

SHARINGCITIES

Deliverable 7.5

Measure – Business Model Profile Report



Partner: UrbanDNA

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Summary

This report is an interim deliverable, which captures the current state of play for business model and financing development of the 10 measures for Sharing Cities.

The selection of business model and financing can have a very marked impact on how a measure will be rolled out across a city, both in terms of scale and timeframe; as well as on how successful that measure will be in implementation in terms of delivering the intended impact.

The application of business models and financing for demonstrators, and more importantly for scale deployment is at an early stage, so there is limited measure coverage. This will obviously increase over upcoming months. This report however provides a basis and stimulus for discussion, which is why it is presently submitted in interim form.

Measure – Business Model Profile Report		WP 7 – D7.5	
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1 INTRODUCTION – ABOUT WP7 & THIS DELIVERABLE

This section provides a standard overview of the Sharing Cities programme, and Work Package 7 on Business Models, Financing & Funding; and also provides orientation on this specific deliverable.

1.1 INTENDED READERSHIP & PURPOSE

The audience for this report is Sharing Cities stakeholders and INEA. The approach captured within the report is also relevant to the broader SCC01 and EIP-SCC Marketplace community, to align activities.

The purpose is to provide a capture of how Sharing Cities is going about developing business model options and making decisions about their application in the contexts of the various cities, for each of the 10 measures that we are committed to implement.

Furthermore, it is clear that collaboration amongst the SCC01s and with the EIP-SCC to deliver a streamlined and more-common approach will help the scale up of measures as it will build investor confidence – a virtuous cycle that will help deliver a scale fluid market.

This deliverable relates strongly to D7.2 which introduces the approach taken (and also proposed across the SCC01s) to ‘packaging’ of measures.

1.2 CONTEXT: THE SHARING CITIES PROGRAMME

This Section 1.2 contains standard text that appears consistently throughout ShC deliverables.

Our vision is of a more agile and more collaborative smart cities market that dramatically increases the speed and scale at which we implement smart solutions across European cities, engaging society in new ways to cause them to play an active role in the transformation of their communities – delivering more vibrant, liveable, economically active, and resource efficient cities.

Underpinning this are shared solutions that apply a ‘digital first’ approach; are more common, integrated, open; and provide the ‘building blocks’ incorporating European and worldwide leading practices that can be deployed at scale, yet tailored to cities of different size and stage of development.

A vision where Sharing Cities – in collaboration with other like-minded parties – is instrumental in ‘creating the movement’ that makes a profound and sustained difference.

The Sharing Cities vision is captured in figure 1. It drives what we do. Specific terms in the supporting text provide a clear direction regarding what we do to convert this to practical action, specifically:

“Underpinning this are **shared solutions** that apply a ‘**digital first**’ approach; are more **common, integrated, open**; and provide the ‘**building blocks**’ incorporating European and worldwide leading practices that can be **deployed at scale**, yet **tailored to cities** of different size and stage of development”.

Figure 1 Sharing Cities Vision

Sharing Cities is an EU Horizon 2020 Smart Cities and Communities Programme. The programme brings together 70 people, from 35 partner organisations and 6 countries to work across 8 highly connected work packages; which broadly focus on the themes of People, Place and Platform. Its vision is for a more agile and more collaborative smart cities market that dramatically increases the speed and scale at which we implement smart solutions across European cities, engaging society in new ways to cause them to play an active role in the transformation of their communities – delivering more vibrant, livable, economically active, and resource efficient cities.

Underpinning this are shared solutions that apply a ‘digital first’ approach; are more common, integrated, open; and provide the ‘building blocks’ incorporating European and worldwide leading practices that can be deployed at scale, yet tailored to cities of different size and stage of development.

There is one demonstrator in each of the three lead cities of London, Lisbon, and Milan. The demonstrator areas will test the replicability of these physical, digital and human systems to deliver sustainable place and resource management opportunities.

1.3 CONTEXT: BUSINESS MODELS & FINANCING WORK PACKAGE 7

This Section 1.3 contains standard text on WP7 that appears consistently throughout WP7 deliverables.

1.3.1 WP7 Objectives

There are four objectives and two themes to the ‘Business Models & Financing’ work package:

1. **Develop a series of fundable business models** to ensure that the measures delivered across the demonstrators can become sustainable, financially viable and scalable propositions across the full range of European cities.
2. **Trigger €500M European Smart Cities Investment** to accelerate exploitation of common integrated smart city solutions.
3. **Establish Smart City Investment Funds** in 3 of the principal cities
4. **Boost scale-up businesses** to support the ‘jobs and growth’ agenda (locally)

Theme 1: Matching Measures to Cities

This seeks to understand cities and measures in order to maximise the speed and scale of adoption, and the value generated. To do so we:

- Profile cities to better understand their context & needs
- Characterise Measures and assess measure-specific needs
- Develop business models that enable adoption
- Perform city-to-measures matching (for the 3 lead; 3 fellow; & relevant scale-up cities)

Theme 2: Establish Funds

This seeks to: **A).** unblock investments of all forms, understand investor motives, de-risk investment, and deliver investable (bundles of) measures in the cities, and **B).** support SMEs and scale-up businesses in the principal cities by packaging and disseminating the Funding London model

- **A:** Design & tailor implementations in other SHARLLM cities...and move to Design & implement an EU-level fund
- **B:** Package “Funding London” (SME enablement) model, that will...provide City-level SME focused support

1.3.2 Relationship of WP7 to the Sharing Cities Vision and Goals

The Sharing Cities vision highlights a number of underpinning features (text shown in red in figure 2). WP7 seeks to support the vision by resolving a key market scale-up barrier – the release of money.

Five of the ‘10 Audacious Goals’ are particularly relevant to WP7:

1. Aggregate Demand and achieve wide Scale Deployment of smart city solutions
 - *e.g. Engage 100 cities (2016), & 50% exploit our products*
2. Deliver Highly Relevant Common and Replicable Innovative Solutions
 - *e.g. deliver >10 repeatable solutions, & ~10 tools/frameworks*
3. Attract Quantum External Investment
 - *e.g. Trigger € 500 million external exploitation investment*
4. Make Acceleration in Uptake of Smart City Solutions Real
 - *e.g. Speed uptake and reduce implementation cycle times*
10. Strengthen Local Scale-Up Businesses in (at least) the 3 cities
 - *e.g. Create >100 new jobs in 3 districts in related sectors*

1.3.3 Inter-Dependencies

The Business Model and Financing work package is significantly dependent on developments in other areas of the Sharing Cities programme; and on initiatives outside of Sharing Cities.

Specifically, in the context of this deliverable, as shown in figure 2:

- WP3 and 4 supply the content for each of the 10 measures and thus the insights of this report are dependent on the development of this work
- WP8 (D8.6: “Development and application of up-scaling and replication toolbox”) is an important partner in setting the foundations for evidencing value from measure implementation through indicators
- Exploitation potential is dependent on alignment and collaboration with the other SCC01s and the EIP-SCC, and the activities of WP5 and 6

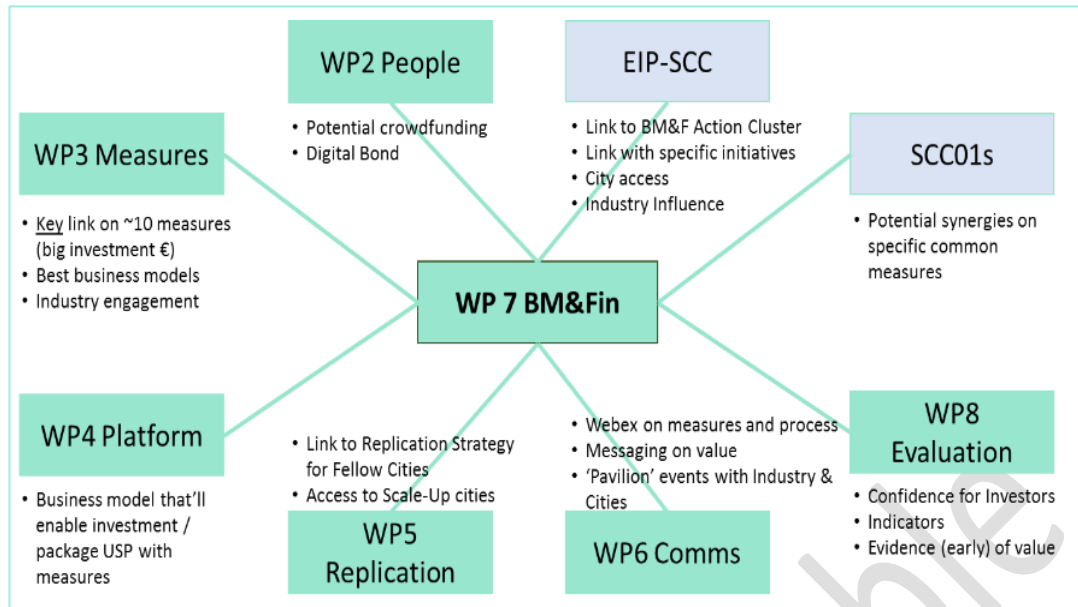


Figure 2 WP7 Interdependencies

1.4 THIS DELIVERABLE: D7.5 MEASURE – BUSINESS MODEL PROFILE REPORT

1.4.1 Overall WP Theme 1 Context

Figure 3 gives context. It shows the logic for Theme 1 of WP7 Business Models & Financing. It shows the feed from, and interdependence with, WP3 & 4 in terms of capturing the essence of each measure as the discussion moves from technical to financial...and again (bottom right) as measures move to procurement, implementation, and evaluation in the cities. Thus 'closing the loop'. It also highlights the specific task and deliverable (red boxes to right).

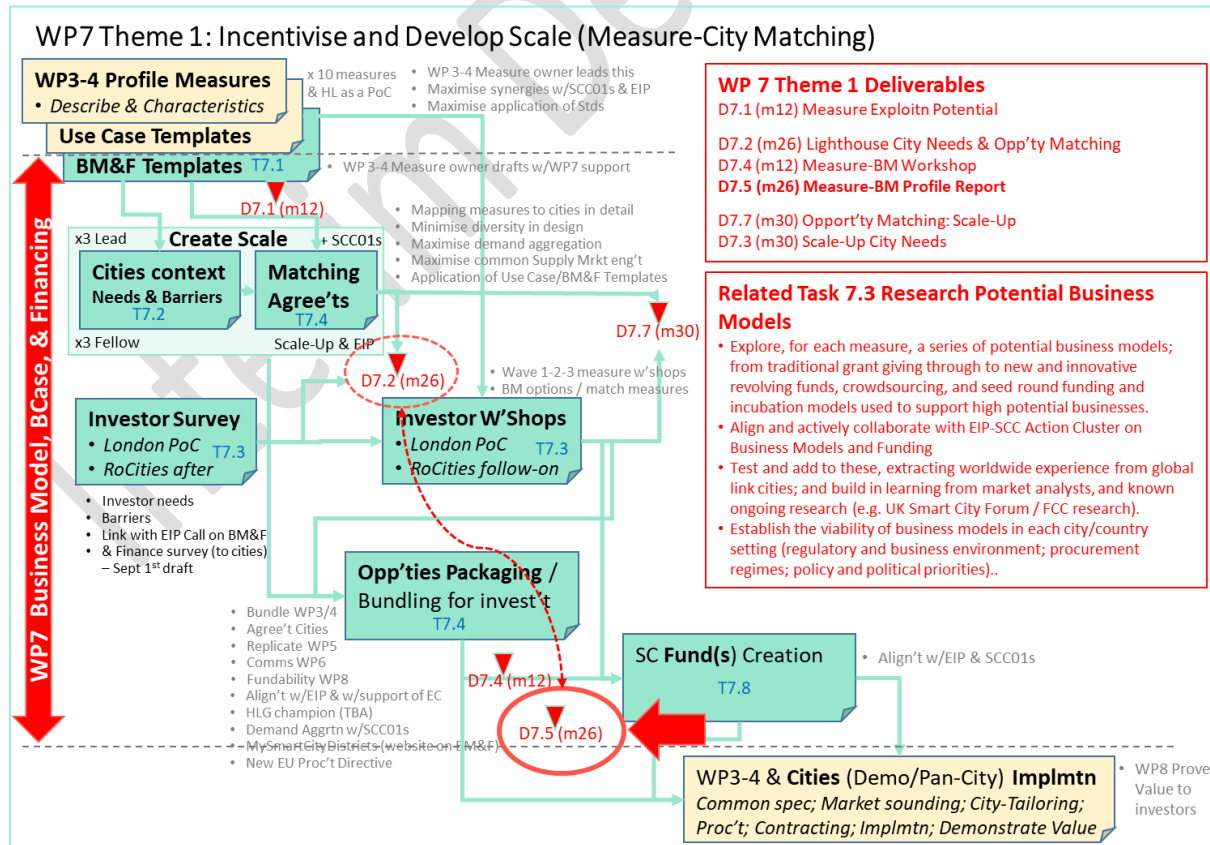


Figure 3 Contextual positioning of Task / Deliverable 7.5 within WP7, and the process of measure exploitation

The precise text that relates to this deliverable states:

Task 7.3. Research Potential Business Models (UrbanDNA, FCC)

- i. *Explore, for each measure, a series of potential business models; from traditional grant giving through to new and innovative revolving funds, crowdsourcing, and seed round funding and incubation models used to support high potential businesses.*
- ii. *Align and actively collaborate with EIP-SCC Action Cluster on Business Models and Funding*
- iii. *Test and add to these, extracting worldwide experience from global link cities; and build in learning from market analysts, and known ongoing research (e.g. UK Smart City Forum / FCC research).*
- iv. *Establish the viability of business models in each city/country setting (regulatory and business environment; procurement regimes; policy and political priorities).*

The extent to which each of the above elements has been undertaken varies. This is because naturally in a programme of this nature and scale various measures develop at different speeds. For the measures that are more advanced there has been considerably more work done on business models and examples of this are included herein. Given the commonality of partners between Sharing Cities and the EIP there is good alignment in place. Items iii and iv are perhaps the least developed areas.

1.4.2 Important relationships with other WP7 Deliverables

A prerequisite to developing a sensible set of business models for measures that will enable scale replication requires consistency and commonality. And that has been central to how we have approached work in WP7

D7.1 ‘Measures Exploitation Potential’, (Dec 2016), captured the nature and scale of opportunities from a collaborative approach to deployment of the 10 measures within and beyond the Sharing Cities programme. It included some important foundational elements which we have built on during the programme, including:

- **Common measure descriptions**, to help communication within and beyond the programme
- The need to align the **physical, human, and digital dimensions** of measures
- Aligning city project (demand) and industry product/service (supply) value chains
- Mapping of measures to Cities; identifying the 6 different types of potential adoption cities
- The various **stakeholders** involved in exploitation (stakeholder analysis is vital)
- **Benefits** of a collaborative approach; also **challenges & blockers**
- Optimal **economy of scale** for specific measures (cf GA volumes and city-planner volumes)
- The programme process of exploitation to deliver **conditioned scale demand**
- **Criteria for roll-out** applied to each measure
- The concept of **‘baskets’ of complementary measures**
- **Templated approach to the profiling of measures**

D7.2 “City Needs and Opportunity Matching”, (Feb 2018), most importantly introduces the ‘packaging’ of measures, of which this work on business models is central to that concept. D7.2:

- Summarises the various **measure plans for the cities**: lead and (as known) fellow
- Outlines an **approach to ‘packaging’ of measures** which is being applied in Sharing Cities and proposed for adoption / adaption across the SCC01 community
- Indicates, from cross-SCC01 collaboration, the **mapping of SCC01 measures** as regards where there is most opportunity for collaboration on creation of common solutions, and potential to extract economies of scale
- Aligns with the spirit and substance of the **EIP-SCC “Towards a Joint Investment Programme for EU Smart Cities”** consultation paper

Building a set of business models to exploit the above is an important step in taking these to market.

1.4.3 This deliverable: D7.5 “Measure – Business Model Profile Report”

The implementation of measures at scale within one city, or indeed through collaboration between cities (either to replicate or demand aggregate) requires city decision makers to be presented with

proposals that they can be confident in; are relatively simple to follow; and compelling in terms of the value they offer. Invariably decision makers will want to know what options have been considered before they make a decision. And central to this are questions of investment, some of which include:

- *How much will this cost?*
- *How do we best deal with capital and operating budgets?*
- *What is the return on investment?*
- *Is there a revenue stream(s) from the initiative, and how best to manage that?*
- *What business model options exist for these measures?*
- *What is the best scale to purchase at?*
- *What sources of finance should we use?*
- *How do business model choices affect long-term flexibility as needs and technology changes?*
- *What are the risks and how are we planning to manage them?*

These questions are embedded in our work and addressed in many of the pragmatic templated approaches that we have applied.

This report provides an **overview of what business model options** may be considered by each city for the various measures being deployed within Sharing Cities, to stimulate debate.

It also summarises the templates used to collect the base-data about measures and cities, specifically:

- The **Measure BM&F template** – covered in D7.1, which captures information for each measure on six themes
- The **City BM&F template** – which addresses how the measure might be implemented in each of the cities, addressing factors which is core to the business model structuring, like asset scope, scale, ownership, life-cycle contracting considerations, service/infrastructure operating model, finance, funding, ROI, business model preferences, and other considerations

Figure 4 captures the ‘packaging’ approach that is being applied (discussed in D7.2) and visualizes how these two BM&F templates fit within that overall process.

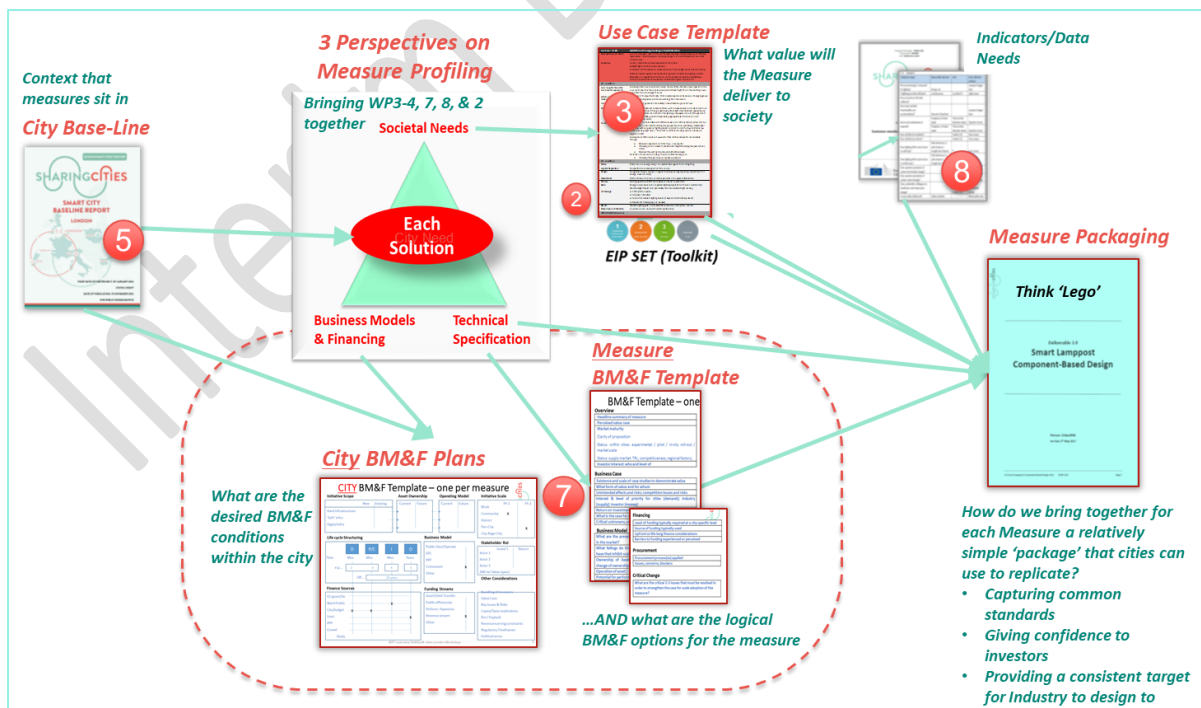


Figure 4: BM&F Templates in the larger 'Measure Packaging' Context

Based on these templates, this report provides a few **worked examples** for measures and cities to keep things practical.

And finally, it sets out a set of **recommendations and forward actions**.

The process of technical development of the measures; ‘packaging’ of solutions; development of appropriate business model and financing options; and choices as to deployment of these in cities, is an ongoing one. As noted earlier, this deliverable is not a finished product for all 10 measures in the Sharing Cities. It does however capture the approach being taken to develop business models for some of the Sharing Cities measures. The templates and approach discussed will continue to be developed over the period of the Sharing Cities implementation, also in collaboration with other SCC01s and the EIP-SCC.

Interim Deliverable

2 BUSINESS MODELS

This section discusses what one might consider as a business model; notes the business model templates that are being used within Sharing Cities; identifies example business (financing) models in use; and starts the matching process for business model to measure.

2.1 WHAT IS A BUSINESS MODEL?

This is one of those question that is easily asked. Many people may feel they can recognise a business model when they see one, however may not be quite so swift when asked to define it.

In the commercial world the simplest answer might be “how one plans to make money”. In the public realm things are necessarily much more sophisticated, as value is more complex, and organisational forms (and numbers of organisations involved), and roles, are more convoluted.

Wikipedia provides a useful and indeed fairly all-encompassing definition: *A business model describes the rationale of how an organization creates, delivers, and captures value, in economic, social, cultural or other contexts.*

In addition to the decision makers’ questions of investment posed earlier, there are additional questions in relation to society that are central to developing a successful business model, like:

- *What policy outcome is being addressed?*
- *What customer problem or challenge is being addressed?*
- *Who is the target customer?*
- *What value is being delivered?*
- *How to understand, access, engage, cause participation, and retain customers?*
- *How to define and differentiate the proposition? (increasingly important in the modern world of public services)*

It is this holistic view of society / customer, value, and organisational form that makes the construction of business models in the public sector particularly interesting. Central to the packaging work is the alignment of social needs, to technical solution, to business model and financing.

To inform our research we also reviewed the approaches proposed (or in development) from the available SCC01s’ BM&F work packages (7 in total reviewed). In summary, this indicated a wide variety of approaches are being taken, from the application of the ‘business model canvass’, to more academic and detailed approaches, to pragmatic structured, or indeed some still forming views. This diversity has advantages in that it does not inhibit innovation. However, the need to achieve scale investment, and the fact that investors have been investing money for some time now, suggests that alignment could reap greater rewards. This forms the basis from which the cross-SCC01 BM&F Task Group will progress its work.

2.2 DATA CAPTURE TEMPLATES

The two templates noted in Section 1.4.1 provide a basis to address most of the business model questions posed above.

- **Measure BM&F template** – which captures information for each measure on six themes
- **City BM&F template** – which makes the business model, financing, and operating model intentions for each measure specific to the context and circumstances of the city

Examples of both templates in blank form are included in annex.

2.3 WHICH BUSINESS MODELS MIGHT APPLY BEST TO PARTICULAR MEASURES?

This section seeks to align business model and financing mechanisms to particular measures. Given this is a fairly emergent new area in a smart cities sense, and that Sharing Cities measures are only now coming to market, the analysis presented here is considered preliminary and will be further developed with time.

2.3.1 Business Models / Financing Mechanisms

Perhaps not holding entirely true to the broader definition of business model, however providing a pragmatic means to describe the range of different constructs that cities may engage in to acquire a product or service, we consider the following categories of (financing and contracting) model. They are not mutually exclusive:

- **Grant Funding** – very relevant in public sector, where a portion (up to 100%) of a project's costs are covered by public funds. This is typically used to stimulate action in priority policy areas. It can lead to reliance of the market on 'free' moneys, which can inhibit innovation and taking of full asset life-cycle accountabilities
- **Traditional Procurement** – public sector take ownership of the asset and accountability for service delivery
- **Performance Contracting** – a means by which the buyer places an incentive on the supplier; the nature of which is not prescriptive and comes in various forms. It can apply to any domain, however energy performance contracting (EPC) is a fairly common approach whereby the provider typically guarantees coverage of the capital investment for improvements.
- **Concession** – whereby a city will offer a concession to the market to operate a set of assets and/or provide agreed service(s) for a set period of time. The terms of a concession will typically be bespoke.
- **Public Finance Initiative (PFI)** – typically used for long-term (e.g. 10-25yr) infrastructure projects funded by private sector equity and debt; and repaid by regular public sector payments
- **Public Private Partnership (PPP / P3)** – typically involving the set-up of an SPV / JV company where each party contributes assets, expertise, and/or money to an agreed formula. In the energy sphere ESCOs are a growing example of this construct
- **Asset Transfer** – this can be a mechanism for existing city-owned assets where there are benefits to transfer the asset off the city's books. It can also be a mechanism by which a city gets private sector investment in an asset that is transferred later back to the city's books (design-build-operate-transfer: DBOT contract)
- **Crowdfunding** – a very different model to the above, whereby society is engaged in the process of financing an initiative where they see value in stimulating or steering action. With digital engagement means, this process becomes much easier to implement and is thus appearing more in the market. Crowdfunding is often match-funded by city / public investment
- **Private Investment** – obviously, several assets in cities will reside in private sector ownership, notably buildings, some of which will have mixed ownership (e.g. multi-tenant private residences) and thus private finance will be used to establish new assets or affect change in existing. Importantly, influencing when, how and on what such moneys are invested can be influenced by various (public sector) policy instruments, which include the likes of regulation, fiscal mechanisms, grants, and standards. These are all important instruments to achieve sustainable policy outcomes.

The above examples are indicative of the sorts of financing mechanisms that are used in the market. Their use varies: for different volumes of product or service being acquired, different geographies where models may be more or less favoured; and different solution areas.

Cities may also take different routes to raising and structuring finances for particular projects. This report does not go into the financial engineering mechanisms that cities may choose.

The emergence of data as a tradable asset in a smart cities context is introducing quite some additional turbulence in the market, as new approaches are being tried and tested, with varying levels of success.

2.3.2 Which Business Models might Cities Select?

There are many considerations that will affect the choice of business model and financing scheme that a city will elect to apply for any particular measure. There is no right answer, however the process of exploring options, and indeed having options available for a city, are both important. It is not uncommon for cities to lack the skills or market (investor) confidence, which can result in closing off options that may well be beneficial to the city. For instance, the ability to structure a PPP or ESCO model, and the ability to access finances on suitable terms from the market.

The concept of demand aggregation can create the scale that can open up new possibilities for how a city or cities can approach the market, which can bring benefits for both the city/ies, and the supply market.

The table below starts the process of mapping, in a more generic sense, what business model / financing options might exist for any of the 10 measures.

Table 1 Business Model / Financing Options available for Sharing Cities Measures

Measure	Grant	Trad Proct	Perf Con	Concess	PFI	PPP	Asset Tr	Crowd	Private
1 Sharing Service Layer (Apps)	Yes	No	Rare	Potential	No	No	No	Yes	Yes
2 Building Retrofit	-	-	-	-	-	-	-	-	-
2a Social housing EE Retrofit	Limited	Yes	tbd	tbd	tbd	tbd	tbd	tbd	NO
2b Multi-Owner EE deep renovation	Rare	No	tbd	tbd	tbd	ESCO an applied approach	tbd	tbd	Yes
2c Real Estate EE Retrofit	Rare	tbd	tbd	tbd	tbd	tbd	tbd	tbd	Yes
3 SEMS (Smart Energy Mgt)	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd	Tbd
eMobility Solutions	-	-	-	-	-	-	-	-	-
4 eCar Share	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd	Tbd
5 eBikes	Yes	Rare	Rare	Yes	Yes	Rare	No	No	Yes
6 eVeh Charge	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd	Tbd
7 Smart Parking	Rare	Yes	Yes	Yes	In pts of EU	In pts of EU	Rare	No	Yes
8 eLogistics	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd	Tbd
9 Humble Lamppost	For 'smart' services	Current norm	Poss	Poss	In pts of EU	No	Desired by market	V. rare	Only on priv estates
10 USP (Urban Platform)	Desired by cities	Yes	No	No	No	A few examples	No	No	No

As can be seen the table is sparsely populated, as dialogue on business model options is presently at an early stage.

3 BUSINESS MODEL AND FINANCING PLANS WITHIN THE CITIES

This section starts to put shape to business model and financing plans for each measure in each city.

3.1 BUSINESS MODELS THAT TAKE THE CITIES TO A NEW SCALE OF IMPLEMENTATION

The lighthouse cities are procuring a basket of measures for demonstration and evaluation purposes. Some of which (the more developed) may well be procured in volumes that go beyond the commitments made in the Grant Agreement. This could be for a number of reasons:

- due to other or adjacent plans within the city, and / or
- where there is confidence in the technical readiness of the measures and a desire to implement at scale
- where the volumes at demonstration level are recognized to be below that which will deliver best commercial value, or gain the attention and focus on the supply community
- where the measure requires support infrastructure which warrants larger volumes
- where the impact from society requires sufficient volumes to be visible and significant
- or where bundling volumes might open up opportunities for different business models or financing sources – notably from industry / investors

A good example of this is eBikes in Lisbon, where the GA commitment is to provide 30 public eBikes, however the city has procured 1,400, with forward plans to increase this to provide a city-wide service. This has provided a clear and very visible signal to the public in the city centre, justifies the installation of an array of charging infrastructure, and expenditure on communications and societal engagement.

The question therefore is what are the plans and options that the Lighthouse (and Fellow) cities have for acquiring the 10 measures, not just for demonstration purposes, more for city-wide scale-up purposes?

Tables 1 overleaf provides brief information, by measure, for each of the lead cities to answer the above question as far as the thinking has currently developed.

Table 2 Lighthouse Cities beyond demonstration: Business Model and Financing Plans

Measure	London - Greenwich	Lisbon	Milan
1 Digital Social Market (DSM) 	1 Citizen Eng't platform (commonplace) £30k (2yrs). It is assumed this will service cross-Borough needs. Demand Side Response in retrofitted social housing buildings, powered by Kiwi Power's Energy Hero app, delivered in collaboration with WP3.2 (SEMS).	To complete: Demo scale (from Proc't log?) Beyond Demo scale and BM&F plans / options Oppor'ties for collaboration (in city/cross-cities)	The Digital Social Market (DSM) is a reward system which helps identify and promote virtuous citizen behavior change in the fields of mobility, energy and sustainability. At the same time, DSM aims to support local market activities thanks to retailer engagement linked to local rewards. The DSM adopts an ecosystem approach based on different service and app providers, using the API made available by Urban Sharing Platform. This can represent a positive asset for system sustainability. The Business Model for the local DSM will shaped and defined by the to-be contracted provider.
2 Building Retrofit			
2a Social housing Energy Retrofit 	10 Units in proc't. Contract award due Nov'17. Various Energy measures at ITT stage. Traditional procurement approach applied.	(Depreciation costs for) 250 smart meters	Deep energy retrofit of around 4000 sqm of public housing; in particular, the measures will address the installation of the following technologies: • PV for electrical energy production • Solar thermal integrating Domestic Hot Water • high-performance central heating & DHW generation based on water-to-water heat pumps An Energy Management System (EMS), combined with electric storage batteries (20 kWh), will help maximize the building self-use of PV energy, to satisfy common uses (e.g. elevators; lighting, and (potentially) heat pumps & mechanical ventilation). • 19 sensors pre-retrofit & ~60 sensors post-retrofit • outdoor meteo station The Business Model & Financing mechanism for this intervention is profiled in Section 3.4.1

2b Multi-Owner EE deep renovation			Deep energy retrofit of around 23,000 sqm. After 18 months of co-design & energy audit, the owner group choses if and how to refurbish their buildings. Another action could be the creation of a one-stop-shop to assist flat owners in developing their own energy efficiency project. The one-stop-shop could be deployed by CdM and the umbrella organisations of the market involved (building sector; energy service companies; heating & cooling producers/installers). The promoter (owner community) should receive technical, legal and financing assistance and be involved in a co-design process to understand step-by-step how the energy efficiency design is developed. This will increase investor confidence in the resulting retrofit projects. Potential collaboration within CdM will be explored as a coordination between the Smart City and Environmental Units to exploit results for future local incentives programmes.
2c Real Estate EE Retrofit			
3 Smart Energy Mgmt (SEMS) 			Monitoring and management of energy demand/offer linked to buildings, mobility areas, lamp posts Business Model Plans and Collaborations TBA
eMobility Solutions			
 4 eCar Share	10 eVehicles planned.	65 municipal vehicles	Rental for 2e-Veichles for condo blocks Business Model Plans and Collaborations TBA

 5 eBikes	15-20 purchased in March 2017, £50k. Unknown forward plans in RBG as the current initiative seeks to assess user preferences. Obvious pan-city collaboration potential. Potential for private sector involvement (as with 'Boris bikes') through a concession.	30 eBikes & eB charge stations	14 Bike sharing stations: 7 new + 7 available from the system (some integrated with Wi-fi hotspots). 150 new eBikes with child seats. Software update. The pilot will be integrated with the wider bike sharing system of the City Plans and collaboration linked to BM&F template has to be updated
 6 eVeh Charge	15-20 additional eV Charge Pts planned. At ITT stage. Obvious pan-city collaboration potential, and ongoing pan-Borough eV charge framework procurement in process Lamppost electric vehicle charging, being procured through the pan-London Go Ultra Low City Scheme, funded by the Office for Low Emission Vehicles (OLEV). (i.e. collaboration / framework agreement / potential demand aggregation)	24 CPs	10 Mobility Areas with a total of 60 eV charge points (20 of which fast charge). In future, the packaging of EV charging stations and smart parking management (through integrated digital platforms enabling MaaS - mobility as a Service) could stimulate investment in charging stations: the '<i>bundling</i>' of these two services ensures proper use of eV charging stations and makes their business model more viable. Advertising revenues could strengthen the BM: this opportunity, under evaluation, could contribute to make the BM replicable and scalable without local subsidies.
7 Smart Parking 	300	30 sensors	187 Smart Parking split by use cases: 100 on Mobility Area; 60 on goods upload/download spaces; 15 on parking for disable people; 12 near to bus stops. This smart parking pilot will be integrated in the future BM&F plans for the wider smart parking system foreseen by CdM, helping to provide a more accurate real-time map of parking patterns.
8 eLogistics 	4 cargo bikes, plus equipment, March '17. £10k. Traditional procurement for current volumes.	80 eVehicles (incl 5 light eVs)	9 eVans / 2 eBikes for delivery of goods within the pilot area Business Model Plans and Collaborations TBA

9 Humble Lamppost 	1 Air Quality sensor purchased (£2.6k) Dec'16, however trial proved unsuccessful. Unknown # sensors. Business model and contracting process to be determined. Obvious pan-London demand aggregation potential, and pan-city survey completed to ascertain Borough interest, and discuss collaborative action. (i.e. collaboration / framework agreement / potential demand aggregation)	100 smart lampposts. 10 Envir't sensors. 250 smart lamppost sensors 6,000 LED upgrades planned to 2019 Potential for cross-municipal collaboration.	District lamp posts are already LED lights (as all in the city), providing the enabling infrastructure for new services: e.g. environmental monitoring (e.g. air quality, pressure, noise, ...) and transport monitoring. Telecommunication will use LoRaWAN protocol providing coverage across the pilot district. The energy saving and provision of monitoring data will support economic sustainability. Development of Smart Use Cases identified Synergies with the EIP-SCC 'Humble Lamppost' Initiative and with SCC01 Lighthouse Programmes is foreseen Other BM&F Plans and collaborations TBA
 10 USP (Urban Platform)			The USP will foster federated sharing of Smart City data enabling digital interoperability among different stakeholders. It will provide data collection, analysis and insight from various sensors. To support financial viability, the USP is developed with the CdM interoperability platform. The USP, using ShC data, represents the test/pilot that could be extended to all City data. Synergies with another EU-funded project are in place (e.g. Synchronicity). Other BM&F Plans and collaborations TBA

3.2 SPECIFIC CITY PLANS FOR MEASURE BUSINESS MODELS & FINANCING

A principle underpinning the approach taken to BM&F within Sharing Cities is that of pragmatism and simplicity. This is to seek to demystify the basics so that barriers of complexity are taken down, and so that all parties can be engaged in the process somewhat more swiftly and easily.

A coarse review of the business model and financing approaches taken by 8 of the 9 SCC01 Lighthouse programmes has been made (as part of the collaboration agreement and plans). This has also afforded a comparison of approaches taken to address the BM&F work packages. The approaches taken by all SCC01s are significantly different.

Within Sharing Cities, some measures are more advanced in terms of market readiness. For those, the cities are individually completing a “City BM&F template” (figure 5) which explores in more detail what the plans are for each measure. The template is pragmatic and simple: all on “1-sheet of A4” as regards the overview.

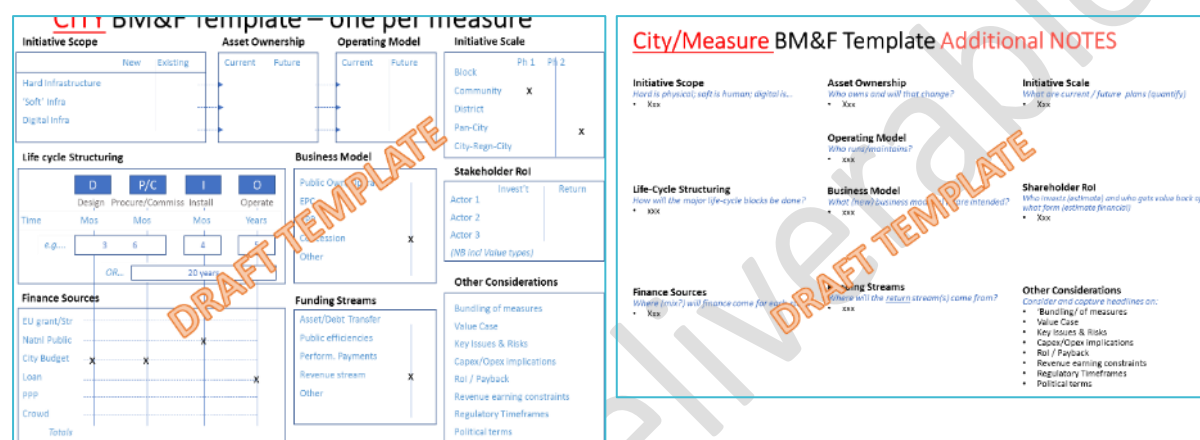


Figure 4 City BM&F Template

This captures the key information for each measure as to how the city intends to implement the measure from a business model and financing standpoint. It builds on the Measure BM&F template that is included in D7.1 for each measure (at a generic level). The above template considers city-specific considerations. It addresses:

- What will change between existing and planned measure implementations
- What scope, ownership, operating model; scale is intended
- How will the city go about design, procurement, implementation and operation and how much money (if known) is intended to be spent
- What business model is (or options are) anticipated
- Where the returns stream(s) will come from to pay back investments
- The various stakeholder investments and returns (of all forms)
- A variety of other considerations that may or may not be relevant for the city / measure combination

Examples of some completed templates follow.

3.2.1 Example City BM&F Template for eBIKES across Sharing Cities

eBikes have been implemented in all three lead cities, with different societal propositions, different technical configurations, and different business models and financing arrangements. This early measure (top right priority quadrant of the measure mapping in D7.2) provides a good candidate to test the templates across all cities, and draw insights.

- Greenwich is trialing 16 eBikes to assess car users' propensity to shift travel modes through a loan scheme. As such societal engagement is the primary motive, and the business model that has been selected is focused on taking down barriers to use

- Lisbon is committed to delivering 30 eBikes within the Grant Agreement, however is actually demonstrating 1,400 eBikes as part of a future city-wide eBike system
- Milan is committed to and is demonstrating 150 eBikes together with charging stations as part of a major city-wide multi-modal transition

All cities see societal insight, engagement and participation as central to their activities, albeit the drivers that underpin the policy ambitions and practicalities of each do vary somewhat.

And the technical designs, and therefore customer propositions between the three are also somewhat different.

Interestingly few of these cities are likely acquiring eBikes at optimal economy of scale.

This emphasises the value of a consistent (and relatively simple) approach in order to help make comparison between the cities. And therefore capture the learning of what works and does not, for the benefit of these and other replication cities.

3.2.1.1 London, Greenwich eBike BM&F Template Example

Figure 6 captures the Greenwich (city) BM&F template for eBikes. This comprises an overview capture template (that enables easy cross-city comparison), together with a back-up sheet capturing some supporting notes.

Initiative Scope		Asset Ownership		Operating Model		Initiative Scale		
	New	Existing	Current	Future	Current	Future	Ph 1	Ph 2
Hard Infrastructure	X			RBG			Block	?
'Soft' Infra	X	None	None	RBG	None	Public Run / Maintain	Community	15-20
Digital Infra	X			RBG			District	same
							Pan-City	
							City-Regn-City	

Life cycle Structuring				Business Model		Stakeholder Rol	
Time	D	P/C	I	O			
	Design	Procure/Commiss	Install	Operate			
	Mos	Mos	WKS	MONTHS			
Phase 1	3	3	4	10	Public Own/Operate	X	Invest't Funds
					EPC		Return Cover Costs
					ppp		Individual Use/Data
					Concession		Actor 3
					Other		(NB incl Value types)

Finance Sources		Funding Streams		Other Considerations	
EU grant/Str		Asset/Debt Transfer		Investable model required if scale-up desired (not scope of Ph1).	
Natnl Public		Public efficiencies		Current model intended to cover costs in order to test the propensity of car users to shift to eBike.	
City Budget	In house	Perform. Payments		Adoption requires MarComms	
Loan		Revenue stream	£10/one-off user fee	Minor data privacy issues (GDPR) require treatment (user locations)	
PPP		Other			
Crowd	Phase 1 funded under Mayr's LEN fund. Ph 2 will be ShC				
Totals					

Figure 5 London, RBG: eBike BM&F Example

3.2.1.2 Lisbon eBike BM&F Template Example

TBD

3.2.1.3 Milan eBike BM&F Template Example

TBD

3.2.2 Humble Lamppost Example

One measure that has been developed more in-depth in general business model terms is smart lampposts. The initial measure BM&F template is shown in figure 7 (also as captured in D7.1).

Overview of Measure				
Headline summary of measure	Upgrade city lampposts to LED to gain the RoI benefits (of energy and operational savings) and <i>in parallel</i> , multi-purpose these assets to enable delivery of smart city services; and in so doing develop a common design that is fundable and can be exploited by other cities. Bring attractive funds / loan terms			
		Business Case		
Perceived value case	Existence and scale of case studies and previous policies that demonstrate value	Cases: principally LED-only replacement – several city cases (up to ~2yrs experience). Various ‘smart’ pilots: Santander, Glasgow, BCN, ... No known policy measures that incentive adoption of ‘smart’ features.		
Market maturity	What forms of (‘hard’/‘soft’) value, for whom, that provide criteria for decision	‘Hard’: Energy consumption financial savings for city administration; and maintenance savings (both high percentage: 30-80%). Dimming & trimming through central mgmt system (CMS). Public safety crime, driving accidents, air pollution fines)		
Clarity of proposition		Proof of taking ‘smart city journey’ for politician / city officials.		
Status: within city experimental / pilot / in-roll-out / market scale		‘Smart’ features can be very evident for society (eg pervasive WiFi; ‘push to talk’, sense of safety, transparency thru opening up data). Some can be measured (‘hardened’). Some offer revenue potential (eg geo-fencing data for retailers & events managers; CCTV data for parking companies)		
Status: supply market: T competitiveness; regio factors;	Unintended effects and risks; competition issues and risks			
Investor interest: who level of	Unintended effects could be non-recognition / communication / receipt of financial benefits by society made worse if upgrade causes any issues; privacy concerns from public security (CCTV) use etc. Risks include: (i) doing LED-only 1 st and thus damaging business case to retrofit smart features; (ii) not establishing means to take financial gains to bottom line. Competition for LEDs high causing price drop. <i>Integrated</i> smart lamppost solutions and ‘smart’ features nascent and fragmented (pricing is still volatile).			
		Interest & level of priority for cities (demand); industry (supply); investor (money)		
		Med/Hi interest for cities and growing significantly. Similar for Industry – perhaps more. Limited from investors (tho for a few it’s growing).		
		Return on Investment / Payback – marketed / real		
		Marketed as LED 50-80% savings. 5-8 yr RoI. Real evidence less prominent, and less significant; though certainly still significant.		
		What is the case for demand aggregation?		
		Strong. Unique city lampposts &/or individual procurement are detrimental to value, confidence, innovation, speed of implementation.		
		Critical unknowns, concerns, blockers		
		Value case for ‘smart’.		
Business Model				
What is / are the prevailing business model(s) currently adopted in the market?	Variable / range. From city owner and operated lighting, through to outsourced operations; and shift of ownership to utility (or for a few ANO party). Limited current innovations for performance contracting (only for outsourced), or com			
What failings do the current market and/or business model have that inhibit scale adoption?	Individual limits do or indee aggrega	Financing		
	Desire / neglect Capex/C	Level of funding typically required at a city-specific level	Significant though not major infrastructure investment. <u>Very</u> varied per-lamppost cost benchmarks: range from €400-8,000. Detail on “pole upgrade vs LED only”; “LED vs CMS & ‘smart’ features” hard to come by	
	Energy adoption	Source(s) of funding typically used, and new forms that could be accessed	Small tactical upgrades typically from internal budgets. Larger scale with sovereign funds. E & S EU with elements of structural funding. Some bank loans. Emergence of asset transfer SPVs with more freedom to exploit data / offer paid ‘smart’ services.	
Ownership of Assets: which sector; what level of clarity; change of ownership over time	Varied provide	Upfront vs life-long finance considerations	Typically investment is capitalised (unless city service provider / utility owns, or eV charge / SPV invests). Energy & Maintenance costs transcend capex.	
Operation of asset / service(s), and any change(s) in sight	Current exist – operatio	Barriers to funding experienced or perceived	Lender confidence. Projects are too small and ‘irritating’ to attract serious investors (eg EIB). Interest in swift financial energy bcase, not in harder to measure ‘smart’.	
Potential for performance contracting	Significa include	Regulatory, Policy & Procurement		
		Procurement process(es) applied	OJEU typically a requirement for any initiative. In some countries / cities framework contracts exist within which change can be made via private sector service provider	
		What existing or needed (inter-)national regulatory and (local) policy actions will support?	Some (national) regulatory change is required for municipalities to sell power for eV charging; sell (geo-fence) data; etc Strengthening of local policy to support cross-cutting (departmental) benefits. Policy to support ‘demand aggregation’ for smaller municipalities	
		Issues, concerns, blockers	Few incentives or procurement mechanisms that facilitate demand aggregation	
Critical Change				
What are the critical 2-3 issues that must be resolved to strengthen the case for scale adoption of the measure?		- Clarity of value case for ‘smart’ - Incentives for demand aggregation - Availability of tools, templates and proof points to make decisions simple		
		Record submitted by: Graham Colclough, v02 6-4-16		

Figure 7 Humble Lamppost Measure BM&F Template

Following completion of the above template a number of optional business models were developed. These were developed to address a necessary change in the way the market operated. The typical 'As-is' HL city market characteristics can be typified as below:

- The current 'silo' approach within a city, and lack of collaboration between municipalities limits possibilities, erodes value, and slows progress
- Lighting Department typically 'owns' the agenda
 - Lighting is treated as a cost item and thus managed down (at times of strained budgets)
 - Often poor energy and/or cost monitoring to support economic mgmt of the service
 - Capability constraints at times for addressing the 'smart' agenda
 - Conflict of interest / incentives (who pays / who benefits...and over what timeframe) for doing more than light (increased capital and maintenance burden)
- Utility at times owns and / or manages the asset; or a long-term PPP lighting service contractor
- Competing public value priorities – new hospitals and schools, social care commitments etc 'win' over upgrading streetlights; thus *LED upgrades are spread over longer timeframes (& smart options often dropped)*, so cities fail to get economies of scale
- Limited 'Smart Lighting' Masterplans in place that drive new strategies and introduce new opportunities
- Dynamic 'smart' market (alongside a now fairly stable LED market) which can lead to caution regarding application of 'smart' services
- Limited desire or motive to collaborate across cities to aggregate demand and get better deals

Four business model options have been developed (see figure 8), and are elaborated in turn.

1. Traditional Procurement Model
 - A: Energy focus – LED Upgrade only
 - B: 'Smart' Ambitions – added features
2. ESCo Model
 - Different ownership structure – energy savings focus
3. (Demand Aggregation Model)
4. 'VASCo' (value-added-services company) Model

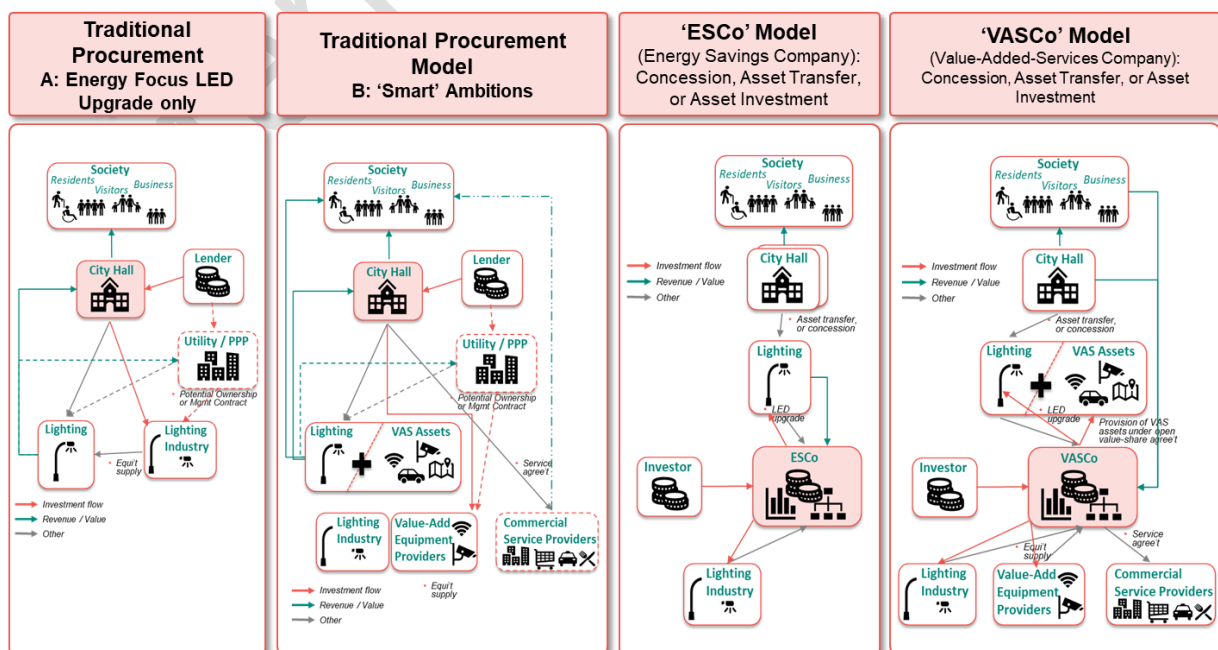
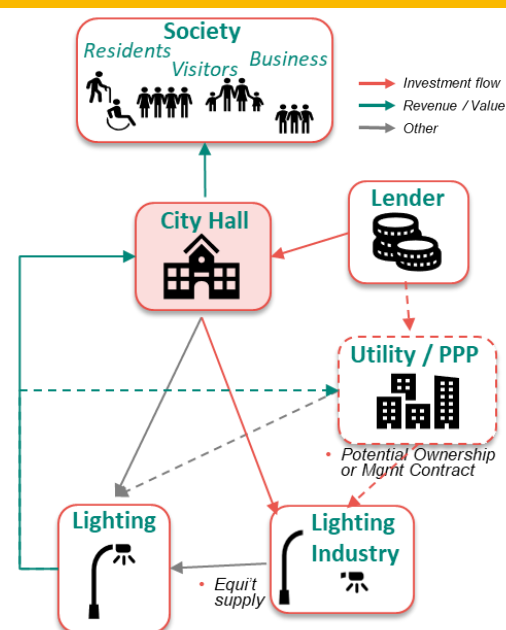


Figure 8 Humble Lamppost BM&F Options

Traditional Procurement Model

A: Energy focus – LED Upgrade only



Description

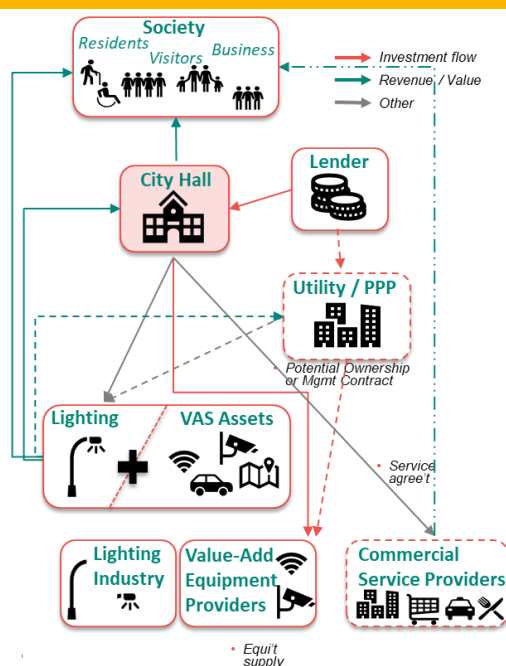
- Society expects well-lit safe public spaces – and that's what they get
- 'City Hall' (CH) is obliged to deliver quality 'public value'
- Incentive is to save energy and maintenance costs through LED upgrade
- CH covers asset upgrade costs under internal budgets and capital allocations, or...
- Potential role for Lender (Sovereign; Public Bank; Commercial Bank etc to provide access to scale finances)
- Traditional procurement model whereby CH carries out its own market survey; internal readiness; design; business case; specification; procurement documents etc (potentially aided by commissioned advisor)
- Utility or PPP (Service Company) may own or operate lighting assets

Characteristics of the 'Model City'

- Adequate capability and resource availability to manage entire end-to-end process
- Adequate budget available internally (or loan option) to cater for pan-city upgrade
- Low ambition or need for 'smart' services

Traditional Procurement Model

A: Energy focus – LED Upgrade only



Description

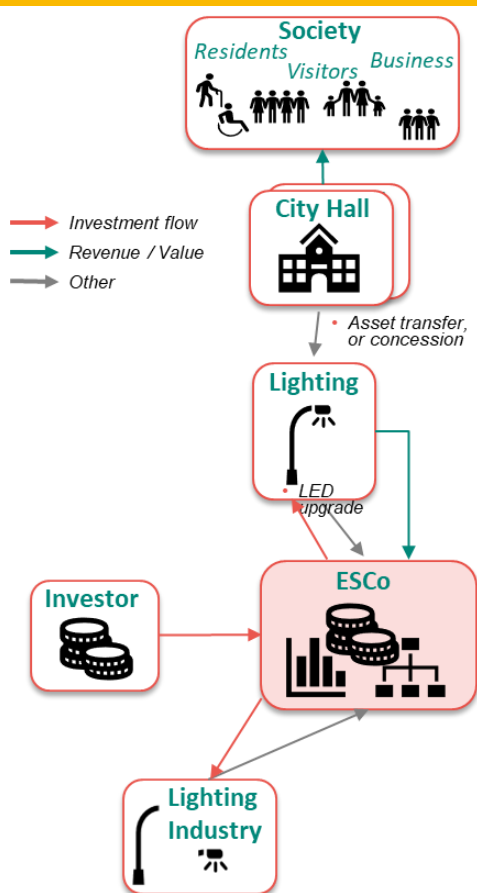
- Society expects well-lit safe public spaces
- Businesses may be attracted to well-connected cities
- Individuals may elect to pay for additional value-added services (VAS)
- 'City Hall' (CH) is obliged to deliver quality 'public value'
- Ambition is to save energy & maintenance costs and 'smarten' the city
- CH covers asset upgrade & 'smart' equipment costs under internal budgets and capital allocations, or...
- Potential role for Lender (Sovereign; Public Bank; Commercial Bank etc to provide access to scale finances)
- Traditional procurement model whereby CH carries out its own market survey; internal readiness; design; business case; specification; procurement documents etc (potentially aided by commissioned advisor)
- Utility or PPP (Service Company) may own or operate lighting assets

Characteristics of the 'Model City'

- Adequate capability and resource availability to manage entire end-to-end process
- Adequate budget available internally (or loan option) to cater for pan-city upgrade
- High ambition or need for 'smart' services

'ESCo' Model (Energy Savings Company): Concession, Asset Transfer, or Asset Investment

Description



- Society expects well-lit safe public spaces – and that's what they get
- 'City Hall' (CH) is obliged to deliver quality 'public value'
- CH gives a term-concession or Asset Transfer to ESCo, or could take equity / position in ESCo
- ESCo holds accountability for delivery
- Takes concession or takes over ownership of lighting assets
- ESCo invests in LED upgrade
- Captures energy saving on LED upgrade (pays investment, energy & maintenance)
- Accesses finance if and where required
- Manages best-of-breed provision of equipment from Industry (no 'vendor lock-in')
- ESCo model provides relatively easy application to multiple cities – accessing economies of scope and scale

Characteristics of the 'Model City'

- Has sufficient scale of assets to warrant creation of ESCo (as city or city grouping)

3.3 MILAN HOUSING RETROFIT EXAMPLE

3.3.1 Public Housing Retrofit

Milan public housing retrofit is captured in the completed templates below with supporting notes.

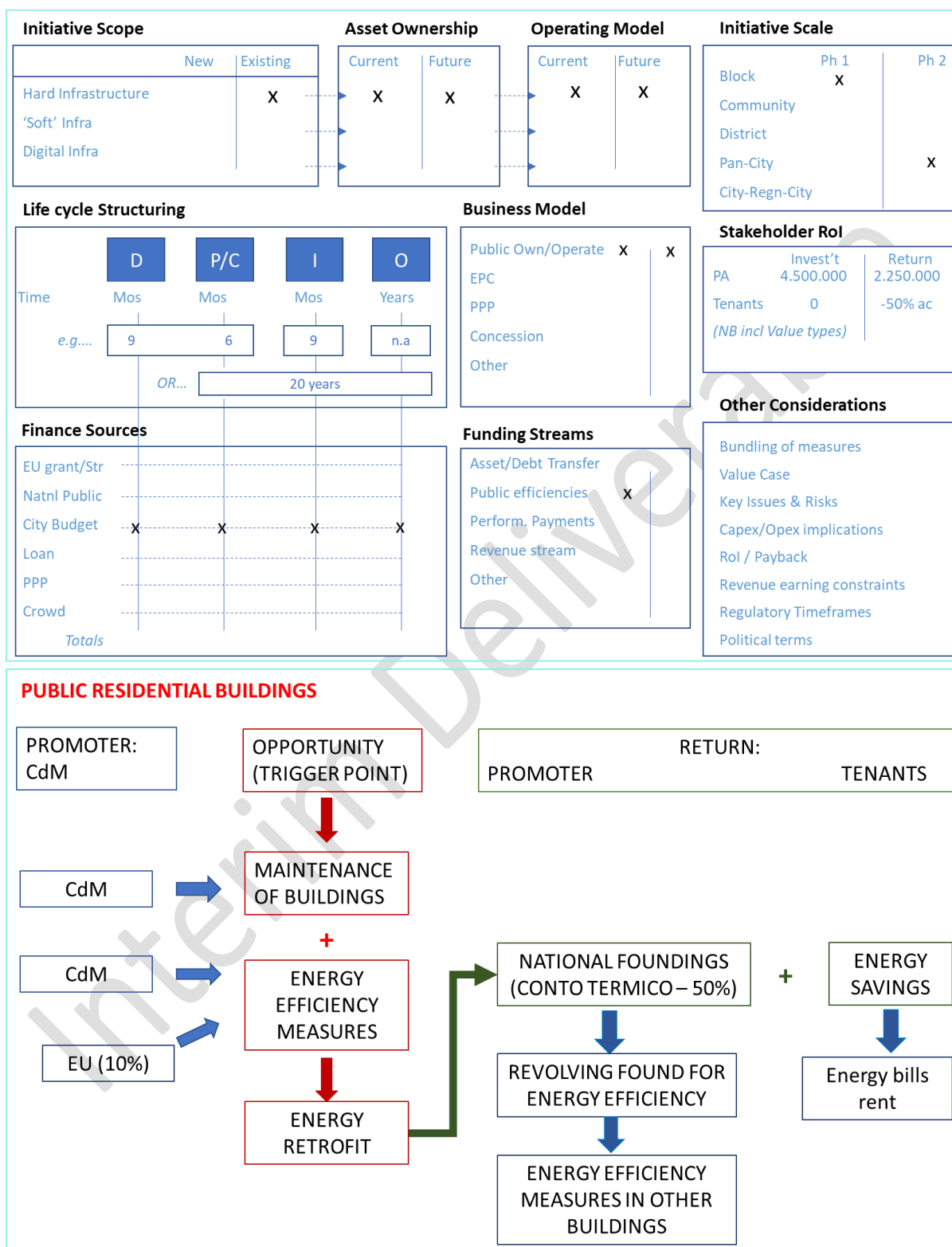


Figure 8 Milan Public Housing Retrofit BM&F Template

Key:

- Blue narrow: financing
- Red narrow: opportunity
- Green narrow: revenues

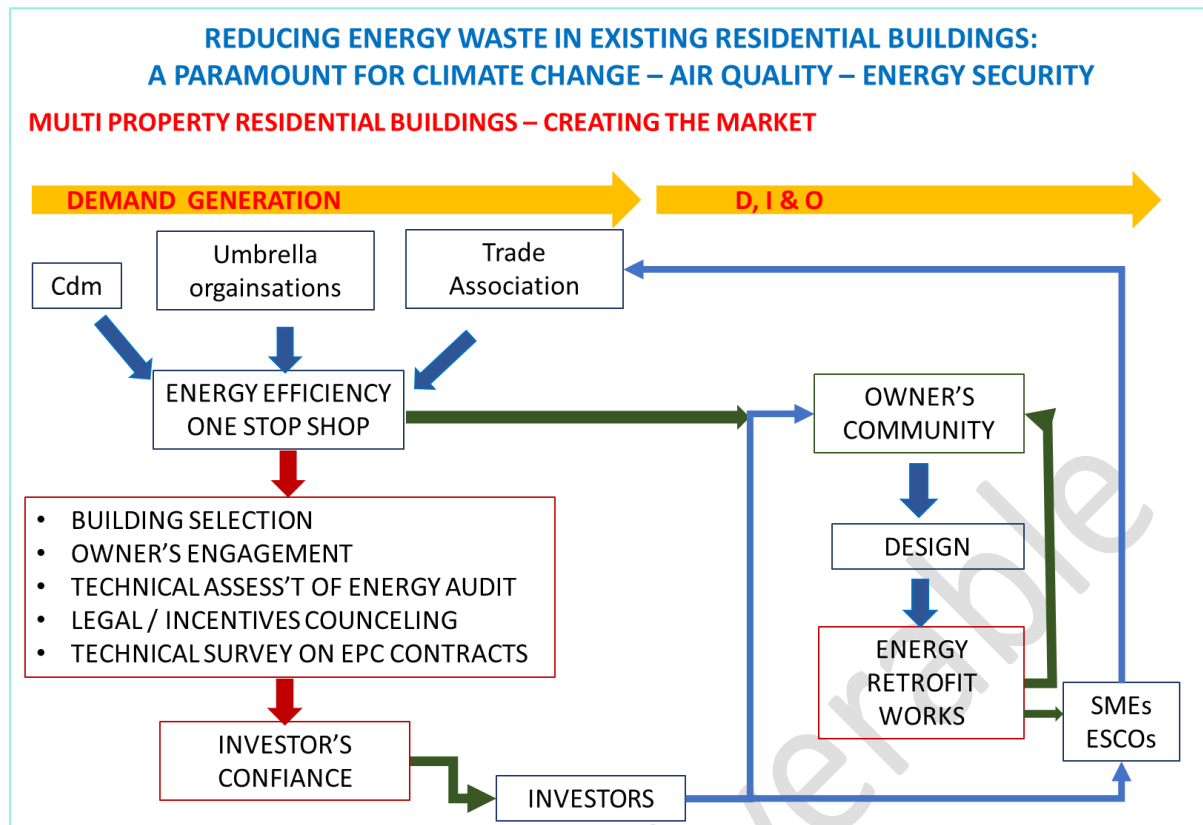


Figure 9 Milan Multi-Property Housing BM&F Template

Key:

- Blue narrow arrows: financing
- Red narrow: opportunity
- Green narrow: revenues

The challenge is to create a market through Public Administration driven demand generation. Despite strong incentives, the market is still nascent. Within the sharing cities project, we create a one-stop-shop to assist flat owners in developing their own energy efficiency project.

The trigger point is building maintenance (both building envelop or heating generation) of common parts.

In the future, the one-stop-shop should be deployed by CDM and the umbrella organisation of the market involved (building sector – energy service companies – heating and cooling components producers and installers).

The activities of the one stop shop are aimed to increase investor confidence in the energy retrofit projects produced. The promoter (owner community) should receive technical, legal and financing assistance and be involved in a co-design process to understand step by step how the energy efficiency design is developed.

The energy audit and the design should be controlled and approved – especially the EPC contracts proposals, that are very difficult to understand by citizens.

After 18 month of design and energy audit, the owner's community choses whether to take benefit from the specific financing instrument, and operate itself the new installation once works are over, or to sign an EPC contract.

The generated market is for SME – which can benefit from the increase of the demand and participate to the costs of the one stop shop through their umbrella organisations.

4 RECOMMENDATIONS & WAY FORWARD

This section suggests specific actionable steps that should be taken to maximize value.

Within Sharing Cities

xxx Investor Summit

1.

Cross-SCC01 BM&F Collaboration

xxx

Alignment with the EIP-SCC

The BM&F action cluster ...

[Towards paper](#)

5 CONCLUSIONS

Business Models and Financing play an enormously important role in setting the parameters for implementation of smart city measures. There are a wide variety of options available to cities, and as cities realise that public finance can no longer support the scale and pace of investment needed to address the challenges they face, there will be a shift towards accessing private sector investments. This will only occur if projects can be made to be attractive to investors. And this will require considerable change within cities.

This report has scratched the surface of this topic. There is considerably more to be done to fashion a portfolio of competent business models and financing options for the 10 Sharing Cities measures. Doing so in isolation is not considered wise, as if this was an approach taken by all SCC01 programmes the investor market, which typically approaches the (smart) cities market with some caution, will be left confused and likely will therefore not engage.

As such, the cross-SCC01 collaboration BM&F Task Group offers an important avenue to better quality market engagement. With further development, improvement and successful application of the business model and financing approach, aligned also with other developments within Sharing Cities (e.g. packaging) there is a very real chance to make a very positive impact on the overall EU smart cities market.

0 ANNEX

0.1 MEASURE BUSINESS MODEL PROFILING TEMPLATE

Below is the common measure data sheet used to profile measures. It enables consistent capture to aid cross-functional and city collaboration; as well as collaboration beyond (e.g. SCC01s & EIP-SCC).

Overview of Measure

Headline summary of measure	
Perceived value case	
Market maturity Clarity of proposition Status: within cities: experimental / pilot / in-city roll-out / market scale Status: supply market: TRL; competitiveness; regional factors;	
Investor interest: who and level of	

Business Case

Existence and scale of case studies to demonstrate value	
What form of value and for whom	
Unintended effects and risks; competition issues and risks	
Interest & level of priority for cities (demand); industry (supply); investor (money)	
Return on Investment / Payback – marketed / real	
What is the case for demand aggregation?	
Critical unknowns, concerns, blockers	

Business Model

What is / are the prevailing business model(s) currently adopted in the market?	
What failings do the current market and/or business model have that inhibit scale adoption?	
Ownership of Assets: which sector; what level of clarity; change of ownership over time	
Operation of asset / service(s), and any change(s) in sight	
Potential for performance contracting	

Financing

Level of funding typically required at a city-specific level	
Source of funding typically used	
Upfront vs life-long finance considerations	
Barriers to funding experienced or perceived	

Procurement

Procurement process(es) applied	
Issues, concerns, blockers	

Critical Change

What are the critical 2-3 issues that must be resolved in order to strengthen the case for scale adoption of the measure?	
---	--

0.2 CITY BM&F TEMPLATE

Below is the common template used by cities to capture their initial thoughts on how they will tackle each measure. Back-up sheet(s) add additional detail as necessary. The approach of seeking to keep the overview 'all on one side of A4' has been applied for simplicity.

CITY BM&F Template (1/measure for each city)

Note: Add back-up sheets if and as necessary

Initiative Scope		Asset Ownership		Operating Model		Initiative Scale	
New	Existing	Current	Future	Current	Future	Ph 1	Ph 2
Hard Infrastructure						Community X	
'Soft' Infra						District	
Digital Infra						Pan-City	X
						City-Regn-City	

Life cycle Structuring		Business Model		Stakeholder Rol		Other Considerations	
Time	Mo\$	Mo\$	Yrs	Public Own/Operate	Invest't	Return	
	D _{design}	P _{roct} /C _{omm}	I _{ns tall}	EPC	Actor 1		
	3	6	4	PPP	Actor 2		
	OR...	20 years	5	Concession	Actor 3		
	e.g....			Other	(NB incl Value types)		

Finance Sources		Funding Streams	
EU grant/Str		Asset/Debt Transfer	
Natnl Public		Public efficiencies	
City Budget	X	Perform. Payments	
Loan		Revenue stream	
PPP		Other	
Crowd			
Totals			