Embracing the New Era of Green Buildings and Smart Cities

Aug 2015



Gordon Falconer AAPI MRICS

Director Smart Cities - Asia, Schneider Electric

Schneider Electric

Today's Agenda

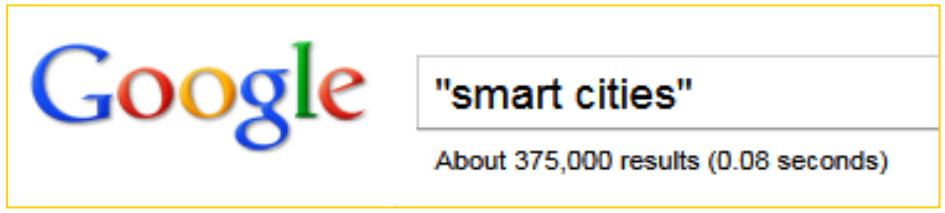
- Smart Cities - Overview
- Schneider Electric & Smart Cities
- Singapore Smart Nation
- Green Buildings in Smart Cities
- Development Process – Developers View
- Green Buildings in Smart Cities – Challenges & Issues

1. Smart Cities - Overview

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Smart Cities is a hot topic

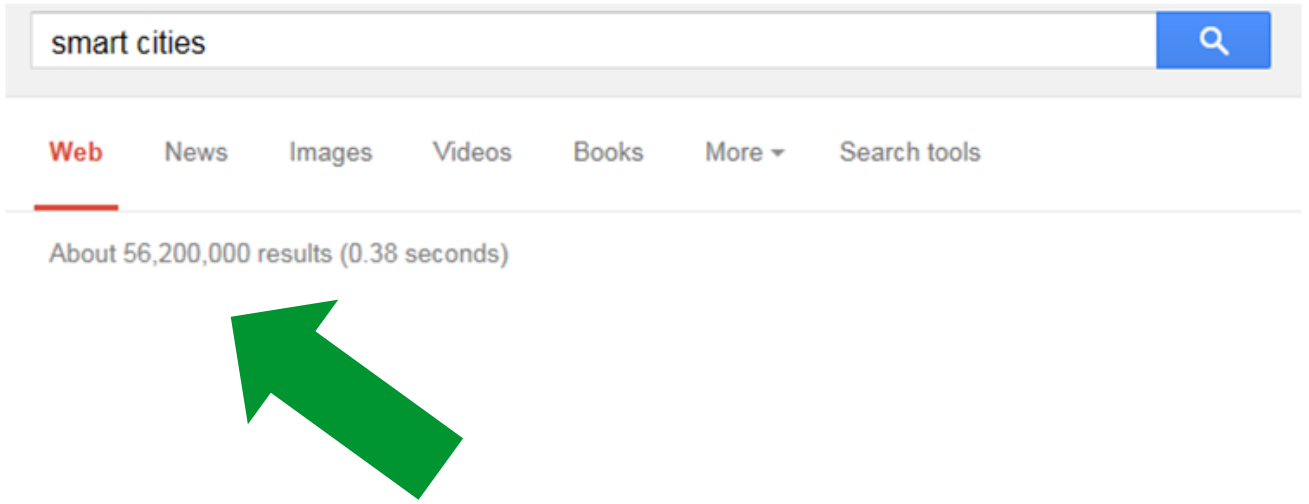
May 2011



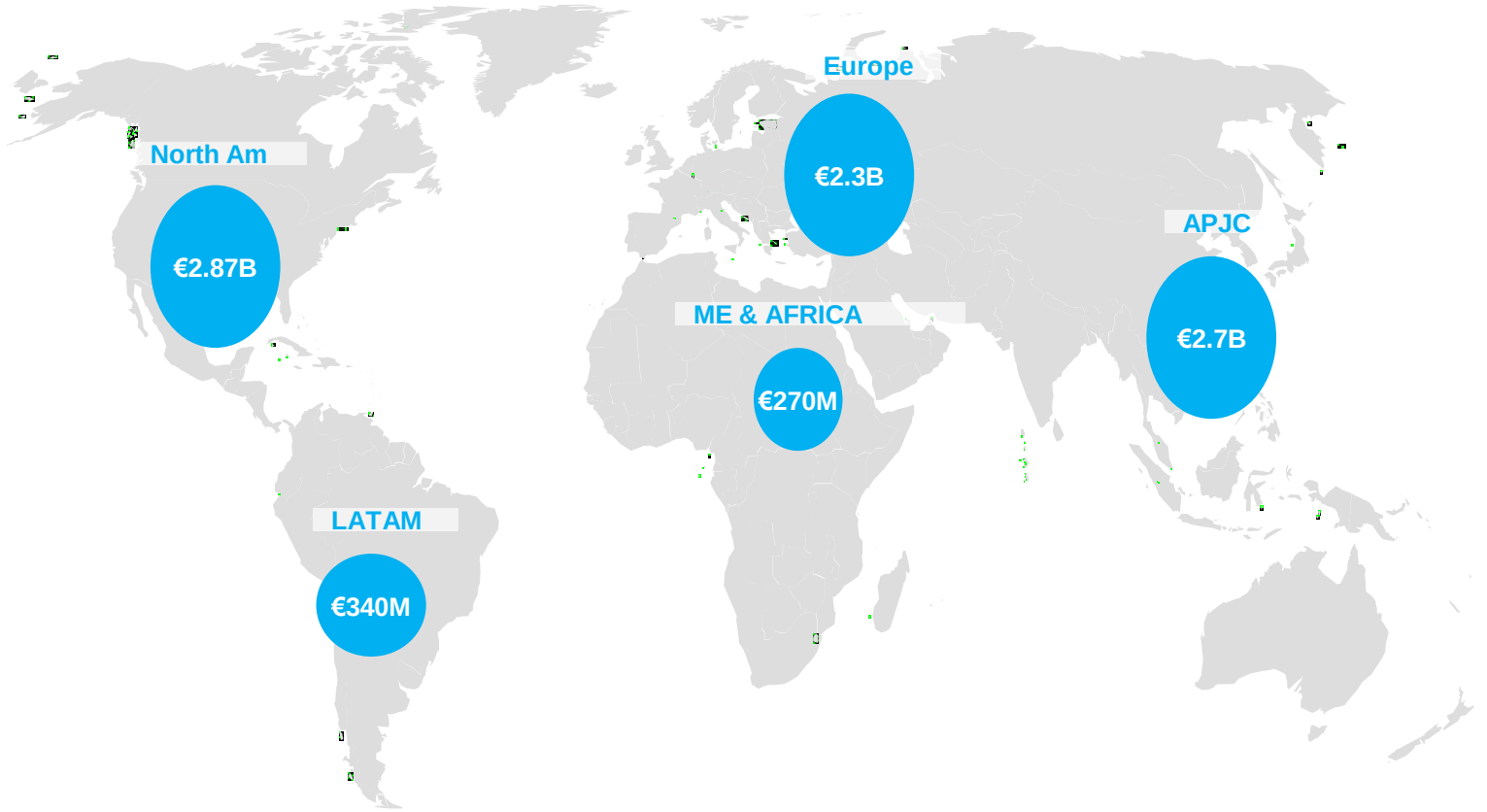
May 2012



May 2015



Smart Cities research shows spending



Future Smart City Spending by region – Forecast 2015

Navigant Research 2014

Smart City Market

Market size:
€8.48 bn

CAGR'15
13%

Navigant Research - 2014



amsmartcity

Smart Cities and Communities

TWEETS

CrystalPistol__: @TheRealSonReal works hella fast. Stokked to hear Good News!! Words I Said was amazing. #wego

reply

about 1 hour ago

TIP OF THE WEEK

Waste separati

amsmartcity official host

keynotespeech Jeremy ri

27 en 28 juni 2012

smart city expo WORLD CONGRESS

CITY PROTOCOL

Guidelines for implementation of Smart City project soon

By PTI | 11 Aug, 2015, 08.36PM IST

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NEW DELHI: Union Urban Development Ministry will announce the details of first stage recommendations and guidelines for development of 100 Smart Cities this week as such suggestive policy measures have

arcelona establishes the public/private basis to roll out Smart Cities

RUSSIA'S SILICON VALLEY September 01, 2011, 5:25 PM EDT

Skolkovo, Russia's Would-Be Si

A project near Moscow aims to rival the U.S. tech industry city," billions in government investment, and a university n

By Peter Savodnik

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Barcelona establishes the public/private basis to roll out Smart Cities

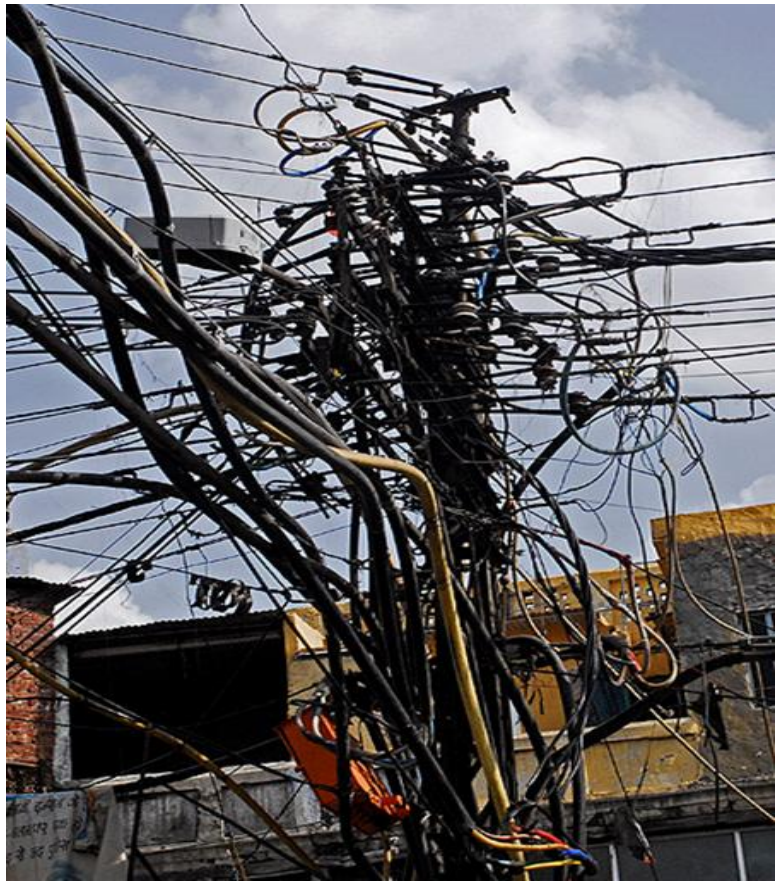


Following on from conversations with the company Cisco to develop the Smart City concept, Barcelona has public/private basis to become a global reference model of sustainable urban development.

The city will create the BIT-Habitat Foundation, design the City Protocol, test-run new urban services, and enjoy th of private enterprises that will also bring their knowledge of human and material resources to the table. This ha favorable atmosphere for the creation of a Metropolis Initiative promoted by Barcelona City Council and Cisco.

AGENDA
Nice News Today
2020 meeting OPh

vision to reality





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© 2011 Scientific American


Oshodi market, located at a major crossroads in the northern part of Lagos, Nigeria, was an entrepreneurial marvel—until a raid by security forces in 2009 demolished it.

2. Schneider Electric & Smart Cities

Schneider Electric

The global specialist in energy management

Company Overview

32

billion $ of sales

41%

of sales in new economies

150,000+

employees in 100+ countries

#10

World's most Sustainable Co's (Global 100 Index)

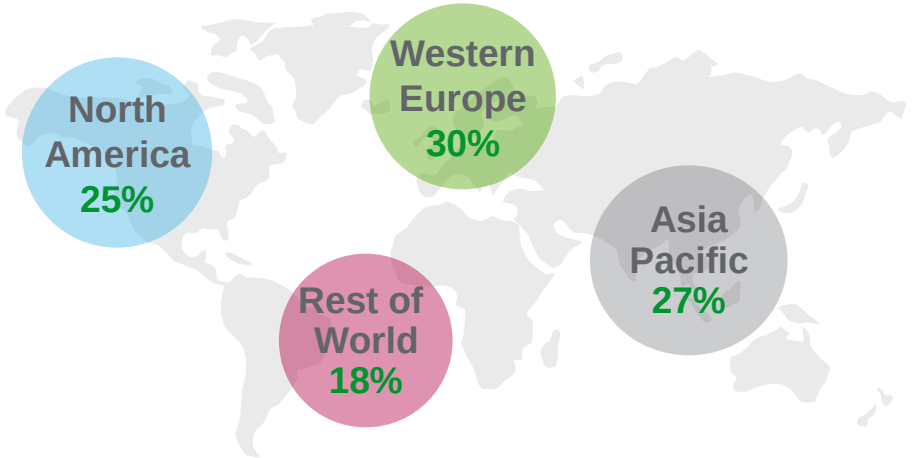
Diversified end markets

FY 2012 Sales (billion €)

- Utilities & Infrastructure 25%
- Industrial & machines 22%
- Data centres 15%
- Non-residential buildings 29%
- Residential 9%

Balanced Geographies

FY 2012 sales



SC Rankings

#3

Navigant Research Leader board

Smart Cities IT/OT Suppliers

#1

Navigant Research Leader board

Smart Cities OT Suppliers

From smart devices through to big data, we provide cities with services, systems and technology to:



Reduce energy consumed



Reduce costs & generate revenue



Optimize & integrate city systems



Improve performance & reliability



Realize measurable efficiency



Reduce CO2 footprints

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Global energy consumption continues to grow with no signs of slowing down.



Urbanization



Digitization



Demographic



Industrialization

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All of these issues are daunting…



When looked at collectively the need for an integrated, sustainable response becomes critical

“A smart city is characterized by the integration of technology into a strategic approach to sustainability, citizen well-being, and economic development.”

-Navigant Research, A leading market research group

What drives cities to become smart?

Cities must become smarter

a smart city strategically approaches technology with emphasis on sustainability, efficiency, and liveablity

Efficient

- Better information sharing
- Improved resiliency to disruptions
- Increased control over city systems

Sustainable

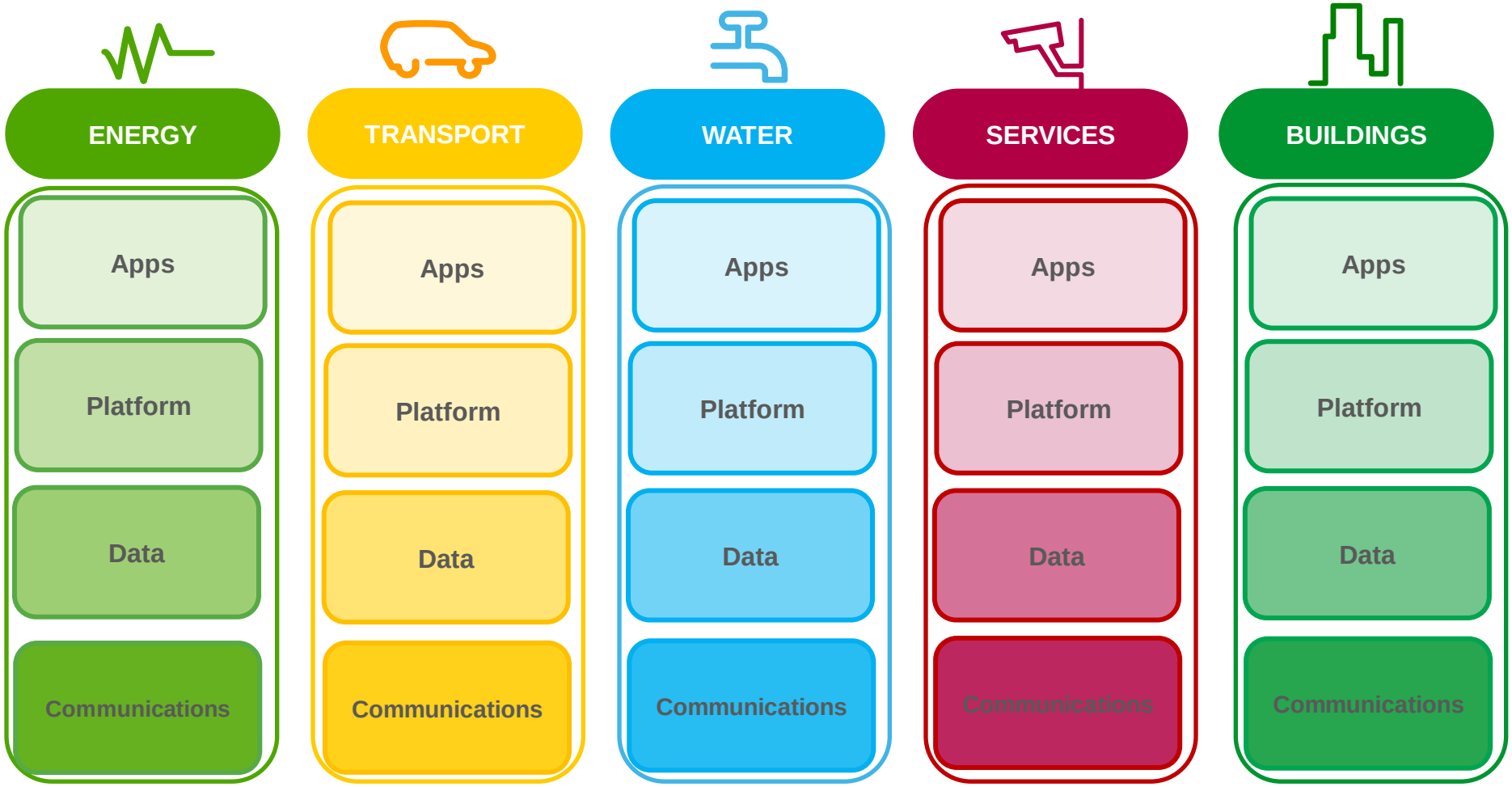
- Reduced Carbon emissions and energy consumption
- Operational cost savings
- Decreased need for massive infrastructure investments

Liveable

- Higher quality of life for city residents
- Increased attractiveness to jobs & talent
- Increased global competitiveness

Leveraging City Systems & Data in New Meaningful Ways

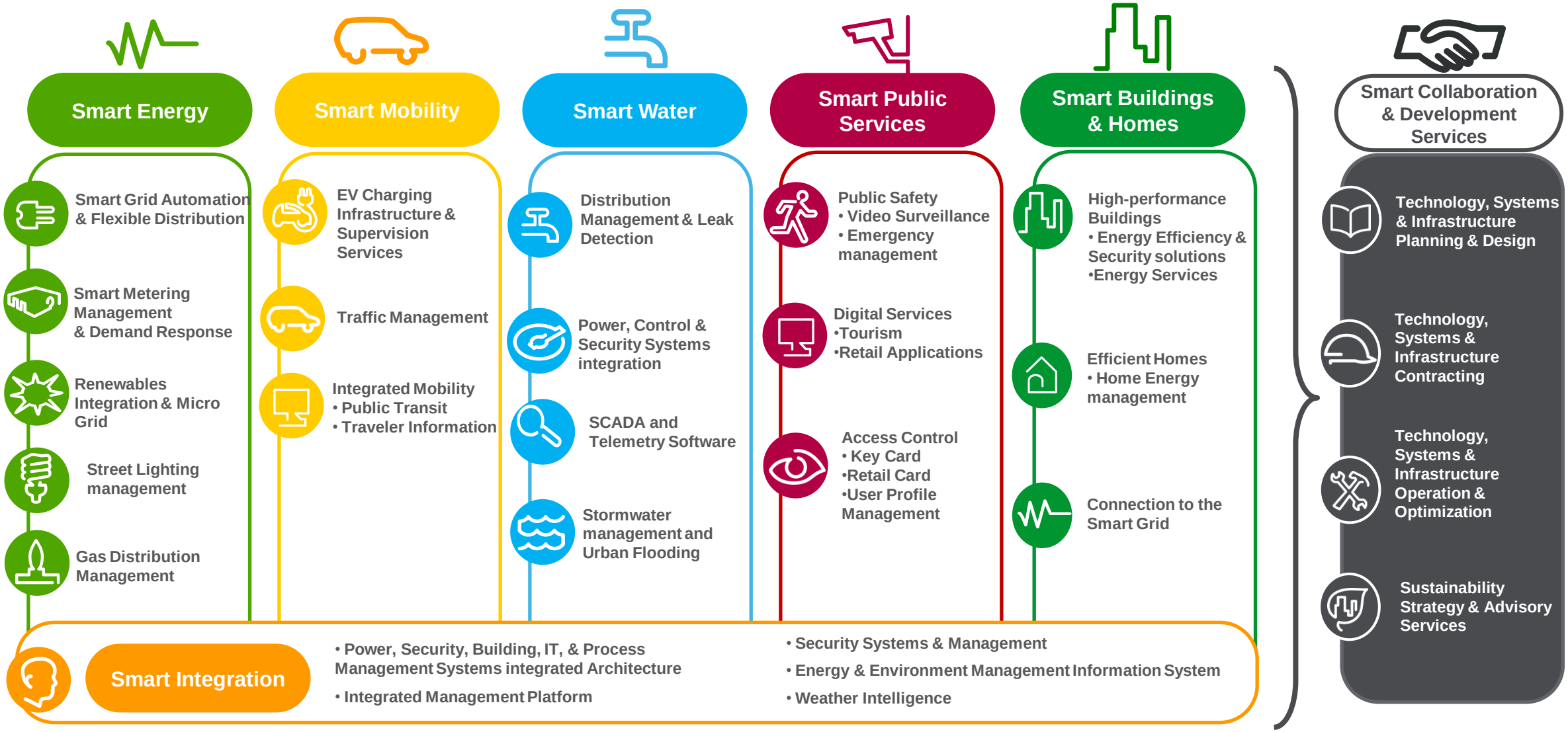
- Each domain within the City has systems and data contained within silos
- And while there is a significant amount, it is near impossible to aggregate in a continuous way



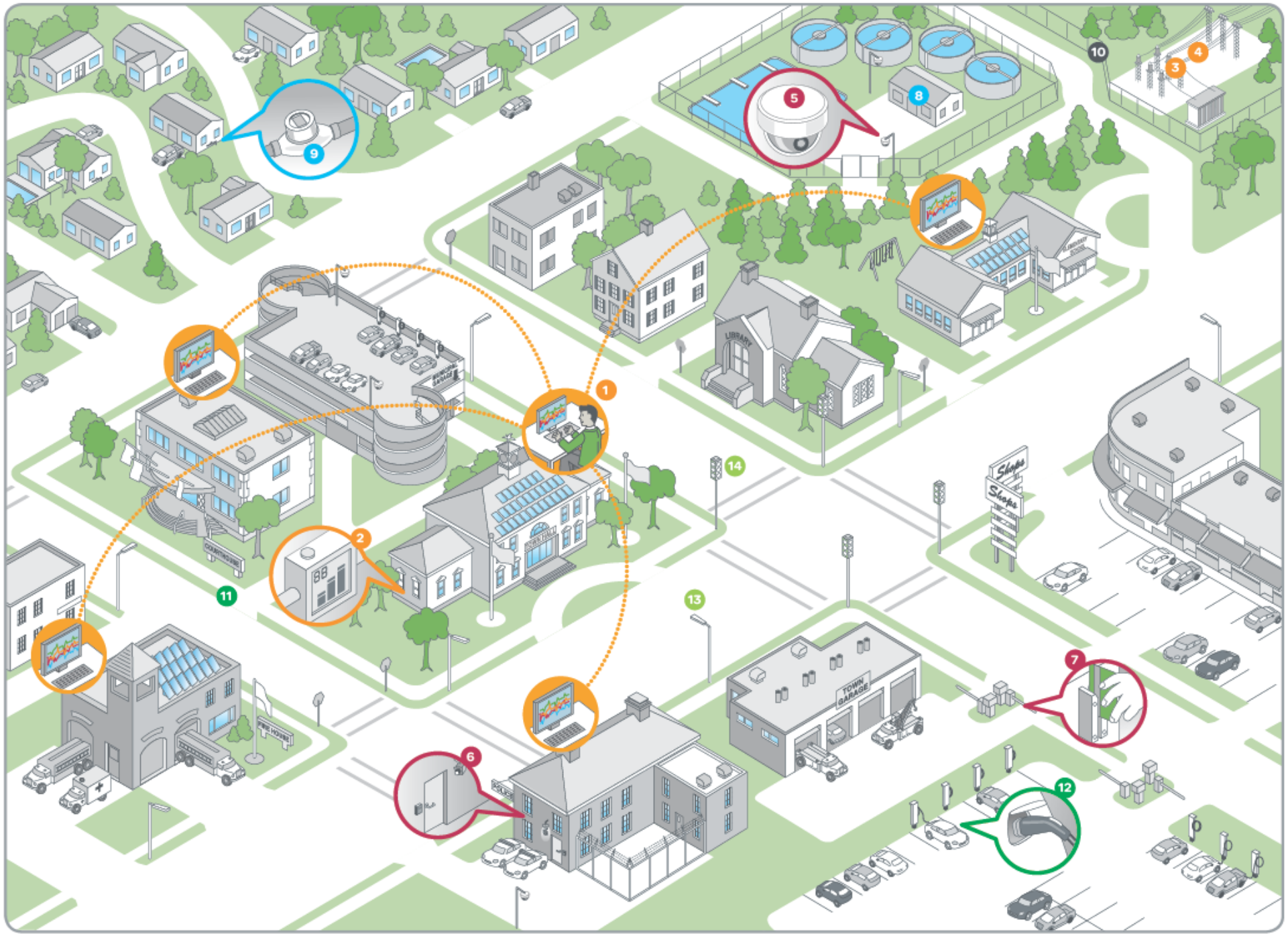
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Environmental Sustainability & Resiliency:

What is Included? Solutions for cities' challenges; solutions to seize new opportunities



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1 Integrated Enterprise System Control & Visibility

2 Metering by End Use

3 Smart Grid Solution & Utility Tie-in

4 Power Distribution

6 Comprehensive Safety Solutions

8 Water Treatment & Recycling

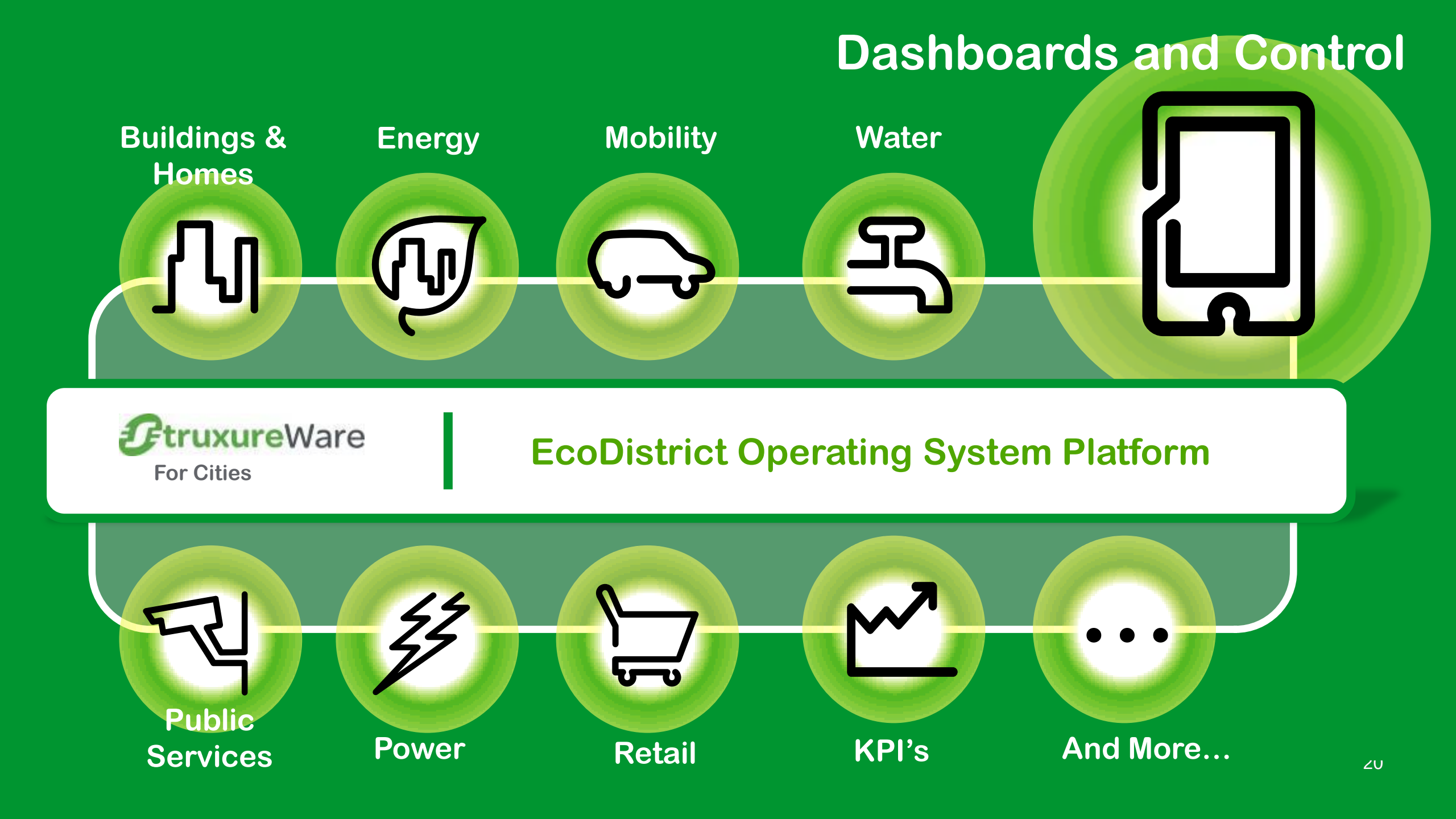
9 Water Infrastructure & Metering

11 Renewables, Energy Storage & Microgrid

12 Electric Vehicle Programs

13 Street Lighting & Smart Streets

And Many More…


Dashboards and Control
Buildings & Homes
Energy
Mobility
Water
truxureWare
For Cities
EcoDistrict Operating System Platform
Public Services
Power
Retail
KPI's
And More…

3. Singapore Smart Nation

Singapore Smart Nation is a priority

TOWARDS A SMART NATION



As our city becomes increasingly complex and diverse, demands… will rise… We will **make full use of new technologies to develop sustainable and innovative solutions**… We will make Singapore a **Smart Nation.**

- President's Address to Parliament, May 2014



There are many applications, many gadgets in our plans to make Singapore a Smart Nation - **not just to run the place better**, but so that it can **make a difference to people's lives.**

- PM Lee Hsien Loong, National Day Rally, Aug

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iDA SINGAPORE

Smart Nation initiative is underway

1,000 sensors to be rolled out in Singapore as part of 'smart nation' plan

PUBLISHED ON OCT 10, 2014 11:06 AM



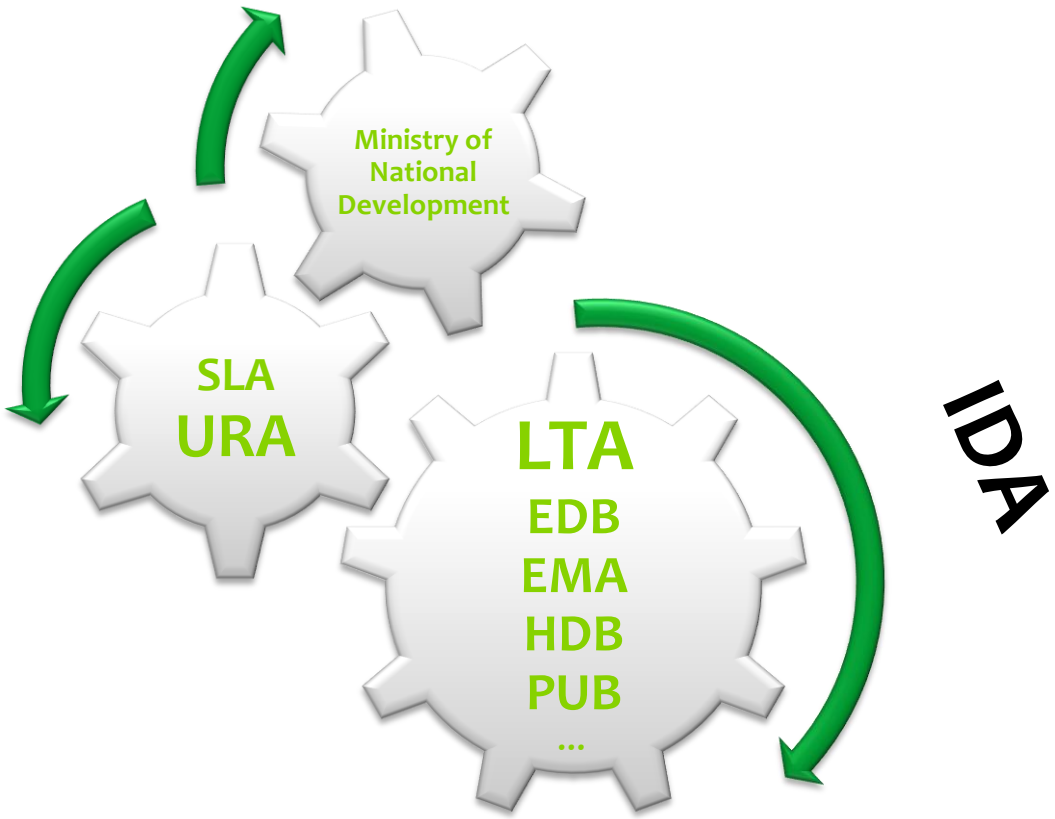
Hazy skies at the Skyline Promenade, Gardens by the Bay (Bay East), on Oct 17, 2014. Some 1,000 sensors will be rolled out throughout Singapore to track everything from air quality and water level to public safety as the Government' "smart nation" plan kicks off. -- ST PHOTO: ONG WEE JIN

Led by IDA, SNP involves establishing a communications backbone and sensor networks, as well as using data analytics. The SNP is centred around three focus areas—connect, collect and comprehend—and will be developed in various phases.



SNP targets to build an infrastructure that will enable "greater pervasive connectivity, better situational awareness through data collection, and efficient sharing of collected sensor data." (Source: IDA)

Singapore - many Government agencies



Source: Singapore government agencies websites

MND (Ministry of National Development):
Designs guidelines for Singapore Urban Development

SLA (Singapore Land Authority):
Allocates land and locations

URA (Urban Redevelopment Authority):
Establishes the Urban Masterplans'

IDA (Infocomm Development Authority):
Main role is IT policy and gathers information, writes and defines informatics standards

LTA (Land Transport Authority):
Implements the mobility intégration for Singapore with roads, trains, buses etc.

Other agencies operate and collaborate in their area of expertise

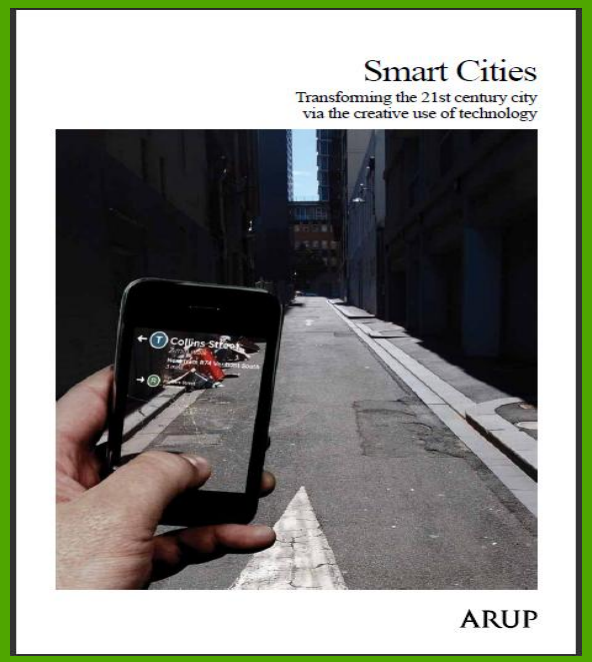
Singapore GreenMark highlights energy

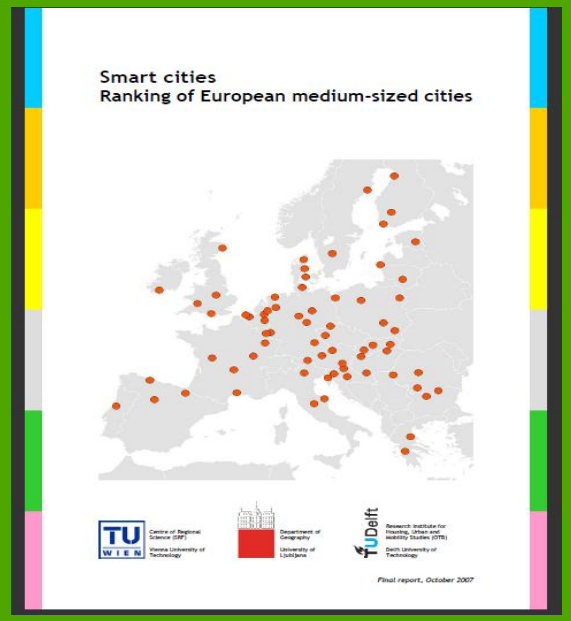
Appendix A – Criteria Comparison

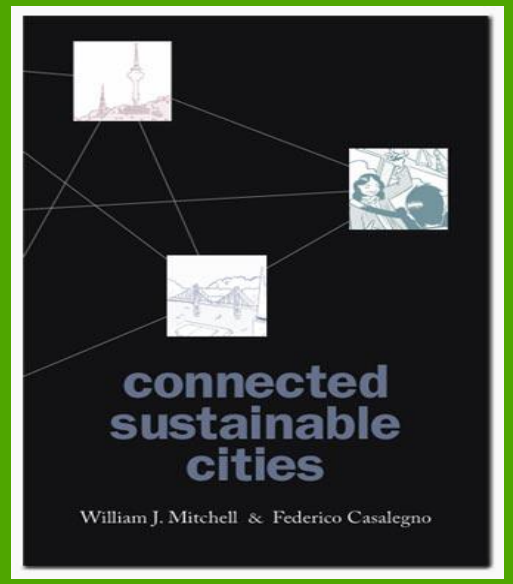
Criteria	Green Mark NRB 4.1	Credits	LEED NC V4 (draft)	Credits
Energy Based				
	Thermal performance of Building Envelope	12	Fundamental commissioning & Verification (requisite)	0
	Air-Conditioning system	30	Minimum energy performance (requisite)	0
(pro rate)	Passive Design (Envelope design)	35	Building level energy metering (requisite)	0
(pro rate)	Passive Design (Ventilation)	20	Enhanced commissioning	6
	Daylighting	6	Optimise energy performance	18
	Artificial lighting	12	Advanced energy metering	1
	Ventilation in Carparks	4	Demand response	2
	Ventilation in common areas	5	renewable energy production	3
	Lifts and Escalators	2	Green Power and Carbon offset	2
	Energy Efficient practices	12		
	Renewable energy	20		
Weight		**61%**		**29%**

4. Green Buildings in Smart Cities

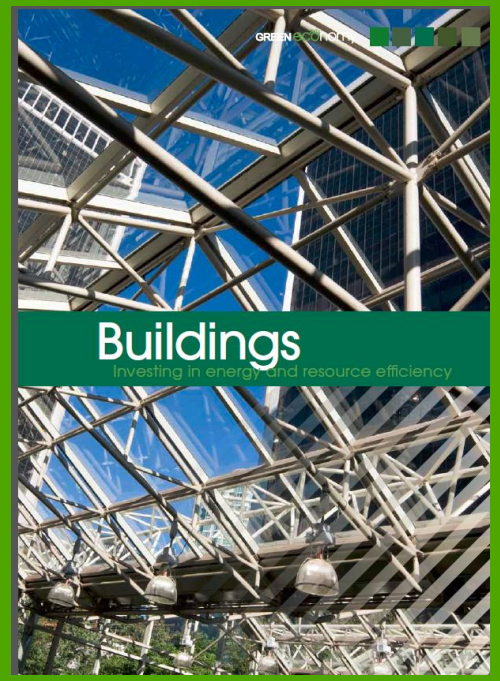
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- Rental rates higher by 2 to 17%
- Resale value improved by 5.8 to 35 %
- Occupancy rates higher by 0.9 to 18 %
- Operating expenses lower by 30 %
- Net operating income higher by 5.9 %
- Capitalisation rates down 50 to 55 basis points
- Productivity improved by 4.8 percent



Masdar City

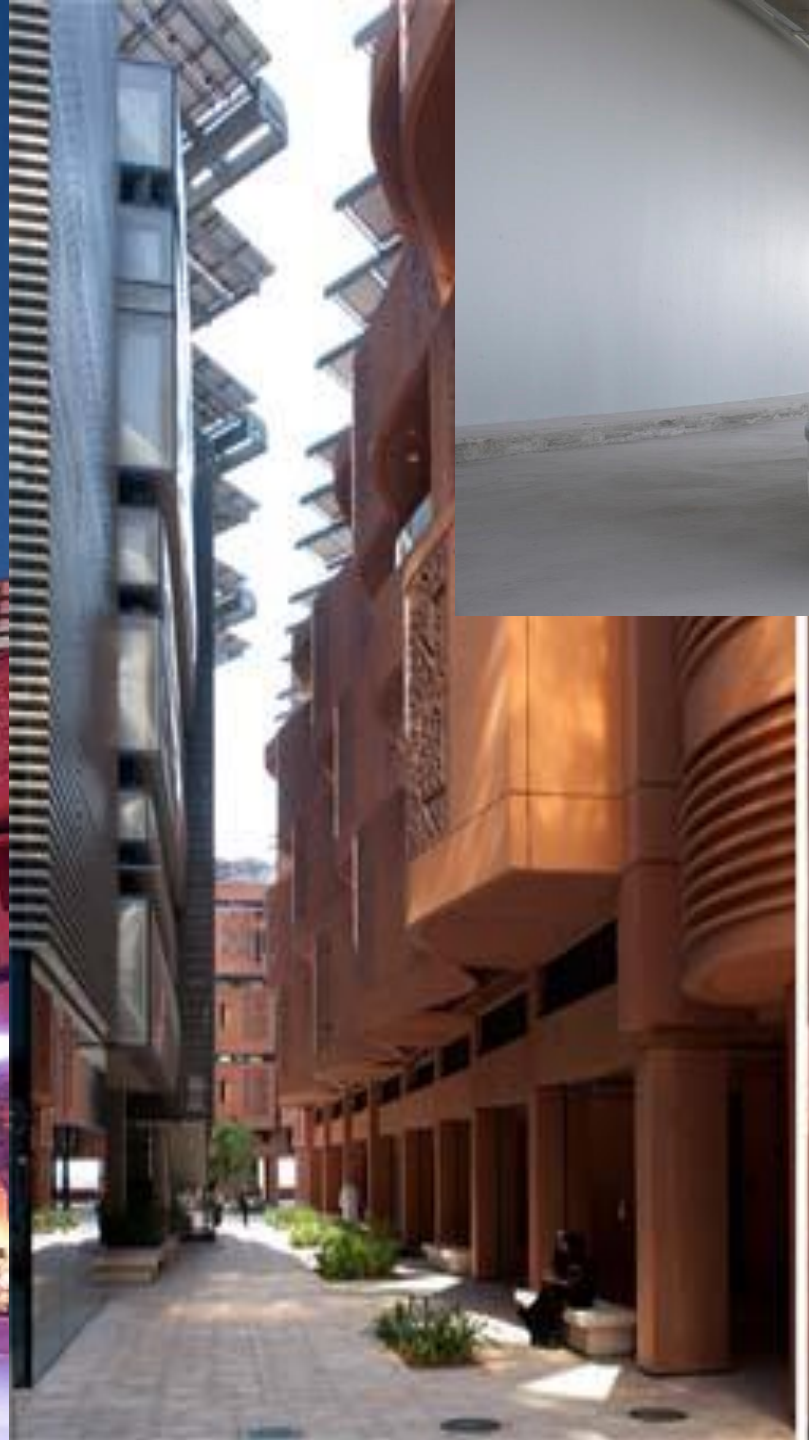
Building Design	Energy Generation	Transportation	Recycling	Carbon offsetting
Energy efficient	**Renewable**	**Electric/Solar**	**Waste to energy**	**Carbon Sequestration**
-56%	-24%	-7%	-12%	-1%

= Carbon Neutrality

Conventional City

Building Design	Energy Generation	Waste	Transportation
Conventional	**Oil and Gas**	**Landfill**	**Fossil Fuel**
80%		13%	7%

= 1,100,000 Tonnes CO_2


© 2011 Bloomberg






- Window Retrofit
- Direct Digital Controls (DDC)
- Tenant Lighting, Daylighting, and Plugs
- Variable Air Volume (VAV) Air-Handling Units (AHUs)
- Retrofit Chiller Plant
- Tenant Energy Management Program
- Radiative Barrier, and
- Tenant Demand Control

38% Energy Saving

* Projected – Source - Clinton Climate Initiative

Frankfurt, Germany



Saved € 65 million 2008-2012 through improved management of water and heating of 2,450 city buildings; Schneider Electric software integral part of operational optimization which has a cost: benefit ratio of 1:3–1:5

Greenovate Boston

Support the city's efficiency and sustainability goals with:

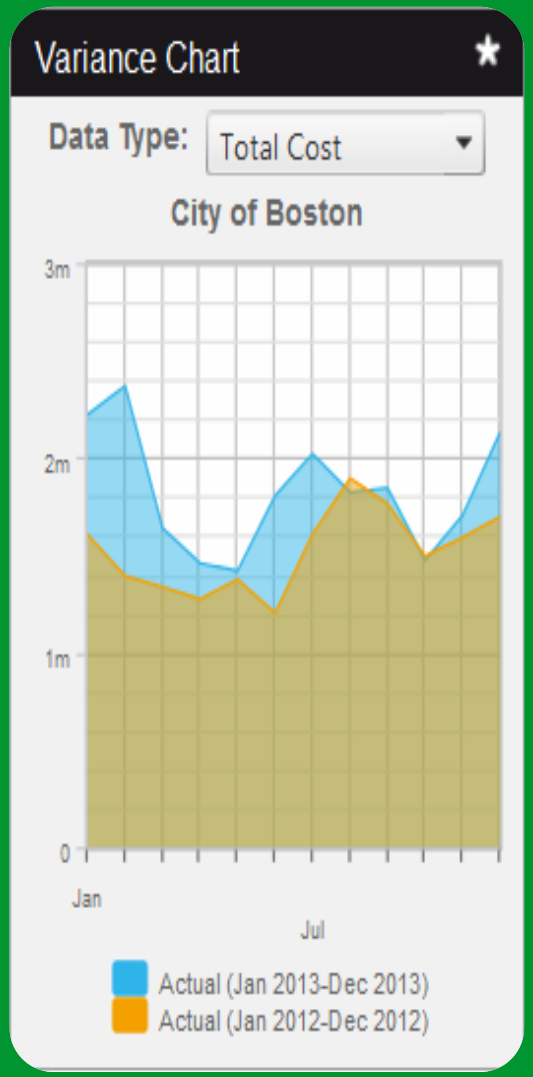
- Energy consumption dashboards for tracking and reporting
- Management of energy conservation projects
- Automated calculation of greenhouse gas emissions
- KPI tracking

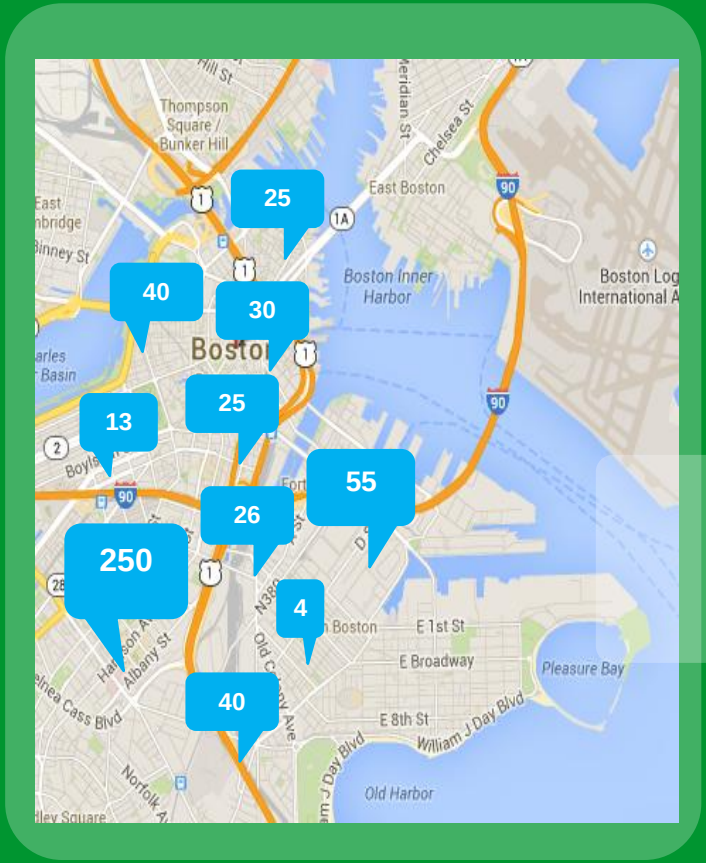
Project elements included capturing, analyzing data from the city's:

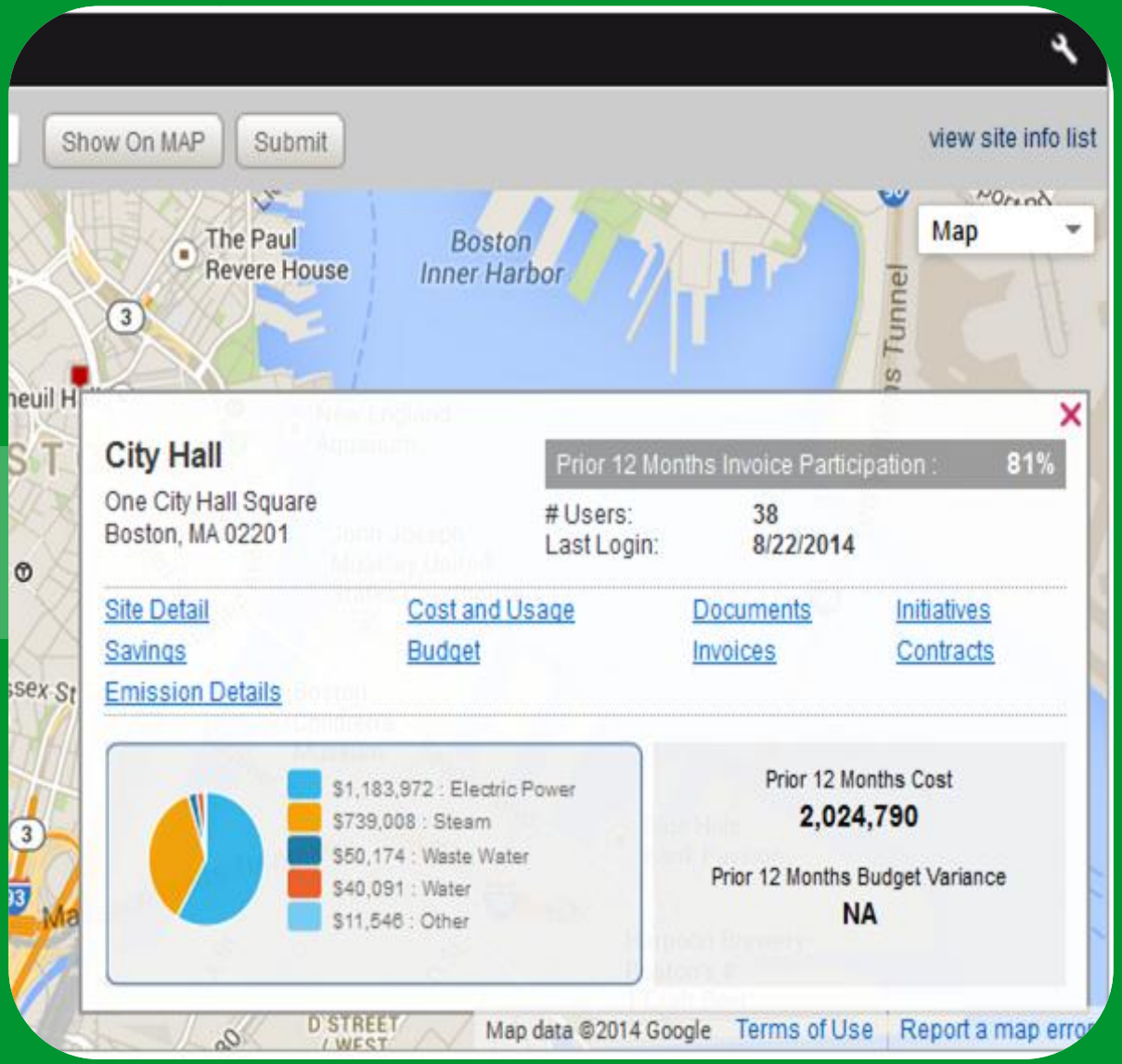
- 350 facilities (including 135 schools)
- 850 traffic lights
- 64,000 street lights
- 3,100 city vehicles



Boston is tracking energy and GHG



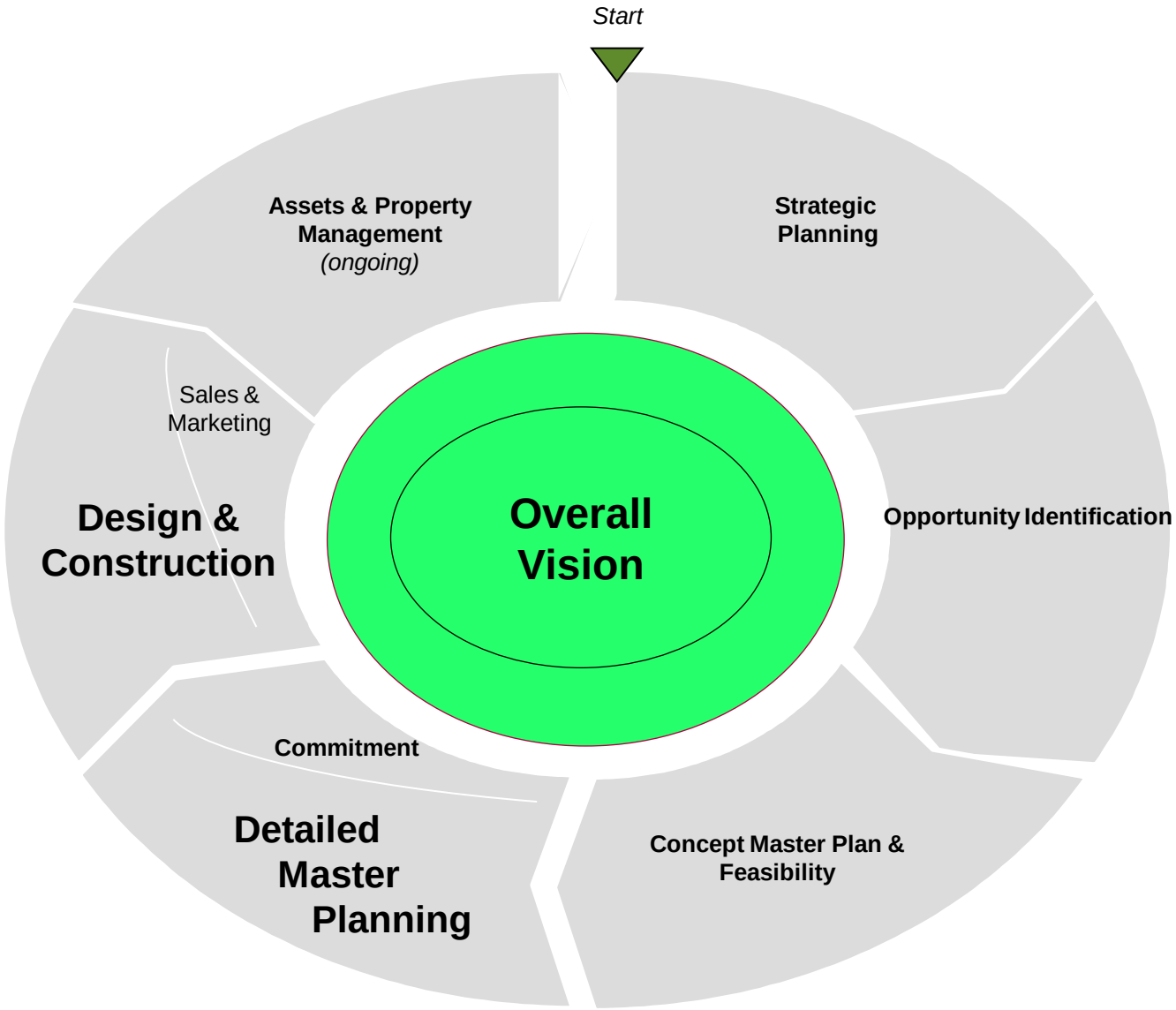


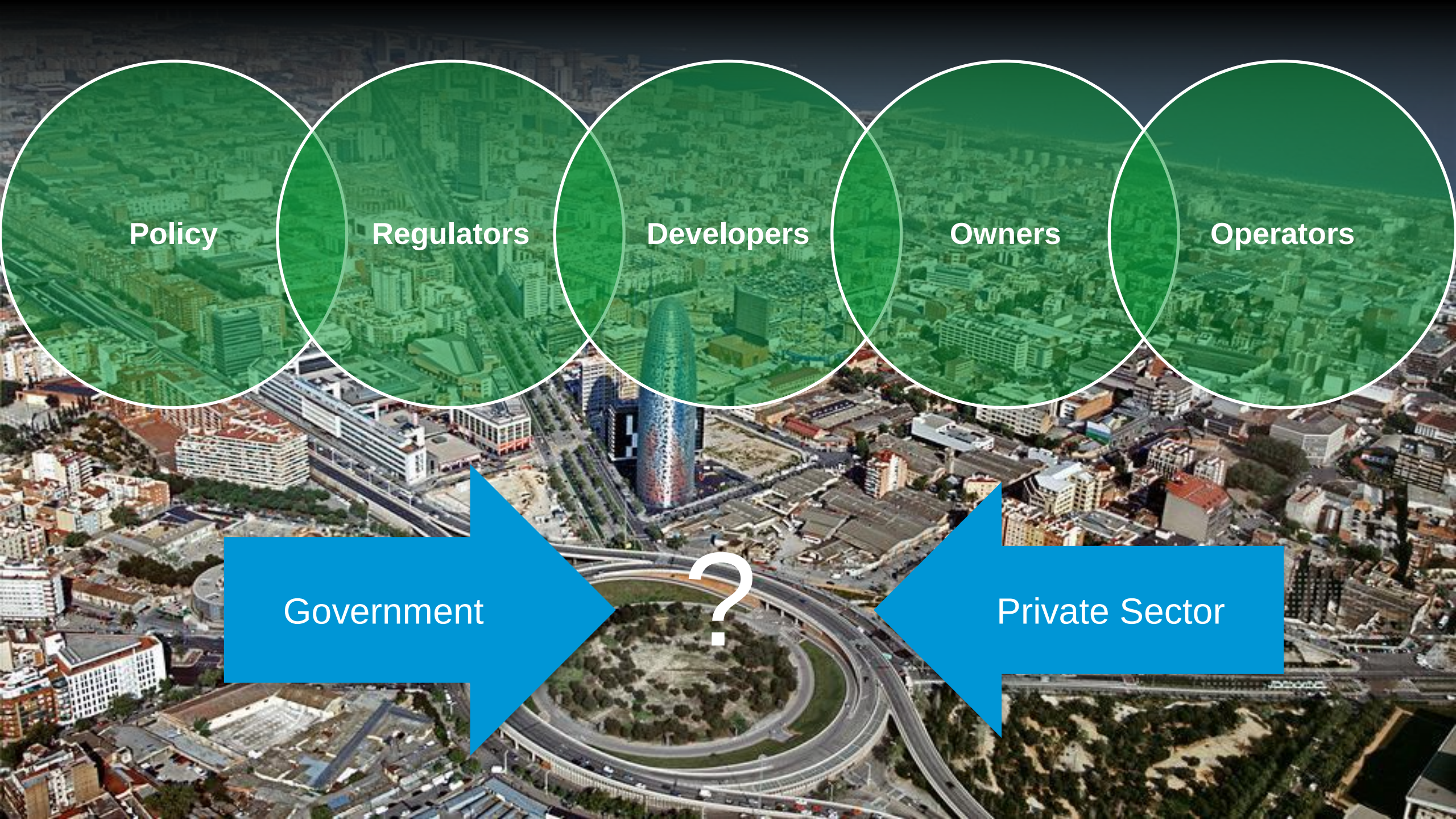


5. Development Process – Developers View

Schneider Electric

A standard development cycle




Policy
Regulators
Developers
Owners
Operators
Government
?
Private Sector

Smart /Green costs are “hidden” within other costs

D		Furnishings, Fittings & Equipment				
	D.1	Furnishings, Fittings and Equipment	375,440	28	0.58%	
		Total for FF&E	375,440	28	0.58%	
E		Services				
	E.1	Sanitary Appliances	501,567	37	0.76%	Standard specification for sanitary appliances
	E.2	Services Equipment	0	0	0.00%	
	E.3	Disposal Installations	1,233,632	91	1.92%	Grey water harvesting excluded
	E.4	Water Installations	1,016,730	75	1.58%	
	E.5	Heat Source	0	0	0.00%	
	E.6	Space Heating & Air-Conditioning	5,829,252	430	9.06%	
	E.7	Ventilating System	216,902	16	0.34%	
	E.8	Electrical Installation	6,561,298	484	10.22%	
	E.9	Fuel Installation	0	0	0.00%	
	E.10	Lift and Conveyor Installations	3,389,860	250	5.28%	Based on
	E.11	Fire and Lightning Protection	1,125,161	83	1.75%	
	E.12	Communication & Security Installation	1,952,122	144	3.04%	
	E.13	Specialist Installation	1,531,873	113	2.39%	Standard
	E.14	Builder's Work in Connection	460,918	34	0.72%	
		Total for Services	23,819,375	1,757	37.11%	

LEED/Sustainability items excluded from base case

	AED	AED/m²
Grey Water Harvesting	112,000	9
Increased BMS	240,000	18
Steel framework and shading panel for PV cells	5,660,000	434
Extra over for triple glazing	2,860,000	219
Extra over for glazing 1.3 Uvalue over 1.6	1,978,000	152

Optional Additions to Baseline

	AED	AED/m²
Cladding Mock ups	250,000	20
Façade maintenance system?		

Some cost consulting reports to a developer advise items in rates per m/2 at a summary level

Additional costs carved out here which relates to smart or green“options”

Schneider Electric

6. Green Buildings in Smart Cities – Challenges & Issues

Schneider Electric

Topics: Innovation and R&D

GAO: Agencies having trouble implementing green building initiatives

SHARE

Email

Federal agencies are having trouble implementing the green building standards ordered by the Obama administration, says a July 23 Government Accountability Office report.

Mayor Boris challenges London businesses to slash energy use



Annual Business Energy Challenge aims to encourage firms across the capital to cut their carbon emissions

Guardian sustainable business In the shadow of the BRICs

Can India lead on green buildings, clean energy and corporate sustainability?

ARCHITECTURE

The Challenges of Greener Cities

11.12.14

A major theme throughout the presentations was the need to debunk the idea that sustainability is separate from—and an added expense in—architecture and planning.

“If [sustainability] is done properly and you consider it as an integral process, there is no additional expense for having a highly sustainable building,”

explained Gordon Gill, M.Arch ’93, a founding partner of Adrian Smith + Gordon Gill Architecture.

Smart Cities issues

- Smart City development is new, complex & technology role unclear
- Lack of “smart city” experience by government and private sector
- “Design led” or “vision led” too often
- Technology / solution providers do not understand “must haves” and “like to haves” and “insertion points”
- Developments with utilities & infrastructure adds complexity especially with stakeholders with different business models
- Fundamental real estate drivers often ignored
- Asset ownership (asset bundles), funding, delivery and operational models complex and impact design
- Over reliance on PPP models and assumption that public sector projects will be funded by private sector

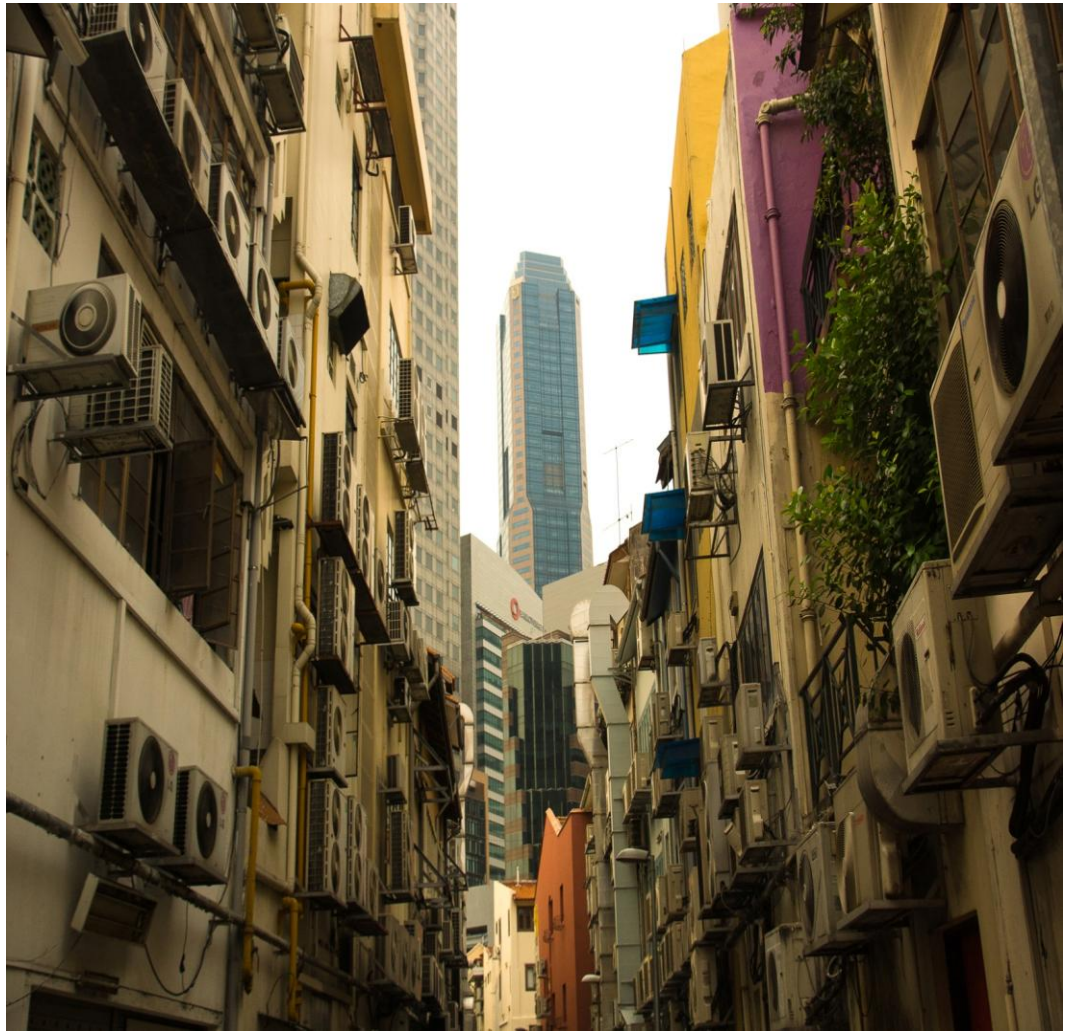
Green Building Issues to be addressed

New Build

- Business case still under review at times
- Developer focus – short / long term
- Design teams lack of awareness – consultants don’t do R&D
- Lack of government incentives – where marginal
- Land values in SG – encourage redevelopment

Retrofit

- Split Incentive – tenant space
- Green leases optional – tenants now demanding
- Disruption to tenants – owners fear disruption
- Minimal green competition – immature market



Starting Point for thinking…..

1. How will technology effect the shape, design, mix of use types and quantum of future cities & property?

2. How will technology effect the business models of existing property owners and occupiers?

3. Who will win and lose when life and business patterns of behaviour change in cities?

4. How can we influence developers of buildings and assets to incorporate new and better technologies?

Key Words:

Online

Connectivity

Social / People

Community

Experience

Resilience

Locations

Business Models

Disruption

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