned within the city of Langfang. Langfang is situated within the *Beijing-Tianjin Growth Corridor*, and was approved by the Ministry of Environmental Protection as a *National Model City for Environmental Protection* in 2006. The proposal features a theme park and the world's largest exhibition centre. There is an emphasis on green space throughout, with a network of green corridors and 'blueways' (integrated landscape and water features) aimed at harvesting water, restoring biodiversity and enhancing the city's identity. The use of petrol powered vehicles is to be restricted, with a monorail system and pod vehicles being considered as alternatives. A central transportation hub will link the city to the new Beijing-Shanghai high-speed rail line. The Langfang 'Eco-Smart City' masterplan was given the 2010 *Merit Award for Urban Design* by the Hong Kong chapter of the American Institute of Architects.

A separate eco-city (Wanzhuang – profile 169) is planned on a greenfield site to the north-west of Langfang.

**119****Living City DC 14<sup>th</sup> & U (Washington DC)**

Location	North America - USA
Website	<a href="http://www.livingcityblock.org">http://www.livingcityblock.org</a>
Size	2 adjacent city blocks
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Based on the *Living City Denver LoDo* model developed in Colorado (see profile 120), this project plans to retro-fit the mixed-use Washington DC urban community bounded by 13<sup>th</sup> & 15<sup>th</sup> and U & V Streets. The aim is to engage with building and business owners, residents, civic and neighbourhood associations, and the DC city government, to transform the area into a model of energy and resource efficiency, while preserving the current buildings, uses, and neighbourhood character. Project organisers Living City Block aim to obtain a 50% energy use reduction by 2013 and a 75% reduction by 2015. Among the planned initiatives are green roofs, green storm water infrastructure and organic community gardening.

**120****Living City Denver LoDo**

Location	North America - USA
Website	<a href="http://www.livingcityblock.org">http://www.livingcityblock.org</a>
Size	16 buildings
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Living City Block, a non-profit making organisation aiming to make cities more sustainable one block at a time, was launched in Denver, Colorado in 2010. The 'LoDo' (i.e. lower downtown) area of Denver was chosen as a pilot project. The residents and building owners take responsibility and pay for the retro-fitting of the buildings while the City of Denver takes responsibility and pays for sustainable streets and public spaces. By the summer of 2012, *Living City Denver LoDo* aims to reduce aggregate energy use by 50% compared with 2010 levels. The company facilitates deep energy efficiency retro-fits while exploring different renewable options, from rooftop solar cells to wind turbines to geothermal; energy that would be shared by the whole block. Living City Block wants to replicate the project by identifying other mixed-use sites across the US

in which to launch 'sister-neighbourhood' projects. The Denver initiative has been selected among other projects by the US Department of Energy for their *Commercial Buildings Partnership Program* under which they will receive a \$200,000 grant. A similar initiative is underway in Washington DC (see profile 119); another is planned for Gowanus in Brooklyn, New York.

**121****Loja**

Location	South America - Ecuador
Website	<a href="http://findarticles.com/p/articles/mi_hb6376/is_2_20/ai_n29330367">http://findarticles.com/p/articles/mi_hb6376/is_2_20/ai_n29330367</a>
Size	1,4 million inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Loja, the capital of the Ecuadorian province by the same name for years experienced high levels of both air and aquatic pollution, as well as persistent waste management problems. In 1996, the city's newly elected mayor (Jose Castillo) embarked on a sustained *eco-transformation* programme: measures were adopted to reduce air and water pollution, including the introduction of low polluting buses; all new buildings were required to include at least 20% green space; and a program of reforestation was initiated in and around the city. The city also gained a reputation for its advanced waste management and recycling system: a mandatory waste separation and recycling policy – now also including organic waste – was introduced and enforced by a penalty system, with the rate of recycling reaching up to 95%.

**122****Magok (Seoul)**

Location	Asia - South Korea
Website	<a href="http://english.seoul.go.kr/gtk/news/news_view.php?idx=726&amp;">http://english.seoul.go.kr/gtk/news/news_view.php?idx=726&amp;</a>
Size	c.350 hectares
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

The Metropolitan Government of Seoul is developing the Magok district into an international business, R&D, and hi-tech industrial complex, integrated with housing and social infrastructure, connected to a new waterfront park and ferry terminal on the Han River. The district is being promoted as the 'Eco Energy Town of the Future'. The initiative is intended to serve as a role model for other cities around the world, and was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. It is expected that 40% of total energy used in district will come from renewable and 'clean' sources, including a large hydrogen fuel cell plant, and heat generated by local sewage treatment facilities. A district heating and cooling system will be introduced, solar panels will be fitted to local schools, and energy-efficiency standards will be introduced for all buildings. Additionally, energy-efficient LED lighting will be used extensively. Magok is due to be complete by 2031, with the main business section opening in 2015.

**123****Mahindra World City (Jaipur)**

Location	Asia - India
Website	<a href="http://www.mahindraworldcity.com/Jaipur.aspx">http://www.mahindraworldcity.com/Jaipur.aspx</a>
Size	3,000 acres
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

Mahindra World City Jaipur is being developed by the Mahindra group in partnership with RIICO (the Rajasthan State Government's industrial development and investment agency) as a sustainable business park. It will incorporate a passive cooling system and solar external lights, with two-thirds of its water obtained from recycled water sources. Landscape improvements will include a tree planting scheme. Low-energy building materials will be used in the construction process, with waste products recycled. The initiative was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. Completion is planned for 2017.

**124****Malmö**

Location	Europe - Sweden
Website	<a href="http://www.malmo.com">www.malmo.com</a>
Size	285,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Following rapid economic decline in the 1990s and the subsequent shift towards a service-based economy, Malmö embarked on a concerted programme – including its acclaimed BoO1 harbour district – of urban regeneration according to sustainable principles and reinventing itself as a ‘climate’- / ‘solar’- / ‘eco’-city. Houses were retro-fitted to achieve up to 35% more energy efficiency; a new recycling system and a sustainable transport system (with experimental electric street cars) were initiated; and a variety of solar thermal and photovoltaic plants have been introduced (including Sweden’s largest photovoltaic plant in Sege Park, completed in 2007). The city aims to be ‘carbon-neutral’ by 2020 and run on 100% renewable energy by 2030. Malmö is frequently held up as a model ‘retro-fit’ eco-city.

*Update 2011*

Malmö received an award for sustainable development in 2009 from the UN Habitat Program, and another in 2010 for BoO1 and the Western Harbour from the Building Exchange (a London-based construction industry event organiser).

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**Manchester**

Location	Europe - United Kingdom
Website	<a href="http://www.ecocitiesproject.org.uk/ecocities/index.aspx">http://www.ecocitiesproject.org.uk/ecocities/index.aspx</a>
Size	484,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

In 2008, Manchester University set up an eco-city initiative with local developers Bruntwood, in order to propose a blueprint for Greater Manchester to become a more sustainable city and encourage ongoing debate. This took place against a background of green council-led initiatives, including a campaign in 2005 to become Britain’s greenest city under the slogan ‘Love Manchester? Improve it! Challenge Manchester’, envisioning Manchester as a ‘Green City’ by 2015, proud of its improving local and global environmental performance. It also created a demonstration ‘Eco-House’ in 2006. In February 2008, the City Council formally consolidated its previous initiatives into its *17 Principles of Tackling Climate Change* document. This was followed in 2009 by a *Call to Action* implementation plan. The Association of Greater Manchester Authorities (Agma) aims to reduce CO<sub>2</sub> emissions across the city as a whole by 30%-50% by 2020. Meanwhile, ongoing national media attention has been given to developers Urban Splash, who have developed a series of sustainable new-build communities and eco-apartment blocks, and retrofitted dilapidated terraced housing in various inner-city areas.

**126****Masdar**

Location	Middle East - United Arab Emirates
Website	<a href="http://www.masdar.ae">www.masdar.ae</a>
Size	40,000 inhabitants & 50,000 commuters
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

Launched in 2006, Masdar proclaimed itself the world's first fully 'zero-carbon' and 'zero-waste' city in the making. Situated on the outskirts of Abu Dhabi with governmental support, the project is an attempt to transform the Emirate into a global leader in sustainable energy technologies. The city's masterplan mixes principles of traditional Arab architecture (providing natural ventilation and minimising heat impact) with modern high-technology innovation. Proposed features include a solar-powered 'personal rapid transport' system; energy generated by photovoltaic technology; water recycling through irrigation recovery; and waste incineration to generate power and heat. The new city aims to become an international hub for renewable energy research and development, led by the Masdar Institute of Science and Technology (in cooperation with MIT, Cambridge USA). Work started in 2008, and the first buildings are scheduled for completion in 2011.

*Update 2011*

In 2010, the first building phase was completed at a cost of approximately £875m, including six main buildings, over 100 apartments and the Masdar Institute of Technology. Due to the global recession, the overall completion date has been put back from 2016 to 2021-25. Furthermore, some of the environmental sustainability features have been scaled back: for example, plans for a hydrogen power plant and a solar manufacturing plant have stalled. The goal of having 100% renewable energy generated on site has been abandoned; Masdar is now expected to become a 'carbon neutral' rather than, as originally envisioned, a 'zero carbon' city. Nevertheless, the Masdar 10MW photovoltaic plant is now connected to the Abu Dhabi national grid. By 2015, some 7,000 people are expected to live in, and 12,000 people to commute to, the city.

**127****Mata de Sesimbra**

Location	Europe - Portugal
Website	<a href="http://www.oneplanetcommunities.org/communities/endorsed-communities/mata-de-sesimbra">http://www.oneplanetcommunities.org/communities/endorsed-communities/mata-de-sesimbra</a>
Size	5,000 units
Type	I - new development
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Located south of Lisbon, this £1.1 billion initiative by Pelicano architects has been designed as a mixed-use, zero-carbon, zero-waste coastal resort for approx. 30,000 residents. Endorsed by BioRegional (see profile 9), it became the world's first *One Planet Community* project. It incorporates a sustainable public transport system based on hybrid 'eco shuttles', free bicycles and car clubs. 50% of food is to be sourced locally. The project seeks to promote ecotourism and includes the largest private forest restoration initiative in Europe, with 4.8 km<sup>2</sup> of the 5.3 km<sup>2</sup> site consisting of a pine and oak forest. As of July 2011, all planning permissions were in place with detailed masterplanning near completion.

**128****Meixi Lake (Changsha)**

Location	Asia - China
Website	<a href="http://www.kpf.com/project.asp?T=10&amp;ID=135">http://www.kpf.com/project.asp?T=10&amp;ID=135</a>
Size	180,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

In February 2009, the municipal government of Changsha (capital of Hunan Province) signed an agreement with developers Gale International to create a new 1,675-acre satellite town. The masterplan was designed by Kohn Pedersen Fox – also Gale International's partners on the Songdo International Business District project in South Korea (profile 91). A high-rise business district will be built around a lake linked to individual residential neighbourhoods by a series of canals. Proposals for innovative forms of public transport include the use of boats. Plans have been made for city-wide grey and black water treatment systems and distributed energy plants. The energy-efficient buildings in the development will also be connected to a smart energy grid. Meixi Lake is expected to be completed by 2020.

**129****Menlyn Maine (Pretoria)**

Location	Africa - South Africa
Website	<a href="http://www.menlynmaine.co.za">http://www.menlynmaine.co.za</a>
Size	280 hectares
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Melvyn Maine is a residential, office and commercial development being built in the eastern suburbs of Pretoria, replacing the low-density housing which existed on the site. The private developers' techniques to reduce the carbon footprint of the construction process include the use of materials locally produced and salvaged from the demolition of the older houses on the site. Their goal is for Melvyn Maine to be a greenhouse gas negative development overall. Grey water and storm water harvesting systems are being developed. Office and residential areas will be well connected, with cycle paths introduced across the development. Open space, parks and a rehabilitated wetland will be included in the project. The initiative was one of 16 selected to form the Clinton Climate Initiative's global *Climate Positive Development Program* in 2009.

**130****Mentougou Eco Valley (Beijing)**

Location	Asia - China
Website	<a href="http://ecocity.fi/projects/?lang=en">http://ecocity.fi/projects/?lang=en</a>
Size	17 km <sup>2</sup> / 20,000 residents
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Plans are being made to redevelop part of the Miaofeng mountain area near Mentougou. They are focused on a group of rural villages suffering from environmental degradation, a polluted and limited water supply, and unemployment, in the wake of extensive mining in the area over the last few decades. The plans have been developed with Finnish input: Professor Eero Paloheimo originally conceived of the project, commissioning consultancy VTT to conduct a feasibility study in 2007; Eero Paloheimo EcoCity Ltd then prepared a detailed masterplan in conjunction with Eriksson Architects. The masterplan, currently awaiting approval from the Beijing urban planning authorities, includes a new town centre and a clean-tech science park with space for nine eco-innovation centres to be occupied by both Chinese and international companies. It is hoped that the science park will become a major eco-tourist attraction. Existing village buildings will be retrofitted for energy efficiency, or replaced with new eco-friendly ones, and new residential areas will be created in the old quarries. The various parts of the eco-city will be interconnected by trams, bicycle paths, electric-car only roads, and diagonal passenger lifts. It is envisioned that the new eco-city will be self-sufficient in energy and water; recycled water and waste will be used to boost the local agricultural eco-system. Reafforestation of the valley has already begun.

**131****Missouri Green Impact Zone**

Location	North America - USA
Website	<a href="http://www.greenimpactzone.org">http://www.greenimpactzone.org</a>
Size	150 square blocks
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	c - civic empowerment/involvement

Missouri Green Impact Zone is a 150-square block area of Kansas City, Missouri, proposed by US Congressman Emanuel Cleaver II as a private-public partnership. In 2011 unemployment in Kansas City was at 11.7% city-wide and estimated to be as much as 50% in parts of the Green Impact Zone. The project's purpose is to strengthen the local community through job creation and improved energy efficiency. The initiative includes house retro-fitting and weatherproofing programmes, job training and placement, health and wellness programmes using sustainability as a catalyst for change. The aim of the programme is not just to reverse the decline in the area but to turn it into a thriving, sustainable neighbourhood. The initiative aims to use federal funds as stimulus to overcome the economic crises in order to implement its plan.

**132****Nanhe Jingwu (Tianjin)**

Location	Asia - China
Website	<a href="http://www.constructiondigital.com/tags/eco-city/plans-unveiled-jingwu-eco-town-china">http://www.constructiondigital.com/tags/eco-city/plans-unveiled-jingwu-eco-town-china</a>
Size	75,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Nanhe Jingwu, aka Eco Nanhe Town, has been planned as an extension of the small town on Nanhe, on the outskirts of Tianjin (see also profile 132). The town has strong connections to the Jingwu Association of kung-fu, from which it will take its name. The central park of the city will be bordered by a series of towers shaped to suggest the movements of a kung-fu practitioner. The 2008 masterplan, designed by Milanese architects AM Progetti, took its inspiration from 15<sup>th</sup> century Italian urban design and Beijing's Forbidden City, but has incorporated modern green technologies. As well as residential and commercial buildings and public services, the proposed development will include hospitals and a science park, to foster connections with the nearby the university area and with Tianjin itself.

**133****Nanjing Eco High-Tech Island**

Location	Asia - China
Website	<a href="http://www.channelnewsasia.com/stories/singaporebusinessnews/view/1075103/1/.html">http://www.channelnewsasia.com/stories/singaporebusinessnews/view/1075103/1/.html</a>
Size	600 hectares
Type	I - new development
Phase	1 - planning stage
Key implementation mode	a - technological innovation

Plans are being finalised for an 'Eco High-Tech Island' on Jiangxinzhou in the Yangtze river, adjacent to Nanjing's city centre. This will include commercial, industrial and residential complexes, with the first phase expected to be completed in 2020. The city's backing for the idea reflects a desire to diversify its industrial base. Plans for the island include a new water treatment plant, and the encouragement of foreign investment by attracting IT, biotech, pharmaceuticals and communications companies to the island. It aims to emulate the success of Suzhou Industrial Park (profile 132), which was also established with joint funding from local and Singaporean developers.

**134****Neapolis Smart EcoCity (Paphos)**

Location	Europe - Cyprus
Website	<a href="http://www.cypruspropertynews.net/neapolis-smart-ecocity-within-a-city-comes-to-paphos">www.cypruspropertynews.net/neapolis-smart-ecocity-within-a-city-comes-to-paphos</a>
Size	1.1 million square meters
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability

Neapolis Smart EcoCity, described as an 'intelligent sustainable community', will be situated between Paphos and Geroskipou. Aiming to become 'the most innovative Smart EcoCity in the Eastern Mediterranean', this is a privately funded initiative (by property group Leptos, with a budget of over €2billion) for a 1.1 km<sup>2</sup> mixed development including: residences; business and retail facilities; a research and development centre; a hospital; cultural facilities; an ecological park; and a new private University at its heart (this opened in 2010 in temporary accommodation). The development aims to be 'carbon neutral' overall, with 70% of the land coverage 'dedicated to green areas'. 25% of the energy needs for construction will come from local renewable sources. Construction work is expected to begin in late 2011, and the development as currently planned is expected to be complete by 2024.

**135****Nieuw Terbregge (Rotterdam)**

Location	Europe - The Netherlands
Website	<a href="http://www.nieuw-terbregge.nl">http://www.nieuw-terbregge.nl</a>
Size	3,000 inhabitants
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

This new neighbourhood of Rotterdam was developed under the European Commission-funded *RESTART* (Renewable Strategies and Technology Applications for Regenerating Towns) cross-national programme involving eight European countries. The aim of the programme, which started in the mid 1990s, was to reduce carbon emissions by at least 25%, while at the same time promoting high-quality living. In the demonstration project of Nieuw Terbregge, the 860 houses incorporate energy efficient designs; both individual and collective renewable energy technology; and an advanced grey water recycling system. Furthermore, the district has implemented a programme of stakeholder engagement, including joint consultation with residents, developers and utility companies.

**136****One Gallions (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.onegallions.com">http://www.onegallions.com</a>
Size	260 apartments
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	b - integrated sustainability

Located in East London, within the Royal Albert Basin regeneration area (profile 146), One Gallions is a new development consisting of 260 apartments, local shops/utilities and recreational areas. Of the 260 homes, 169 will be for private sale, 50 for social housing, and 41 for shared ownership. Instigated by the London Development Agency, and endorsed by BioRegional (see profile 9) as a *One Planet Living* initiative, the development is being built through a partnership involving BioRegional, Crest Nicholson and Southern Housing Group. The construction phase is designed to minimize carbon emissions and waste. The homes will be equipped with appliances to significantly reduce domestic water consumption. The first residents are expected to move in by 2011, with completion expected by 2013.

BioRegional and Crest Nicholson also collaborated on the design and construction of the One Brighton residential and commercial block (in Brighton), completed in 2010 in accordance with the principles of *One Planet Living*. Buildings were constructed using various sustainable, locally sourced building

materials, such as natural clay block and wood fibre insulation. Approximately 50% of energy is generated using an on-site biomass boiler and photovoltaic panels.

**137****Oslo**

Location	Europe - Norway
Website	<a href="http://www.iclei.org/index.php?id=9329">http://www.iclei.org/index.php?id=9329</a>
Size	520,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Oslo counts among the early pioneers of urban sustainability in Europe. Building on its *Local Agenda 21* principles, in 2001 the city adopted the so called *Earth Charter*. It also introduced a city-wide carbon footprint monitoring system. Public transport has been made more environmentally sustainable using various experimental hybrid fuel technology solutions. A comprehensive recycling system was successfully introduced. In 2003, Oslo was awarded the *European Sustainable City* award along with Ferrara (profile 53) and Heidelberg (profile 87). More recently, the city has extended its sustainability efforts to the redevelopment of its harbour area.

*Update 2011*

Five hydrogen buses will be introduced in November 2011. A new urban environmental policy document for 2011-2026 has been published, which includes a commitment to become greenhouse gas neutral by 2050.

**138****Panama Pacifico (Panama City)**

Location	Central America - Panama
Website	<a href="http://www.panamapacifico.com">http://www.panamapacifico.com</a>
Size	1,400 hectares
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

The mixed-use Panama Pacifico development, on the site of the former Howard Air Base across the canal from Panama City, is promoting itself as 'Latin America's first green city'. The Government of Panama selected London & Regional Properties to develop the site in 2007; the initiative was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. Panama Pacifico aims to become a major international business hub, including

leisure areas, a golf course, and 20,000 new homes, all set in a restored tropical landscape. Green corridors will manage stormwater runoff and provide accessible open space. Business park buildings will be highly insulated and make use of LED street lighting. Residential housing will be designed to minimise exposure to sunshine and include low-water taps and toilets – although an ‘environmentally friendly upgrade’ (to bring houses in line with *LEED* standards) will only be available for a 10%-15% premium. Compact neighbourhood centres containing dense mixed-use buildings will minimise the need to travel. The first completed business offices are already in occupancy, but the whole development will take up to 40 years to complete.

**139****Pedra Branca (Palhoça)**

Location	South America - Brazil
Website	<a href="http://www.cidadepedrabranca.com.br">http://www.cidadepedrabranca.com.br</a>
Size	30,000 inhabitants
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Pedra Branca is a new residential area of Palhoça built around one of the campuses of the University of Southern Santa Catarina (Unisul). Pedra Branca Ltda, its private developers, decided in 2005 to expand the district in a more sustainable way. The new compact district will eventually accommodate 30,000 residents, and include 2,000,000 square feet of commercial development. Buildings will be between 4 and 12 storeys high, interspersed with parks and cycle lanes. Energy will largely be supplied from hydro-electric power, with solar PV panels on individual buildings. Low-energy LED street lighting will be introduced and rainwater will be recycled. The initiative has been supported by the Clinton Climate Initiative’s *Climate Positive Development Program* since 2009.

**140****PlanIT Valley (Porto)**

Location	Europe - Portugal
Website	<a href="http://living-planit.com/planit_valley.htm">http://living-planit.com/planit_valley.htm</a>
Size	225,000 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

The 4,000 acre project will be built on a greenfield site in the municipality of Paredes outside of Porto by Living PlanIT, a private developer focusing on the development of new sustainable technologies, which has been selected by the World Economic Forum as a *Technology Pioneer 2012*. The design of the PlanIT Valley project aims to use hi-tech innovation at an urban scale for power generation, water distribution and waste treatment. It will use sensor technology to achieve efficiencies in energy and resource use, both during construction and in service provision to residents and workers. Local homes will use at least 50% less energy and 80% less water than regular city dwellers. Executive Vice President Thierry Martens sees the new city as Living PlanIT's 'R&D centre', based on a replicable 'urban operating system'. The Portuguese government has recognized the project, which should be finished by 2015, as one of great national importance.

**141****PlaNYC (New York City)**

Location	North America - USA
Website	<a href="http://www.nyc.gov/html/planyc2030/html/home/home.shtml">http://www.nyc.gov/html/planyc2030/html/home/home.shtml</a>
Size	All five New York City boroughs
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability/planning

In 2007 the city initiated *PlaNYC* - also called 'PlaNYC 2030' to denote the long-term vision for 2030 - to help New York grow in a more sustainable way to meet the challenges of climate change. Although New York City's per capita energy consumption and CO<sub>2</sub> emissions are low relative to the US national average, it still emits nearly 0.25% of the world's greenhouse gases. The plan aims to help the city reduce its carbon emissions while meeting the challenges presented by an expected population growth of 900,000 new residents by 2030, which include the need to update its infrastructure. The scope of the *PlaNYC Update* (published 2011) is broad, covering affordable housing, sustainable neighbourhoods, parks and public space, improvements to public transport, reclamation of contaminated land, reduction of energy use and GHG emissions, air and water quality, public health, and public engagement. Initiatives to avoid urban sprawl, modernise power plants, make buildings more energy efficient, and enhance the transportation network, will collectively avoid almost 50 million metric tons of GHG emissions by 2030. The New York Restoration Project, an organisation aiming to 'green New York City one block at a time', is also working with the city authorities to plant one million new trees across the city's five boroughs by 2017. New York currently holds the rotating chairmanship of C40 organization.

**142****Portland**

Location	North America - USA
Website	<a href="http://www.portlandonline.com">www.portlandonline.com</a>
Size	Over half a million inhabitants (metropolitan area over a million)
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

For many years, Portland has been ranked as one of the greenest US cities. Early achievements include an integrated public transport system and the pedestrianisation of the city centre. The city established an integrated planning and sustainability office with focus on key areas including energy efficiency, waste management, and green building design. New buildings have to comply with strict regulations concerning building materials and greenhouse gas emissions, resulting in the largest number of *LEED* certified buildings among US cities. The city and regional authorities are noted for their strong land-use planning, including establishing substantial green zones in and around the city to control urban expansion.

*Update 2011*

In 2009, the new Portland Sustainability Institute launched its *EcoDistricts* initiative in partnership with the City of Portland and five neighbourhoods (Gateway, Lents, Lloyd District, PSU, South Waterfront). The five pilot initiatives aim to promote sustainable neighbourhood development across different parts of the city. In addition, the Oregon Sustainability Center is planned as a model for sustainable urban high-rise construction and a hub for sustainable practices, research and entrepreneurship.

**143****Puerto Princesa**

Location	Asia - Philippines
Website	<a href="http://www.puertoprincesa.ph/index.php?page=gi">http://www.puertoprincesa.ph/index.php?page=gi</a>
Size	200,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

Puerto Princesa, the second largest city in the Philippines and an international resort, trades on its green credentials, in order to remain one of the leading tourist destinations in the region. Stringent laws are in place to protect the city's surrounding areas, in particular a UNESCO World Heritage underground river system. The city authorities also initiated an ambitious reforestation programme. In an effort to reduce CO<sub>2</sub> emissions, the ubiquitous tricycles, which serve as main transport means for the city's residents, have been converted to run on electricity and are sold for a quarter of the price of conventional tricycles.

**144****Reykjavik**

Location	Europe - Iceland
Website	<a href="http://saveecodestinations.wordpress.com/2009/04/16/green-city-tour-reykjavik-iceland/">http://saveecodestinations.wordpress.com/2009/04/16/green-city-tour-reykjavik-iceland/</a> <a href="http://saveecodestinations.com/2009/04/green-city-tour-reykjavik-iceland/">http://saveecodestinations.com/2009/04/green-city-tour-reykjavik-iceland/</a>
Size	120,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Iceland's capital, where half of the country's population resides, is at the forefront of an ambitious national plan to turn the country 100% free of fossil fuel by 2050; almost 100% of the country's electricity is already produced from renewable sources. The initial measures focused on public transport, with buses switched to hydrogen technology. More recently, new hydro- and geothermal plants have begun to be built. Since 2003 a network of hydrogen stations has been installed across the city, in an attempt to encourage the conversion of regular cars to hydrogen technology.

**145****Rizhao**

Location	Asia - China
Website	<a href="http://www.rizhao.gov.cn">http://www.rizhao.gov.cn</a>
Size	3,000,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Rizhao, or 'city of sunshine', has a longstanding reputation for its environmental sustainability due to its status as a coastal resort with little heavy industry. With the appointment of Mayor Li Zhaoqian in 2001, the city embarked on its current programme of switching to solar power technology. A majority of houses have since been equipped with photovoltaic cells, while almost all households have solar water heating systems. All street and public lighting is solar powered, and 6,000 homes have been equipped with solar cookers. As of 2007, technologies generating marsh gas from agricultural waste represented a renewable source of fuel equivalent to approx. 3,000 tons of coal annually. In addition to this retro-fitting, the city has also begun work on new neighbourhood developments using strict environmental standards. Rizhao was approved by the Ministry of Environmental Protection as a *National Model City for Environmental Protection* in 2005. It was given a *World Clean Energy Award* in the category of 'Policy and Lawmaking' in 2007, and a *UN-Habitat Award* for well-executed urban planning in 2009.

**146****Royal Albert Basin (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.lda.gov.uk/projects/royal-albert-basin/index.aspx">http://www.lda.gov.uk/projects/royal-albert-basin/index.aspx</a>
Size	20 hectares
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	a - technological innovation

The Royal Albert Basin is situated at the eastern end of the Royal Docks regeneration zone, within London's *Green Enterprise District* (an initiative launched by Mayor Boris Johnson in 2010 – see profile 160). It is owned by the London Development Agency (LDA; a body of the Greater London Authority), which is investing £72m in retrofitting existing buildings, providing waste infrastructure and decentralised energy schemes (possibly including a new combined heat and power energy centre), and remediating brownfield sites. Available sites are being offered to developers who can commit to delivering environmentally friendly buildings which provide a mix of tenure. The aim is to create a mixed-use neighbourhood which includes new riverfront public spaces and respects the area's dockland history. Other mixed-use development schemes in the area include the proposed One Gallions community (profile 136). The Royal Albert Basin was selected as one of the 16 founding projects of the Clinton Climate Initiative's *Climate Positive Development Program*.

**147****Seattle 2030 District**

Location	North America - USA
Website	<a href="http://www.2030district.org/seattle">http://www.2030district.org/seattle</a>
Size	1 district of downtown Seattle
Type	III - retro-fit
Phase	1 - planning stage
Key implementation mode	a - technological innovation

The Seattle 2030 District is a public-private initiative helping local companies to meet the *2030 Seattle Challenge*. It was formally launched in September 2011. The Seattle 2030 District group currently includes five major downtown property owners and managers, two city utilities, and engineering and design firms. The *Seattle 2030 Challenge* has ambitious targets for the operational energy of new or renovated buildings: use of fossil fuels to be reduced by 60% immediately (in 2010), becoming totally carbon neutral by 2030; with greenhouse gas emissions and water consumption being reduced immediately by 50%. The targets for existing buildings are less demanding: fossil fuels, GHG emissions, and water consumption all to be reduced by 10% immediately, rising to 50% by 2030.

**148****Segrate / Milano Santa Monica (Milan)**

Location	Europe - Italy
Website	<a href="http://www.milanosantamonica.it/">http://www.milanosantamonica.it/</a>
Size	2,000 units
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

This new neighbourhood of Milan is based on the concept of 'bio-architecture', promoting the design of the urban landscape in close alignment and harmony with the surrounding environment. The compact neighbourhood will only make up 10% of the overall area, with the rest developed as green space to enhance biodiversity. Solar power and heating will provide electricity and hot water for the new houses. It remains unclear what (public) transport system is planned for travel into Milan city centre. The project, which is financed and developed by private bank Vegagest, is due for completion in 2013.

**149****Sejong**

Location	Asia - South Korea
Website	<a href="http://www.perspectiveglobal.com/perspective-plus/post-165-metropolitan-politics">http://www.perspectiveglobal.com/perspective-plus/post-165-metropolitan-politics</a>
Size	18,000 acres
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

Sejong, a new city approximately 100 miles from Seoul, was originally chosen to be the new national capital city of South Korea. Following the plan's rejection by the Constitutional Court of Korea in 2004, the government decided to continue building it as a major administrative centre. Its 2007 masterplan envisaged a sustainable city, with schemes in place for water and waste management, energy efficiency, recycling, and urban agriculture, with provision made for large open areas and green roofs. These plans were amended in turn, with Sejong to become a 'high-tech eco-friendly city' instead. Finally, however, the large corporations backing the hi-tech plan pulled out after it was voted down by the South Korean Parliament in 2010. Construction is continuing on Sejong as an eco-city with a strong administrative function, amid ongoing political controversy.

**150****SolarCity Linz-Pichling (Linz)**

Location	Europe - Austria
Website	<a href="http://www.linz.at/english/life/3199.asp">http://www.linz.at/english/life/3199.asp</a>
Size	3,000 inhabitants
Type	II - urban expansion
Phase	3 - implemented
Key implementation mode	a - technological innovation

In the early 1990s, the city of Linz decided to build SolarCity Linz-Pichling, a new eco-friendly residential development in the city's Pichling district. The initiative was motivated by a growing housing shortage in the city as well as broader concerns about global climate change. Completed in 2005 with funding from the European Union and the province of Upper Austria, it aims to be socially inclusive by containing a mix of tenure and property sizes, as well as local facilities catering to different age groups. Twelve developers signed a contract with the city to build homes to minimum standards of energy efficiency. Solar energy systems cover about 50% of hot water needs, while a district heating network provides heat for all buildings. Buildings are oriented to maximize the amount of sunlight they receive. A rainwater management system minimizes the amount of water running off into drains. Underground parking keeps the residential areas car-free and therefore pedestrian and bicycle friendly.

**151****Sonoma Mountain Village (Rohnert Park)**

Location	North America - USA
Website	<a href="http://www.sonomamountainvillage.com">http://www.sonomamountainvillage.com</a>
Size	1,694 units + >600,000 sq. ft commercial
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Developed on a 200-acre decommissioned industrial site, Sonoma Mountain Village – a new neighbourhood of the city of Rohnert Park (Sonoma County, California) – aims to become a leading urban sustainability development based on the notion of integrating the use of advanced technology with a design centred upon the needs of its residents and businesses. The sustainability model used is that of *One Planet Community* (BioRegional – see profile 9). This includes a ‘five-minute lifestyle’ concept, with all public amenities and facilities located within a five minute walking distance, thus cutting down on emissions and improving the work-life balance. The development incorporates a business cluster aimed at attracting new sustainable businesses. Coddling Enterprises, the site owner, operates an onsite steel frame company for the production of carbon-neutral houses to be used on the development, and installed the second-largest privately owned solar array in Northern California in 2006. A series of sustainability education and events programmes is planned for residents. Work on the retro-fitting of the business centre began in 2009, with overall project completion expected in 2025.

*Update 2011*

In 2010, planning permission for the overall development was granted by the city of Rohnert Park. Work on the residential units is delayed until 2012 at the earliest due to the economic downturn. Meanwhile, the development was the city’s main source of new employment in 2009, with over 700 jobs on site as of 2011. In January 2011, the initiative received *LEED* ‘Platinum’ certification for *Neighbourhood Development*. In March 2010, the new zero-carbon Operations Center also received *LEED Commercial Interiors* ‘Platinum’ certification.

**152****Sseesamirembe**

Location	Africa - Uganda
Website	<a href="http://www.sseesamirembe.com">http://www.sseesamirembe.com</a>
Size	200 sq miles
Type	I - new development
Phase	2 - under construction
Key implementation mode	b - technological innovation

Sseesamirembe Eco-City (or Lake Victoria Free Trade Zone) was initiated in 2006 by the Ugandan government, with financial backing from China (\$1.5bn; one of the largest Chinese investments in Africa to date). The development stretches an area of some 200 square miles, including multi-use urban developments, sustainable agricultural land and forests, green belts and nature reserves. It is planned as a low-carbon area providing a competitive operational base with efficient infrastructures, administrative support and hi-tech services to attract new businesses to the region. The initiative incorporates principles of nature conservation, pedestrian-friendly, energy-efficient urban design and renewable energy production.

**153****Stockholm Royal Seaport**

Location	Europe - Sweden
Website	<a href="http://www.stockholmroyalseaport.com">http://www.stockholmroyalseaport.com</a>
Size	236 hectares
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

The development of the new Royal Seaport, on a former brownfield site owned by the City of Stockholm, was chosen as one of the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. Construction started in 2010 and is due to be completed in 2025. It will provide 10,000 homes and 30,000 office jobs. The Seaport aims to be fossil fuel free by 2030. While there are plans to introduce solar energy and a biomass plant, the main focus is on improving energy efficiency, including a smart grid system. Sustainable transport initiatives include the introduction of biogas buses, charging points for electric vehicles, and new lanes for pedestrians and cyclists. To reduce emissions into the harbour, docked boats will be able to plug into the electricity grid instead of using diesel. The largest current building on site, a gas works, will become a new cultural centre including an opera stage. This is taking place within a wider context of sustainability initiatives in Stockholm (including the Hammarby Sjöstad development - profile 85), which led to it being named by the European Commission as the first *European Green Capital* in 2010.

154-  
155**Suzhou Industrial Park and Western Ecological City (Suzhou)**

Location	Asia - China
Website	<a href="http://www.sipac.gov.cn/english/categoryreport/InfrastructureAndEcology/201009/t20100913_72198.htm">http://www.sipac.gov.cn/english/categoryreport/InfrastructureAndEcology/201009/t20100913_72198.htm</a> <a href="http://sba-design.eu/3458-Western-Eco-City-Suzhou.html.en">http://sba-design.eu/3458-Western-Eco-City-Suzhou.html.en</a>
Size	288 km <sup>2</sup> / 5 km <sup>2</sup>
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

**Suzhou Industrial Park (SIP)**

In 2004 this joint program between China and Singapore began developing an *Ecological Demonstration Zone* which would use sustainable materials and technologies in building and promote recycling. (*Ecological Demonstration Zones* are promoted by China's State Environment Protection Administration.) In 2008 SIP became the first *National Eco Industry Demonstration Zone* with approval from the Ministry of Environmental Protection, Ministry of Commerce and Ministry of Science and Technology. Energy and water consumption in the area are below national and provincial levels due to their efforts and in 2007 air quality levels were rated as excellent for 326 days of the year. SIP is also host to a wide range of recycling businesses.

In 2010, SIP, the US Natural Resources Defense Council (NRDC) environmental organization, and Nanjing University signed a cooperation agreement to develop an *Eco Science Hub* demonstration project. This will explore the path of low-carbon development and promote the implementation of the *SIP Ecological Optimization Plan*. The project is supported by the governments of California and Jiangsu, who signed a strategic cooperation agreement in 2009 to jointly promote greenhouse gas emission reductions, renewable energy, energy efficiency and environmental protection.

**Western Ecological City**

The German company SBA Design is developing the Western Ecological City, a green centre in the Yangtze River Delta covering an area of 5 km<sup>2</sup>. The existing canal system will be adapted and turned into a new municipal complex that will contain housing, offices, culture and sport centres, all built in a sustainable manner. Construction began in 2010.

**156****Sydney**

Location	Australasia - Australia
Website	<a href="http://www.cityofsydney.nsw.gov.au/Environment/Overview/default.asp">http://www.cityofsydney.nsw.gov.au/Environment/Overview/default.asp</a>
Size	4,300,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Based on two successive local government acts (1993; 1999), Sydney has embarked on a concerted sustainability programme addressing environmental, social and economic issues. Using various sustainability indicators, the city's use of resources is closely monitored. An environmental partnership between the city authorities and civil society groups was established; an extensive public information campaign on conservation and sustainability was put in place; and a household energy savings programme was launched. More recently work on White Bay, a new neighbourhood, has begun using strict environmental norms. There, local transport will be based on a new system of stackable electric mini-cars. Sydney's overall vision is contained within the *Sustainable Sydney 2030* plan, published in 2009. This covers social and cultural sustainability as well as the physical environment. It aims to reduce GHG emissions by 70% compared with 2006.

*Update 2011*

The City Council plans to retrofit 44 major buildings in the city. In the Central Business District many buildings will be retrofitted with solar panels, with underground trigeneration (combined cooling, heat and power) plants fuelled by natural gas installed below street level.

Redevelopment is due to begin in late 2011 of the newly renamed Barangaroo industrial site, close to the Central Business District, to create a new 'climate positive' residential and commercial area and a waterfront park (profile 8).

**157****St. Davids**

Location	Europe - United Kingdom
Website	<a href="http://www.stdavids.co.uk/ecocity/index.htm">http://www.stdavids.co.uk/ecocity/index.htm</a>
Size	1,800 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

St. Davids, the UK's smallest city, has gained a reputation for its green practices and policies. Following a sharp economic decline in the late 1980s/early 1990s, the city – led by civil society actors, including the *Eco-City* group – began to shift its focus to innovation in environmental sustainability and eco-tourism. With support from the National Lottery, it launched a programme to become the UK's first carbon neutral city, by experimenting with and implementing various solar heating and photovoltaic, as well as water conservation and recycling, systems. Since 2006, residents have been able to fill their cars from a biodiesel pump, after joining the city's *Biodiesel Club*. It also runs an education and tourism programme, attracting on average half a million visitors annually. Revenues from this are reinvested in new sustainability technology innovation, including for example a recent study to test the feasibility of installing a tidal turbine in the Ramsey Sound that could provide the city with 100% renewable electricity. The first 'St. Davids Eco City Week' of events, talks and workshops was held in February 2010.

**158****Tajimi**

Location	Asia - Japan
Website	<a href="http://www.japanfs.org/en/mailmagazine/newsletter/pages/027839.html">http://www.japanfs.org/en/mailmagazine/newsletter/pages/027839.html</a>
Size	100,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	c - civic empowerment/involvement

Tajimi is among the leaders in Japanese eco-city development, having won the national *Top Eco-City* award as early as 2003. Its approach to urban sustainable development combines community involvement with transparent information on environmental impacts. New developments and the retro-fitting of existing buildings – using advanced sustainable technologies, such as rooftop gardens and solar panels – are carried out by prior public consultation. Characteristically, urban sustainability as a planning issue is integrated across all of the city's administrative departments.

**159****Tangshan Caofeidian**

Location	Asia - China
Website	<a href="http://www.tangshan.gov.cn">http://www.tangshan.gov.cn</a>
Size	1.5 million inhabitants
Type	I - new development
Phase	2 - under construction
Key implementation mode	a - technological innovation

In 1976, an earthquake levelled Tangshan city, after which it was rebuilt according to higher sustainable standards than most other Chinese cities. In 2006, on the 20<sup>th</sup> anniversary of the earthquake, the Chinese President launched an initiative to consolidate the city as a pioneer for sustainable urban development. Industries that found themselves surrounded by residential areas due to the city's recent growth have been relocated to the periphery. At the same time, strict water and waste recycling requirements have been imposed on all industrial sites. A new city, Tangshan Caofeidian International Eco-City (also now known as Tangshan Bay Eco-City), is being built, with involvement of Swedish engineering group SWECO, to meet the demand for additional housing for up to 1.5m people. It will feature renewable energy and energy conservation technologies. Migrant workers are provided with health care and educational support. Agricultural producers in the city's hinterland have been encouraged to switch to non-pesticide methods.

*Update 2011*

Planning permission was granted in 2009 and by 2010, 21 out of 100 projects within the overall development had been completed, including infrastructure planning for transport, water supply, drainage, and district energy. Work has begun on a 45 km<sup>2</sup> wetland park, as well as on the construction of buildings in the 12 km<sup>2</sup> city centre. 300,000 people are expected to inhabit the city in the 'near future', with 800,000 residents expected to be living there by 2020.

**160**

**Thames Gateway (London)**

Location	Europe - United Kingdom
Website	<a href="http://www.communities.gov.uk/regeneration/thamesgateway">http://www.communities.gov.uk/regeneration/thamesgateway</a>
Size	Approx. 1.6 million inhabitants
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

The Thames Gateway is Europe's largest regeneration project stretching along the river Thames, incorporating parts of London and the counties of Essex and Kent. The 'eco-region', as it is promoted, comprises urban, brownfield and green space, and is to be developed according to economic, social and environmental sustainability criteria. The London Thames Gateway Development Corporation (LTGDC) was set up in 2000 as a strategic planning authority, bringing together over twenty local, regional and national authorities and organisations. It is in charge of the implementation of both large-scale projects, such as the Channel Tunnel rail extension and the Olympic Village, and smaller projects, such as the refurbishment of housing estates. In 2010, the Thames Gateway Institute for Sustainability was launched as a cross-institutional research and innovation centre to support the development of the region.

*Update 2011*

The London Thames Gateway Development Corporation is to be abolished by 2013, as part of the UK government's scrapping of over 200 semi-autonomous

agencies, and replaced by as yet unidentified succession bodies. To date, planning approval has been given for 16,000 new homes and commercial space for 14,000 new jobs. Siemens is involved in building a new Urban Sustainability Centre within the Royal Docks regeneration area (with completion expected in 2012). This Centre will form the flagship of the *Green Enterprise District* initiative (which covers six East London boroughs, and was announced by Mayor Boris Johnson in 2010). The UK government has given the go-ahead for the London Sustainable Industries Park to be constructed in Dagenham South.

**161****Tianjin Eco-City**

Location	Asia - China
Website	<a href="http://www.tianjinecocity.gov.sg">http://www.tianjinecocity.gov.sg</a>
Size	350,000 inhabitants
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Tianjin Eco-City is a new district of the historic city of Tianjin. It forms part of the Tianjin Binhai New Area, and is adjacent to the Tianjin Economic Development Area (TEDA). It is being built with technology and expertise from Singapore, drawing on the two countries' previous experience of developing the Suzhou Industrial Park (profile 154). While initially the district will derive energy from a waste incinerator plant, several other options for energy generation are under consideration, including clean fuel, renewable (solar) and geothermal energy. All buildings will conform to stringent energy efficiency standards. The district is planned to allow for up to 90% public transport, cycling and walking. Advanced water saving and waste management systems will be implemented. The existing wetlands around the city will be protected to enhance biodiversity. Work began in 2008 and is scheduled to take between ten and fifteen years to completion.

See also profile 132 for details of the Nanhe Jingwu eco-city planned for the outskirts of Tianjin.

*Update 2011*

By 2010, several building complexes were completed, and work on a light rail transit system is under way. The city layout is based on integrated mixed-land use 400mx400m 'eco-cells', every 4-5 of which combine to form differently landscaped 'eco-neighbourhoods' of 20,000 residents. Green 'eco-valley' corridors, serving as the main public open spaces, will run through the city. By May 2010, 125 companies had registered in the eco-city, and in July 2010 it received a \$6 grant from the World Bank's *Global Environment Fund* to support the development of policy, monitoring and regulatory mechanisms. The first public housing project is expected to be ready in 2011. Overall completion is expected by 2020.

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**Toronto**

Location	North America - Canada
Website	<a href="http://www.toronto.ca/environment/index.htm">http://www.toronto.ca/environment/index.htm</a>
Size	2.5 million inhabitants
Type	III - retro-fit
Phase	3 – implemented
Key implementation mode	a - technological innovation

In the early 1990s, Toronto launched a concerted sustainability programme led by the city's environment office, with the main focus on the reduction of greenhouse gas emissions. This programme was formalised into a *Climate Change Action Plan* in 2007, implemented through the *Live Green Toronto* initiative (launched in 2008) which offered advice and grants to the public, holding a variety of community events and an annual outdoors festival. By 2009, a greenhouse gas reduction of 40% was achieved in comparison with 1990 levels, leading to the award of the *Pollution Prevention Award* by the Canadian government. Current plans are to reduce greenhouse gas emissions by 80% by 2050. Other significant initiatives include the Green Roof bylaw (2010) applying to all new buildings. A scheme to transform the seafont brownfield site of the Lower Don Lands into a mixed-use sustainable community was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.

*Update 2011*

A new *Power to Live Green* sustainable energy strategy, which built on the 2007 *Climate Change Action Plan*, was adopted in November 2009. A report monitoring progress on implementing both strategies is due to be published in late 2011. Early indications are that work has been initiated on all the *Power to Live Green* recommendations, while almost 80% of the recommendations in the earlier *Climate Change Action Plan* are now complete.

Almost 15,000 households received grants via the *Home Energy Assistance Toronto* program (which ended in 2011) to make their homes more energy efficient. The city launched a 'Live Green Toronto' membership card in Oct 2010 giving discounts on environmentally friendly products and services, with 10,000 residents and 250 local businesses already participating. In 2011, Toronto was ranked Canada's most sustainable large city by Corporate Knights Magazine for the second year running.

**163****Treasure Island (San Francisco)**

Location	North America - USA
Website	<a href="http://www.sftreasureisland.org">http://www.sftreasureisland.org</a>
Size	13,500 inhabitants
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Treasure Island, a decommissioned US military airbase originally built in the 1930s on an artificial island in San Francisco Bay, is an initiative by San Francisco city council to build a model sustainable community, endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009. The first residents are scheduled to move in by 2013, while the project as a whole should be completed by 2020-2025 through a public-private partnership including Lennar and Wilson Meany Sullivan. In addition to converting the existing military barracks, there will be 8,000 new units, 30% of which will be affordable housing, and including 435 homes for formerly homeless people. 300 out of the 450 acres of island will be turned into parks and agricultural allotments/farms. Treasure Island is designed as a self-contained community offering all the necessary facilities and services (shops, schools, hospitals etc), thus minimising transport requirements. A ferry service will provide public transport to San Francisco city mainland.

*Update 2011*

Planning approval was granted in 2011, with work expected to commence in 2012. The project has received several awards, including the American Institute of Architects *National Honor Award for Regional and Urban Design* in 2009.

**164****Vancouver**

Location	North America - Canada
Website	<a href="http://www.vancouver-ecodensity.ca">http://www.vancouver-ecodensity.ca</a>
Size	570,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

In 2008, Vancouver City Council adopted an *EcoDensity Charter*, following two years of political and public deliberation on the future direction of urban planning for the city. The charter's key principles are sustainability, affordability and liveability. In practice, all applications for new developments must meet the *LEED* standard. In addition, land to be developed will be rezoned so as to ensure the inclusion of substantial green spaces. The charter will be used to develop further action plans.

**Update 2011**

In 2010, the city launched its *Greenest City* initiative to become the world's most sustainable city by 2020 combining plans to make the city a 'mecca of green enterprise', with significant reductions in overall greenhouse gas emissions (by 33% compared with 2007 levels) and in residents' ecological footprint (by the same amount over 2006 levels). In the same year, the Vancouver Olympic Village received *LEED Neighbourhood Development* 'Platinum' certification (only one other project worldwide has received this award). In 2011, Corporate Knights magazine ranked it the most sustainable city in Canada (along with Victoria).

**165****Växjö**

Location	Europe - Sweden
Website	<a href="http://www.vaxjo.se">www.vaxjo.se</a>
Size	56,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	a - technological innovation

Växjö, known as one of Europe's greenest cities, has for the last two decades been engaged in an ongoing programme of sustainable urban innovation with focus on three main areas: shifting towards renewable energy, improving energy efficiency, and encouraging behavioural changes among its inhabitants. Originally, its interest in sustainability was prompted by the energy crisis of the 1970s and developed into various action programmes in the following decades. The process intensified following the adoption of a *Local Agenda 21* strategy. In recent years, innovation has extended to waste treatment, organic waste-to-energy production, and improving public transport. The city council uses an 'eco-budgeting' process to integrate its sustainability agenda in all policy sectors.

**Update 2011**

In 2010, it adopted a new *Environmental Programme* which replaced the *Local Agenda 21*. This sets 17 environmental targets for the city, allocates the responsibility for achieving each target, and defines the quantitative indicators with which progress will be measured. The areas to be monitored include fossil fuel and energy consumption, waste management, local food sourcing, public transport and cycling, biological diversity, and clean air and water. In 2009, Växjö achieved a reduction of carbon emissions by 34% per person compared with 1993 levels. The *Environmental Programme* sets a target for this reduction to increase to 55% by 2015.

**166****Victoria Harbour (Melbourne)**

Location	Australasia - Australia
Website	<a href="http://www.victoriaharbour.com.au">www.victoriaharbour.com.au</a>
Size	30 hectares and 340 hectares
Type	II - urban expansion
Phase	2 - under construction
Key implementation mode	a - technological innovation

Victoria Harbour is a brownfield regeneration project which will create a mixed-use area for 30,000 inhabitants in Melbourne's docklands. It is being developed by Lend Lease in partnership with VicUrban (the state Government's land development agency), with completion expected in 2021. The City of Melbourne actively supports a wide variety of environmental initiatives, and attempts to educate the public through its own *Eco City Sustainability Campaign*.

Victoria Harbour was endorsed along with VicUrban@Officer (a separate sustainable development in the suburb of Officer - profile 167) by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.

**167****VicUrban@Officer (Melbourne)**

Location	Australasia - Australia
Website	<a href="http://www.vicurban.com/cs/Satellite?c=VPa ge&amp;cid=1240298109586&amp;pagename=VicUrban%2FLayout">http://www.vicurban.com/cs/Satellite?c=VPa ge&amp;cid=1240298109586&amp;pagename=VicUrban%2FLayout</a>
Size	340 hectares
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	a - technological innovation

VicUrban (the Victoria state Government's land development agency) is developing a 340 hectare new-build residential scheme in the suburb of Officer on the city's south-eastern outskirts. The site was chosen partly for its good transport connections. Unlike traditional suburban schemes, it will offer a mix of high- and low-rise buildings, all highly energy efficient. The first residents and businesses are supposed to be on site by late 2012. The City of Melbourne actively supports a wide variety of environmental initiatives, and attempts to educate the public through its own *Eco City Sustainability Campaign*.

VicUrban@Officer was endorsed along with Victoria Harbour (a separate sustainable development in Melbourne's docklands - profile 166) by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.

**168****Waitakere**

Location	Australasia - New Zealand
Website	<a href="http://www.waitakere.govt.nz/abtcit/ec/index.asp">www.waitakere.govt.nz/abtcit/ec/index.asp</a>
Size	200,000 inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	c - civic empowerment/involvement

New Zealand's fifth largest city, Waitakere was formed in 1989 through the amalgamation of the City of Waitemata and three neighbouring boroughs. At the heart of its early mission was to make Waitakere an eco-city based on blending *Agenda 21* principles with traditional Maori values. Existing buildings have been retro-fitted to render them more energy efficient and improve grey water recycling. At the same time all new buildings have to meet strict energy efficiency standards. Public grants are available to residents for installing solar panels.

**169****Wanzhuang (near Langfang)**

Location	Asia - China
Website	<a href="http://www.arup.com/Projects/Wanzhuang_Eco-city.aspx">http://www.arup.com/Projects/Wanzhuang_Eco-city.aspx</a>
Size	400,000 inhabitants by 2025
Type	I - new development
Phase	1 - planning stage
Key implementation mode	b - integrated sustainability vision/planning

Wanzhuang Eco-City aims to be a model for bridging the urban-rural gap in China. Building on an existing village infrastructure to the north-west of Langfang (half way between Beijing and Tianjin), the new urban development seeks to preserve, harness and enhance the established local traditions and agricultural knowledge. The 15 existing villages will be incorporated in the new network of urban centres, thus preserving the social fabric while providing new development opportunities. The site was selected by the Chinese government in the mid 2000s, and the plans were drawn up collaboratively by Shanghai Industrial Investment Corporation (SIIC) and international engineering firm Arup (the same collaboration as for Dongtan eco-city - profile 28). In 2009, the project was expected to be completed by 2025.

The Wanzhuang project is unrelated to the proposals to retro-fit Langfang itself as an 'eco-smart city' (profile 118).

*Update 2011*

Other than the construction of two roads and an iconic building nicknamed the

'Little Bird's Nest', the Wanzhuang development appears to have stalled.

**170****Weihai City**

Location	Asia - China
Website	<a href="http://www.china.org.cn/environment/2010-10/28/content_21221710.htm">http://www.china.org.cn/environment/2010-10/28/content_21221710.htm</a>
Size	2.8m inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

Weihai, located at the tip of the Shandong Peninsula, is a popular tourist destination and an important national and international centre for cargo distribution, boasting strong trade links with nearby South Korea. It has long had a reputation as a 'livable' city, in part due to a programme of environment and infrastructure improvements first launched in 1987. It was named as a *National Hygienic City* in 1990, a *National Model City for Environmental Protection* in 1997, a *National Excellent Tourist City* in 1998, and a *National Garden City* in 2004, and received the *UN Habitat Scroll of Honor Award* in 2003. Building on these successes, Weihai announced formal plans in 2006 to redevelop itself as an 'eco-city', prioritising public education on environmental issues, and building capacity to deal with environmental emergencies. Weihai has since introduced policies to encourage investment in green and hi-tech industries, and made significant improvements to water quality and sewage systems.

**171****Xiamen**

Location	Asia - China
Website	<a href="http://www.chora.org/?p=56">http://www.chora.org/?p=56</a>
Size	3,500,000 inhabitants
Type	III - retro-fit
Phase	2 - under construction
Key implementation mode	b - integrated sustainability vision/planning

Xiamen was first approved by the Ministry of Environmental Protection as a *National Model City for Environmental Protection* in 1997. Its more recent *Eco-city Conceptual Planning* strategy document (adopted in 2003) provides for city-wide environmental protection alongside economic development. The strategy prioritises the protection of marine environments and the development of Xiamen's tourism and harbour-related industries, and has allowed the city to relocate some of its heavy industry. In 2009, it commissioned a city-wide low carbon masterplan, which aims to improve the energy efficiency of existing buildings, and introduce renewable energy sources, better waste treatment facilities, and less polluting public transport. This energy masterplan now forms part of the *Taiwan Strait Climate Change Incubator* initiative, in which Xiamen is collaborating with the Taiwanese city of Taichung. As part of its programme of ecological improvements, Xiamen recently announced plans to build more wetland parks.

**172****Yangzhou**

Location	Asia - China
Website	<a href="http://www.gtz.de/en/praxis/6534.htm">http://www.gtz.de/en/praxis/6534.htm</a>
Size	4.5 million inhabitants
Type	III - retro-fit
Phase	3 - implemented
Key implementation mode	b - integrated sustainability vision/planning

Yangzhou's eco-city masterplan, adopted in 2003, is a long-term strategy aiming at cultural change as much as environmental improvements, and sees public participation as key to sustainability. To this end, an environmental educational centre was created as a venue for public to discuss environmental issues. Vulnerable habitats including wetlands have been restored and protected. The city has successfully encouraged industrial manufacturers to adopt less polluting production practices, and has a long-term goal to move towards a knowledge-based service economy. Rapid improvements in air and water quality were claimed after the introduction of the eco-city strategy. These were accompanied by the provision of 33,000 units of affordable housing and the preservation of the historic centre - allowing Yangzhou to win a UN Habitat *Scroll of Honour* in 2006 for transforming the city 'from a shanty town into a clean, modern city within five years'.

**173****Yinggehai**

Location	Asia – China
Website	<a href="http://www.sba-design.eu/3462-Low-Carbon-Future-City.html.en">http://www.sba-design.eu/3462-Low-Carbon-Future-City.html.en</a>
Size	43 km <sup>2</sup>
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

A new 'low carbon city' is to be constructed next to the existing village of Yinggehai, to the south west of Hainan Island – currently a rural area used for salt production. The project is at an early stage of planning; German architects SBA Design won an international competition to design the masterplan in 2011. This provides for a low-rise compact city consisting of nine mixed-use districts. Three holiday resort islands will be built on land reclaimed from the sea, connected to the mainland by walkways. Rainwater will be recycled, environmentally-friendly transport encouraged, energy will be produced from wind and solar sources, and stored using molten salt.

**174****Zonk'izizwe Town Centre (Johannesburg)**

Location	Africa - South Africa
Website	<a href="http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&amp;upload_id=11666">http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&amp;upload_id=11666</a>
Size	220 hectares
Type	II - urban expansion
Phase	1 - planning stage
Key implementation mode	a - technological innovation

According to its developers, the new Zonk'izizwe town centre will be built to high standards of environmental sustainability on an unused land site to the north of Johannesburg. It has favourable transport connections, with the Grand Central Airport and a motorway nearby, and will be linked by rapid rail to Johannesburg and Pretoria. Walking and bicycle use are to be facilitated, with buildings located to provide easy access to public transport. It is being developed by Old Mutual Property, a founder-member of the Green Building Council of South Africa (GBCSA). The initiative was endorsed by the Clinton Climate Initiative's *Climate Positive Development Program* in 2009.



## **Update – November 2011**



## Update – November 2011

### Addendum

Since the publication of this report in September 2011, the following four eco-city initiatives have been added to the census:

Profile	Eco-City
175	Amanora Park Town (Pune, India)
176	Copenhagen Eco-Metropolis 2015 (Denmark)
177	Eco Island (Isle of White, United Kingdom)
178	One Planet Middlesbrough (United Kingdom)

Profiling information for these is provided below.

175	<b>Amanora Park Town (Pune)</b>
Location	Asia - India
Website	<a href="http://www.amanora.com">http://www.amanora.com</a>
Size	400 acres
Type	II – urban expansion
Phase	2 – under construction
Key implementation mode	a – technological innovation
<p>Originally launched in 2007, Amanora Park Town is currently being developed by City Corporation Ltd on previously agricultural land in the western outskirts of Pune, close to the city's airport and growing manufacturing and IT industrial hub. It is being built in accordance with the Maharashtra Government's <i>Township</i> policy, requiring the developer to create and maintain the entire infrastructure of the new district (including uninterrupted water and electricity supply, protection of ecological systems, efficient waste management, and the provision of schools, hospitals and a fire station on site). It will deliver 12,000-15,000 homes in a mixture of villas and high-rise developments (up to 22 storeys); the 'Future Towers' residential area was designed by Dutch architects MVRDV (see also profile 81). Extensive retail and leisure facilities and an 5,000-seat amphitheatre are planned for the town centre. Open space will include a 26-acre park and a 2.5 acre lake. The township will have its own railway station, with cycle paths and an electric bus service. An educational 'Temple of Environment' has been inaugurated. Other 'eco-friendly' features include energy-efficient outdoor illumination powered by renewable energy, and planned on-site generation of wind and solar energy for general consumption. A large proportion of its residential properties have already been sold, although completion dates are as yet unclear.</p>	

**176****Copenhagen Eco-Metropolis 2015**

Location	Europe - Denmark
Website	<a href="http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/LivingInCopenhagen/ClimateAndEnvironment/Eco-metropolis.aspx">http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/LivingInCopenhagen/ClimateAndEnvironment/Eco-metropolis.aspx</a>
Size	550,000 inhabitants
Type	III – retro-fit
Phase	2 – under construction
Key implementation mode	a – technological innovation

In 2007, Copenhagen City Council published its *Eco-Metropolis 2015* vision, aiming to become 'rightly known as the capital city in the world with the best urban environment', an 'inspirational example' which will 'demonstrate to other capitals how a greener urban environment can enhance the quality of life in practical terms'. This builds on a legacy of urban environmental initiatives including widespread district heating, pedestrianisation, investment in bicycle infrastructure, recycling of building waste, the introduction of wind turbines, and cleaning up the water in the harbour.

*Eco-Metropolis 2015* shapes the agenda for other city policies including Municipal Plans and the Copenhagen Climate Plan (adopted 2009). It sets specific targets in four areas: cycling (proportion of trips and safety); CO<sub>2</sub> emissions (reduction of 20% by 2015 compared with 2005, and carbon neutrality by 2025); access to and use of parks, 'sea swimming pools' and beaches; and cleanliness and health (air quality, noise pollution, organic food, and rubbish removal). A progress report published in 2010 claims substantial progress in bicycle safety, organic food consumption, and litter collection.

**177****Eco Island (Isle of Wight)**

Location	Europe – United Kingdom
Website	<a href="http://www.eco-island.org/hub/vision">http://www.eco-island.org/hub/vision</a>
Size	148 square miles / 140,000 inhabitants
Type	III – retro-fit
Phase	2 – under construction
Key implementation mode	a – technological innovation

The Isle of Wight published its *Eco Island Sustainable Community Strategy* in 2008. A 'Global Launch Event' took place at the UK Houses of Parliament in 2011, which aligned the initiative with the Government's *Big Society* concept. The partnership co-ordinating *Eco Island* works with public sector organisations, local voluntary groups, and inward investors, aiming to 'enable the community to take its destiny back into its own hands' and 'develop a greenprint which can

be replicated elsewhere’.

The environmental ambitions outlined in its 2011 *Eco Island Charter* are underpinned by the £200m of private funding already raised. Global partners include IBM and Toshiba, who are helping to design a ‘smart grid’ which will integrate wind, tidal, geothermal and solar power in the future – to help the island become a net exporter of energy by 2020. British partners include utility providers and ITM Power, which specialises in hydrogen-generation through water electrolysis, used to power vehicles. Other plans include local food delivery networks and support for new allotments, self-sufficient zero-energy water systems, and educational programmes. A *Greenback Card* scheme has been launched giving residents discounts from retailers deemed to be acting in a sustainable way, and making a financial contribution to *Eco Island* projects each time it is used.

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### One Planet Middlesbrough

Location	Europe – United Kingdom
Website	<a href="http://www.middlesbrough.gov.uk/ccm/navigation/environment/one-planet-living-in-middlesbrough/">http://www.middlesbrough.gov.uk/ccm/navigation/environment/one-planet-living-in-middlesbrough/</a>
Size	142,000 inhabitants
Type	III – retro-fit
Phase	2 – under construction
Key implementation mode	a – technological innovation

In November 2011, Middlesbrough was awarded *One Planet* status by BioRegional (a UK-based sustainable development charity – see profile 9), following publication in June 2011 of its *One Planet Living Sustainability Action Plan* after public consultation. The *Action Plan* builds on work conducted since 2004 by Middlesbrough’s Climate Change Partnership (made up of organisations and individuals from the public, private, voluntary and community sectors) to identify ways of reducing greenhouse gas emissions and mitigating the effects of climate change.

The Plan cover the council’s own activities as well as those of its suppliers and the wider community. Through improved energy efficiency, renewable energy, off-setting measures, and low carbon transport policies, it aims to achieve a net reduction of CO<sub>2</sub> emissions of at least 90% by 2025. It will support projects helping residents, organisations and businesses to move towards zero-carbon status. A goal of ‘zero waste’ has been set, to be delivered through improved recycling and composting facilities. Water consumption will be reduced across the city by at least 1.5% per annum, and flood protection improved. Other initiatives include participation in the *Tees Valley Biodiversity Action Plan*, celebrating local culture and heritage, educational projects in schools, programmes to tackle local unemployment, and the *Food Sustainability Action Plan*, which encourages residents to purchase local, seasonal, and organic food.

## Corrigenda

The following information in the original profiles should be corrected:

Profile	Eco-City	Corrected information
5	Arcosanti	mode a – technological innovation
8	Barangaroo (Sydney)	phase 1 – planning stage
32	EcoVillage at Ithaca	type II – urban expansion
33	Eko Atlantic City (Lagos)	type II – urban expansion
100	Ivory Park EcoCity (Johannesburg)	type II – urban expansion
152	Sseesamirembe	mode a – technological innovation

Including the 4 new profiles (bringing the total number of eco-city initiatives to 178), along with the corrections, has a marginal impact on the figures used to illustrate the 'Key findings' in the published report (pp.3-5). These marginal changes, however, do not affect the substance of the key findings.

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