KPMG

The future of cities: measuring sustainability

KPMG International

kpmg.com

Contents

Preface 4

Introduction 5

What is sustainability measurement? 6

Existing guidelines for measuring cities 8

- Case study: the Bristol Quality of Life Survey 14
- Case study: the Happy City Index 15
- Case study: Tokyo Metropolitan Government 17
- Case study: Region of Waterloo, Canada 18

Measuring the impact of a program or service 21

Lessons from working with measurement data 25

The future measurement of sustainability 26

What is my city worth? 28

What are the next steps? 29

Where do we go from here? 30

Acknowledgments 30

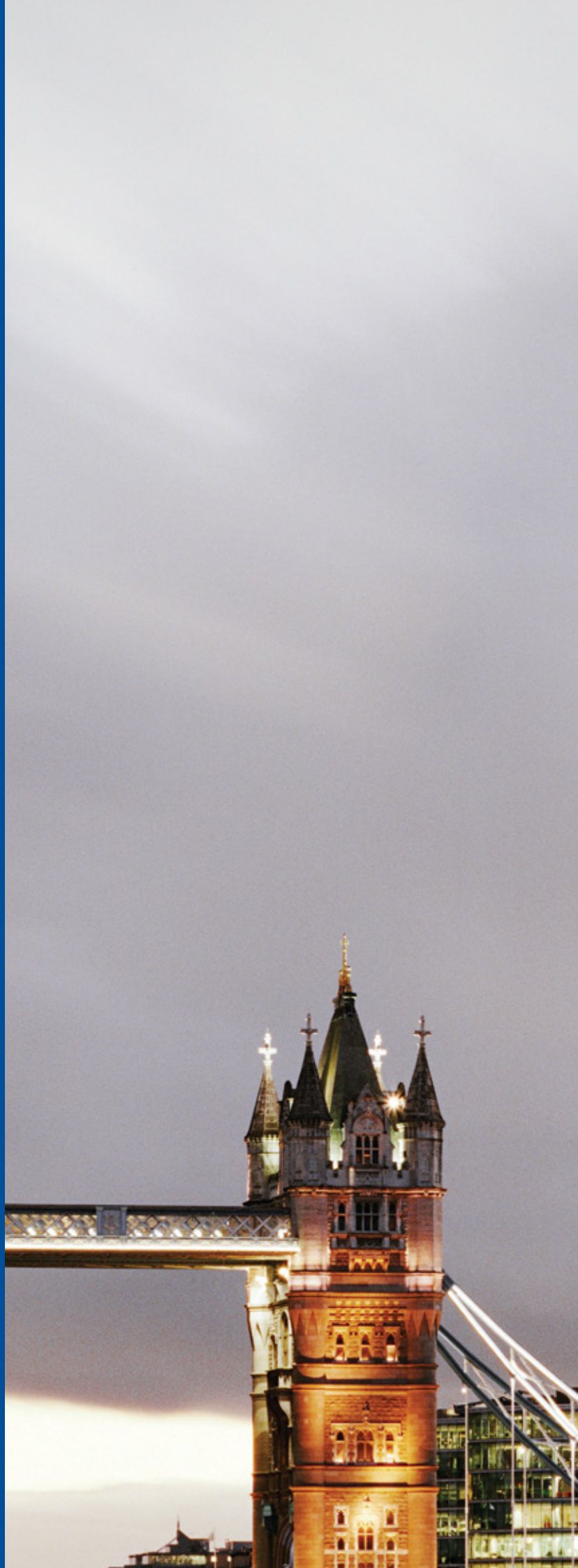
Preface

The prestigious title of European Green Capital is awarded annually by the European Commission to promote and reward the efforts of cities to improve their sustainability for their residents. The award, which was established in 2010 in recognition of the vital role of sustainable, low-carbon living for cities and citizens everywhere, has been won by Stockholm, Hamburg, Vitoria-Gasteiz, Nantes, Copenhagen, and in 2015, by Bristol, the first UK city to do so. Ljubljana bears the title in 2016.

During its tenure as European Green Capital, Bristol convened leading practitioners from a variety of sectors to promote the sustainable future of the city. As part of that discussion, the city council asked KPMG to work with others to develop a knowledge-transfer program that other cities around the globe could apply to their own sustainability needs.

The result was the Bristol Method, a series of modules addressing different aspects of urban sustainability. KPMG's Global Sustainability and Cities practices worked with stakeholders to produce practical modules that guide city governments in measuring their current and future sustainability and building a vision for stakeholders. These modules have been updated and enhanced to form *The future of cities* report.

The report has two modules: "Creating a vision" and "Measuring sustainability". It draws on the expertise of many sources and includes a range of case studies to ensure that cities find approaches relevant to their own context. Although the report has its genesis in the experience of Bristol, its findings are widely applicable, outlining the considerations and processes involved in building sustainable cities for current and future generations.



Introduction

Ever since the first cities were founded, their leaders have needed metrics to understand what was happening in them. What we have measured has changed over time as the needs of city leaders and the role of government have changed. The metrics have become more complex and higher profile, and their uses have expanded, particularly as government addresses a wider range of social needs. When we measure cities now, we are seeking to understand them in order to manage them better and to provide evidence of performance. Increasingly, we measure cities to understand their viability and to make decisions that will allow those who live in them to be happier and healthier in the future.

The measurement of what we call a city's 'sustainability' has also changed over time. We might say that sustainability used to be about measuring the level of pollution and the amount of parkland. In the 1990s, many cities began to take a new approach to balancing their environmental, social and economic impact, using metrics not only to measure factors such as energy, water use and pollution but also to address concerns such as crime, employment and health.

In recent years, the definition of sustainability has become even more sophisticated, and the metrics we use to measure it have broadened to include social cohesion, biodiversity, well-being, inequality and other issues. The 1990s concept of environmental, social and economic balance nevertheless still stands, as recognition grows that these three are interdependent. Focusing on environmental, economic or social aims to the exclusion of the other two areas will not guarantee a successful city — but it may guarantee an unsuccessful one.

This paper discusses some of the ways in which cities are being measured and how these metrics could evolve. More important, it provides practical examples of what leading cities are doing, the lessons to be learned and how these can be applied to other cities.

What is sustainability measurement?

Sophisticated performance measurements link service outputs to program outcomes. The output of a city's fire services, for example, supports the outcomes of its public safety program, but a public safety program requires the output of more than a fire service to support its intended outcomes. We therefore need to be able to measure the impact of multiple activities that support or hinder the same goal.

When all city services are effectively delivering outputs to support all city programs, sustainability is at a sweet spot where quality of life is being maximized for city residents. Quality of life is one measure of the long-term sustainability of the city.

Sustainability is most commonly referred to as:

"meeting the needs of the current generation without compromising the ability of future generations to meet their own needs".

This definition makes a lot of sense in an urban context. Any sustainable city needs to determine how its citizens can thrive while it also ensures that the needs of the next generation are met through education, investment in infrastructure, cultural and community development, and environmental protection. This means balancing the burden of current taxation against investment for the benefit of future generations.

It also means having a clear vision of what the city wants to offer to its current and future residents. We cover this topic in another module.

Creating a happier and healthier city should involve encouraging values and responsible behaviors that enhance the quality of life for its residents both now and in the future, rather than excessive behaviors that create current happiness at the expense of future happiness. Imagine a municipal government that lowered taxes or spent all its revenues on items with relatively short-term 'vanity' benefits, such as poorly conceived festivals or sporting events, at the expense of investment in employability, skills training, legacy infrastructure and green spaces. Current and future generations would receive little or no sustained benefit.

When we consider sustainability, it is important to think beyond simple environmental protection. The definition should take the following, much broader view.

Financial sustainability

Many cities around the world are finding they do not have enough funds to provide the programs and services within their mandate. The challenges of inadequate funding are many and varied, but the relevance to sustainability is whether a city is forced to sacrifice investment in long-term social, environmental and financial outcomes in view of short-term constraints and needs.

Social sustainability

As cities around the globe become larger, the issue becomes whether increasing social unrest, violence and tensions between cultures can be avoided and the rising demand for social supports can be managed as the

population grows. This is true whether cities are densely built or develop into vast urban sprawls, as every form comes with specific challenges.

Environmental sustainability

Just about every resource society uses is either grown or mined. Our way of life depends on the productive capacity of the land and the resources that can be extracted from the ground or recovered from our own waste. It is therefore vital for the future viability of cities that we carefully steward these resources.

Physiological and psychological sustainability

The physiological and psychological needs of urban residents are often considered part of social sustainability. We need to consider if cities can continue to meet not only basic needs such as food, shelter and security but also more advanced needs such as a sense of belonging and the opportunity for self-actualization.

The design and layout of a city are key to its ability to meet those needs.

Sustainability is clearly a multi-dimensional concept that involves balancing city programs so that they operate effectively, and then passing that balanced approach along to the next generation. As soon as we tip the balance in favor of one program area over another, the city runs into problems.

A key challenge facing city sustainability is the mandate of other levels of government to deliver services. While the city might do its best to achieve sustainability within its program mandate, if all levels of government do not synchronize their actions, sustainability can be challenging, if not impossible, to achieve.

A city may wish to incentivize the development of public transport and cycling, whereas the national government may seek to subsidize low-emission private transport. If the target is pollution reduction, the two priorities support one another, but if the goal is to alleviate congestion, they do not.

So while a city might make every effort to optimize the effectiveness of its services, the indicators for those services might be indirectly affected by other levels of government, making it challenging to attribute the effects to one government's services or another's. This suggests that the impact of all related services needs to be considered systemically.

Existing guidelines for measuring cities

City stakeholders use data to make decisions about:

— where to deploy resources

— how to develop a policy

— whether to start, change or stop a program

— what options to offer or withhold from people

— where to live, move or work

— how to spend time and money

— how to form an opinion about an issue

— where to lend support.

Different types of data are needed to enable stakeholders to make different types of decisions.

Who looks at the measurements?

Stakeholders can include infrastructure, healthcare and education providers; residents and businesses; as well as potential investors, migrants and other cities.

Many guidelines for measuring the sustainability of cities already exist. Four methods are summarized in this section:

1 **The Circles of Sustainability model developed by the Global Compact Cities initiative**

2 **The Green City Index**

3 **The Improvement and Efficiency Social Enterprise (IESE) Cities in Motion Index**

4 **The GNH Index developed by the Happiness Alliance**

These methods are sometimes referred to as common guidelines because they can be applied to many cities, generating comparisons and knowledge sharing, although they have not been used often and widely enough to be considered standard sector approaches.

1 Global Compact Cities Circles of Sustainability

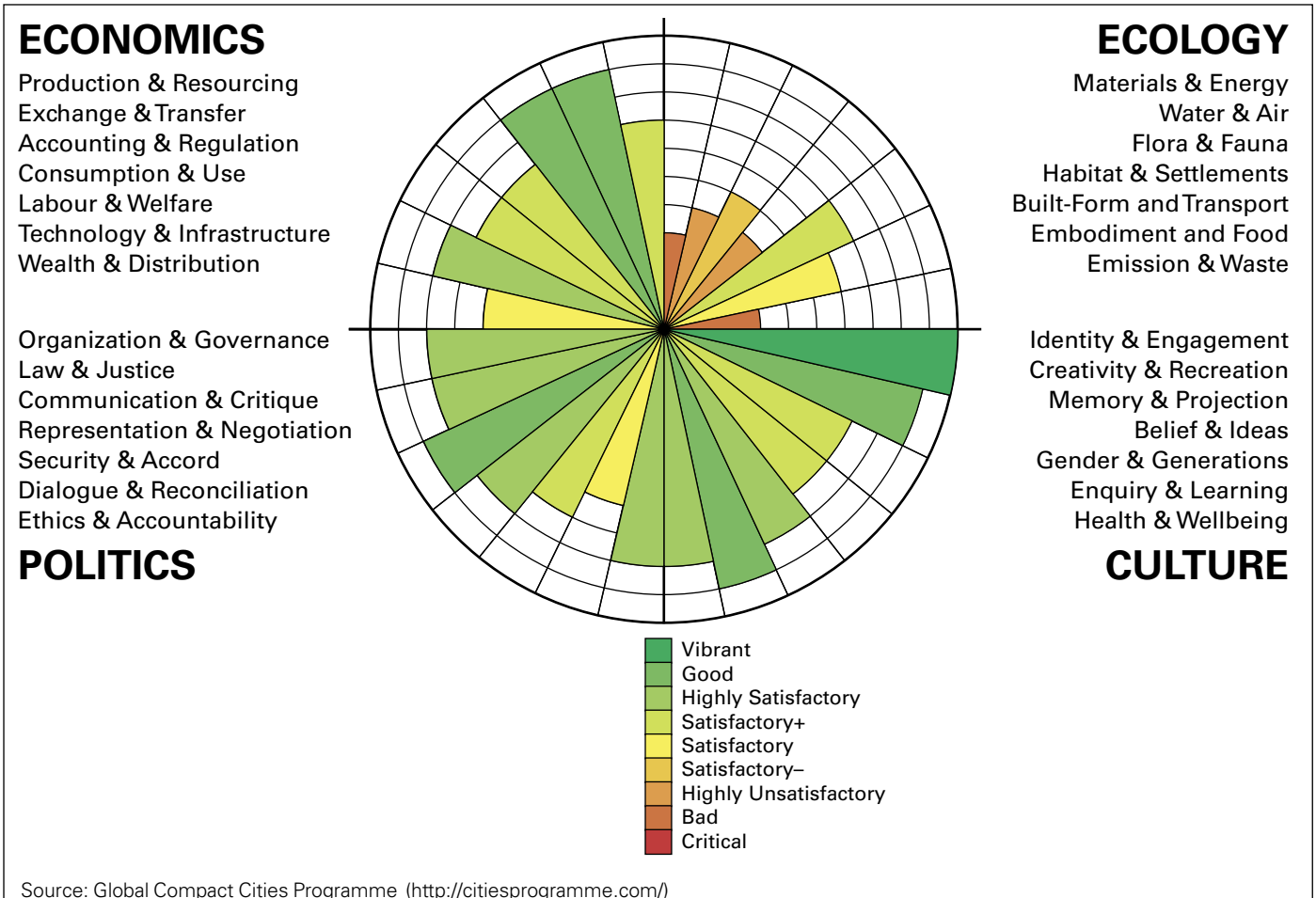
The Circles of Sustainability method helps urban communities understand how to become sustainable. It has been used by numerous cities, among them Johannesburg, Melbourne, New Delhi, São Paulo and Tehran.

Responses to questions about economic, ecological, political and cultural 'domains' are scored to develop a comprehensive profile of the sustainability of an area.

Each of these domains is then divided into seven sub-domains. For example, economics is categorized into production and resourcing, exchange and transfer, accounting and regulation, consumption and use, labor and welfare, technology and infrastructure, and wealth and distribution.

The benefit of this approach is that it considers a range of indicators, allowing policy makers to understand the impact of their actions across diverse social settings. Traditional tools, by contrast, typically focus on only one dimension.

Figure 1: The Circles of Sustainability method indicators



Source: Global Compact Cities Programme (http://citiesprogramme.com/)

2 Green City Index

Created in 2009 the Green City Index is a tool to help cities compare their environmental performance.

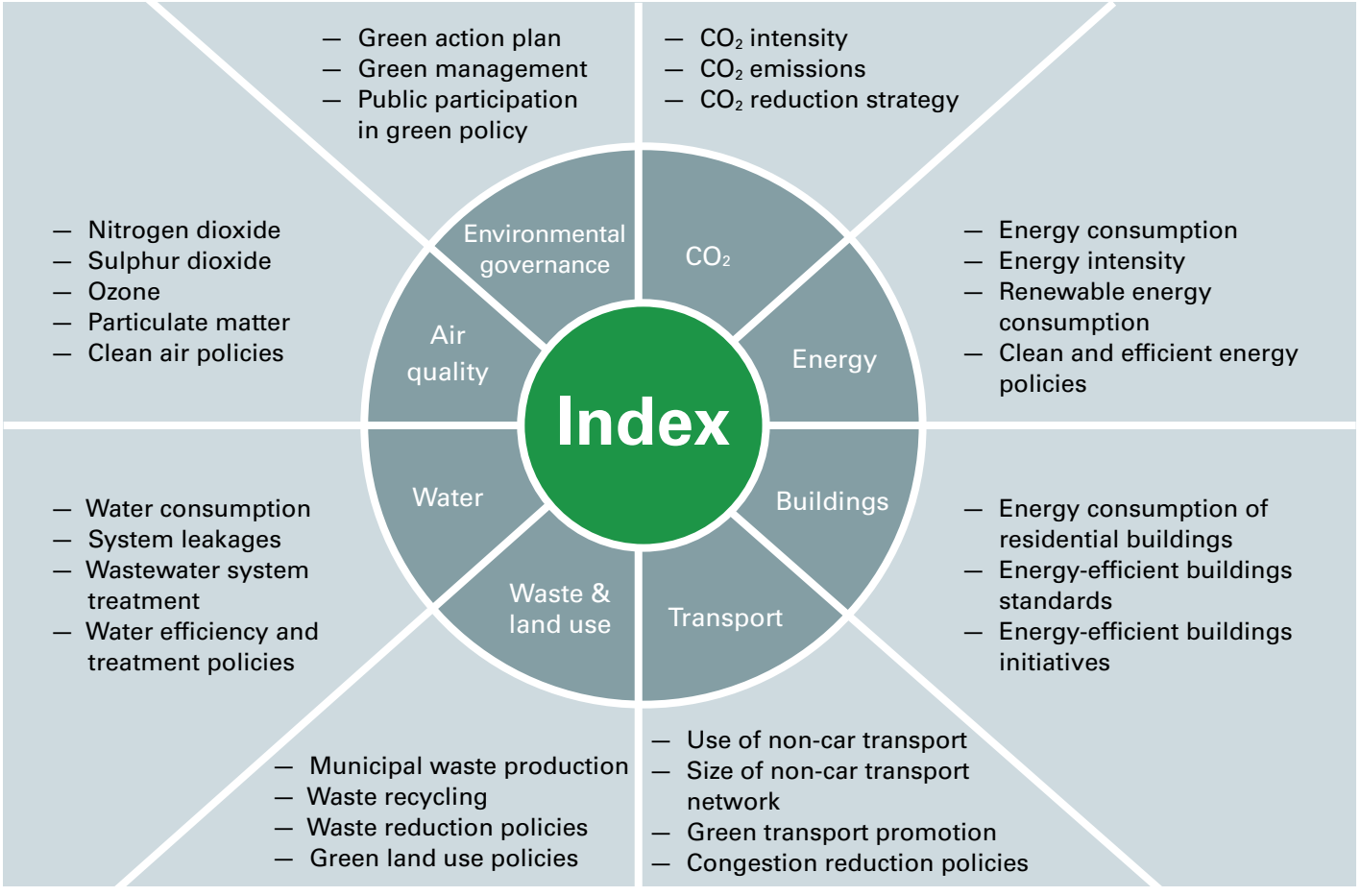
Over 120 cities in Europe, Latin America, Asia, Africa and North America have had their environmental performance measured to identify their strengths and challenges.

The index uses approximately 30 indicators, including CO_2 emissions, energy, buildings, land use, transport, water and sanitation, waste management, air quality and environmental governance. A mix of quantitative and qualitative indicators measures not only each city's current environmental performance but also its intention to become greener.

A summary report documents key findings of the Green City Index about each region, highlighting the best-performing cities, making comparisons between continents and outlining seven key lessons on how to become a greener city.

The benefit of this approach is that cities can learn from each other as they debate policies and strategies to minimize their environmental footprint, accommodate population growth, promote economic opportunity and safeguard quality of life for urban dwellers today and in the future.

Figure 2: The Green City Index indicators



Source: Siemens AG Green City Index (http://www.siemens.com/entry/cc/en/greencityindex.htm)

3 IESE Cities in Motion Index

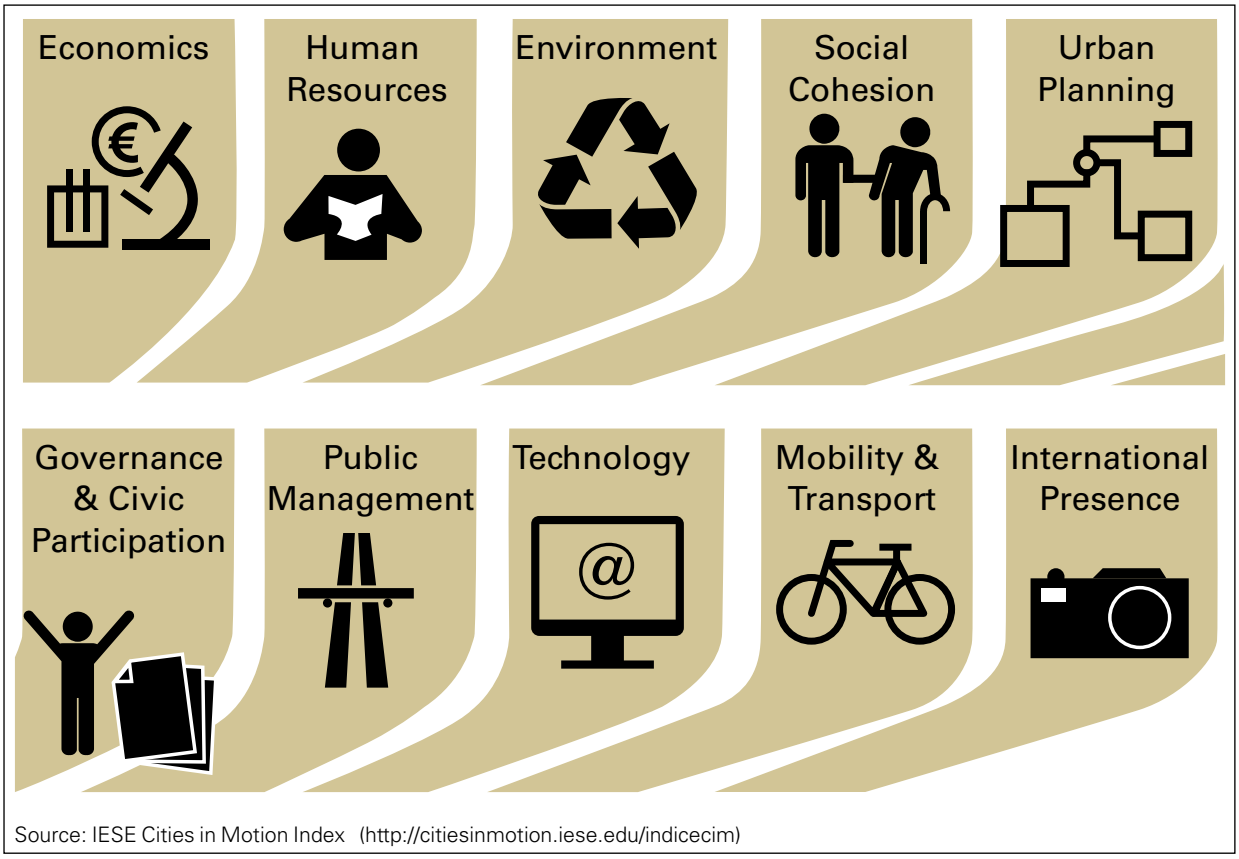
The Improvement and Efficiency Social Enterprise (IESE) Cities in Motion Index is an annual study. Using publicly available data, the index surveyed 148 cities in 57 countries for its 2015 report, 55 of them capital cities.

It examines cities through 10 'dimensions': governance, urban planning, public management, technology, the environment, international outreach, social cohesion, mobility and transportation, human capital and the economy.

The aim is to create knowledge and develop valuable ideas and innovative tools that can generate smarter cities and promote change at the local level.

The IESE Cities in Motion Strategies report that details the findings of the index is intended to be used by city stakeholders such as mayors, administrators, companies that provide solutions for urban challenges and interest groups that promote an improved standard of living for urban residents.

Figure 3: Cities in Motion Index dimensions



Source: IESE Cities in Motion Index (http://citiesinmotion.iese.edu/indicecim)

4 GNH Index

The Happiness Alliance, a Seattle-based organization, was inspired by a survey conducted by the government of Bhutan using a 'gross national happiness' (GNH) index, rather than referring solely to gross domestic product.

Bhutan surveys its citizens on nine key aspects of happiness: psychological well-being, physical health, time or work–life balance, social vitality and connection, education, arts and culture, environment and nature, good government and material well-being.

The Happiness Alliance, which has been endorsed by Seattle City Council, was the first organization in the US to develop objective indicators to measure happiness. The indicators measure poverty rates, air emissions, voter turnout, graduation rates, volunteer rates, rates of domestic violence and other crime, life expectancy, length of commute, work hours and so on.

Thousands of Seattle residents have taken part in the survey. The findings allow policy makers to make more effective decisions when serving their communities.

Figure 4: GNH Index

Source: The Happiness Alliance (http://www.happycounts.org/)

In summary

Using guidelines that are designed to apply to common urban sustainability issues, rather than developing methods that apply to the particular city, offers various benefits and challenges.

Benefits of using common guidelines	Challenges of using common guidelines
— the opportunity to compare cities — a comprehensive breakdown of many drivers of sustainability — peer and specialist support — the opportunity to meet a defined standard — academic research and corroboration — a way to determine whether all relevant issues are covered — a means to identify areas in which the city can perform better	— the inclusion of key performance indicators (KPIs) that are irrelevant to a city's priorities — the time required to participate in a method that uses numerous KPIs — the likelihood of a program being in the pilot stage and having few comparator cities — the use of macro-level KPIs that are unlikely to change over the short term, rather than of KPIs that drive impacts — prohibitive costs in times of budgetary constraint

The following case studies highlight some ways in which particular cities and organizations have measured their progress on the issues that matter most to them. These real-life examples have their strengths and limitations, and they are followed by helpful guidelines for other cities to effectively measure the sustainability of their programs, services and interventions. The case studies featuring Tokyo Metropolitan Government and the Region of Waterloo both included direct support from KPMG firms.

Case study: the Bristol Quality of Life Survey

The Bristol Quality of Life Survey[1] has been distributed annually to up to 29,000 households for the past 15 years. It not only provides a snapshot of the quality of life in Bristol but also demonstrates how this changes over time. As well, the survey gives city residents an opportunity to voice their opinions about local public services and other issues close to their hearts.

The statistics are analyzed by age, gender, ethnicity and city area, or ward. A strict coding protocol and rigorous quality-checking procedures are applied to the data set.

The survey outputs are then used by the city council, health service and other public-sector partners to help plan local services, track change and improve the quality of life for residents. The survey is the council's main tool for providing neighborhood-level statistics and information about public perceptions. Sometimes the differences between hard data collected on such indicators as traffic speed, noise or air quality and the perceptions residents have of those indicators are interesting in and of themselves.

Sustainability and quality of life can be considered synonymous. To provide a comprehensive picture of these two aspects of the city's neighborhoods, the Bristol survey measures them using five levels of indicators:

1. common European indicators
2. national and regional headline indicators
3. stakeholder indicators (selected after consultation)
4. ward and city-wide indicators (introduced as benchmarks and measured by the city authority)
5. community group indicators (developed in 2001–02 and measured by each group).

The report of the survey selects the indicators of widest interest and uses maps and trends to present the material in an accessible and comprehensible format.

Professionals and politicians need the public's insight and feedback. The survey has significant potential to empower citizens and voluntary and community organizations to make a case for change. The information helps them to effect change themselves and to enable others to do so. Many cities have explored running studies similar to the Bristol Quality of Life Survey.

[1] http://www.bristol.gov.uk/page/council-and-democracy/quality-life-bristol#jump-link-2

Case study: the Happy City Index

Happy City is an initiative that works with a wide range of organizations, from grassroots community groups to international bodies such as the United Nations and the European Union. The initiative helps communities facilitate sustainable happiness on a city scale.

With limited resources, local policy makers need to know which factors are most relevant to people's well-being, and why. The Happy City Index has therefore been developed to help stakeholders understand, measure and improve well-being. If well planned, channeling scarce resources to key areas can then make a lasting difference to people's lives, creating ripple-through effects and ensuring significant impact for less money.

Why measure well-being?

Governments attempt to measure the well-being of their citizens for three main reasons.

A common currency	**Measuring what matters**	**The benefits of well-being**
All major policy sectors have an impact on well-being, but they often operate independently despite the potential benefits of working across policy areas. Measures of well-being have the potential to unify the development and assessment of policies, providing a common currency not only for all policy sectors but also for community organizations, businesses, groups and individuals across the city.	Over the past 40 years, the measurement of well-being has developed to such an extent that we can now rigorously monitor the impact of policy areas that have traditionally been thought of as intangible. This includes measuring the impact of green and social spaces and cultural policy.	Higher levels of well-being have been shown to have a positive impact on important conditions such as physical and mental health, social and environmental behaviors, productivity and resilience. Promoting well-being should not be seen as a luxury. It needs to be a serious concern of governmental policy.

How to measure well-being

Well-being is measured using external and internal factors. External factors are the drivers of well-being. They are the conditions that are necessary for people and places to thrive. Internal factors affect the individual's experience of well-being. They involve how a person is feeling and functioning in day-to-day life. The Happy City Index breaks external and internal factors into a number of domains.

Key findings

Happy City performed a pilot study on the city of Bristol in 2015, the first measurement of its kind in the UK. The index combined two different kinds of data: pre-existing data from local and national sources on the 'drivers of well-being'; and primary survey data on 'experienced well-being'.

The result was the ability to identify the conditions that make a difference to people's experienced lives across a city.

This allows local policy to be developed from the standpoint of improving well-being, rather than considering well-being only once economic policy objectives have been met. It combines economic and non-economic objectives into a single framework and permits the potential economic and social benefits of well-being policy to be identified.

Better well-being is associated with better health, socialization and higher productivity, while 'city livability' is an increasingly important criterion for companies deciding where to invest.

To reap benefits, local well-being policy needs to be made across departmental boundaries and from a long-term perspective. It is not enough to look at the obvious, direct connections between a given policy area and well-being. Policy makers need to understand the various pathways through which their work affects people's well-being.

The challenges of implementation

Collecting representative data on certain demographic groups — 16–24-year-olds and minority communities — proved difficult. It is important to ensure a representative sample, and Happy City has developed an online survey in response. The format is intended to be engaging, and allows people to better understand various aspects of their well-being and compare their results to those of others who have taken the survey. The survey will target a number of community organizations across the city to ensure that people who would otherwise not participate in the measurement process are reached.

Demographic differences may mean that policy makers will have to consider different well-being factors when promoting well-being in different areas of the city.

The Bristol pilot was performed on a small scale, and its main finding was that certain factors have a much bigger impact on people's well-being than others. Identifying these city-level factors can help policy makers set priorities for service provision when resources are limited.

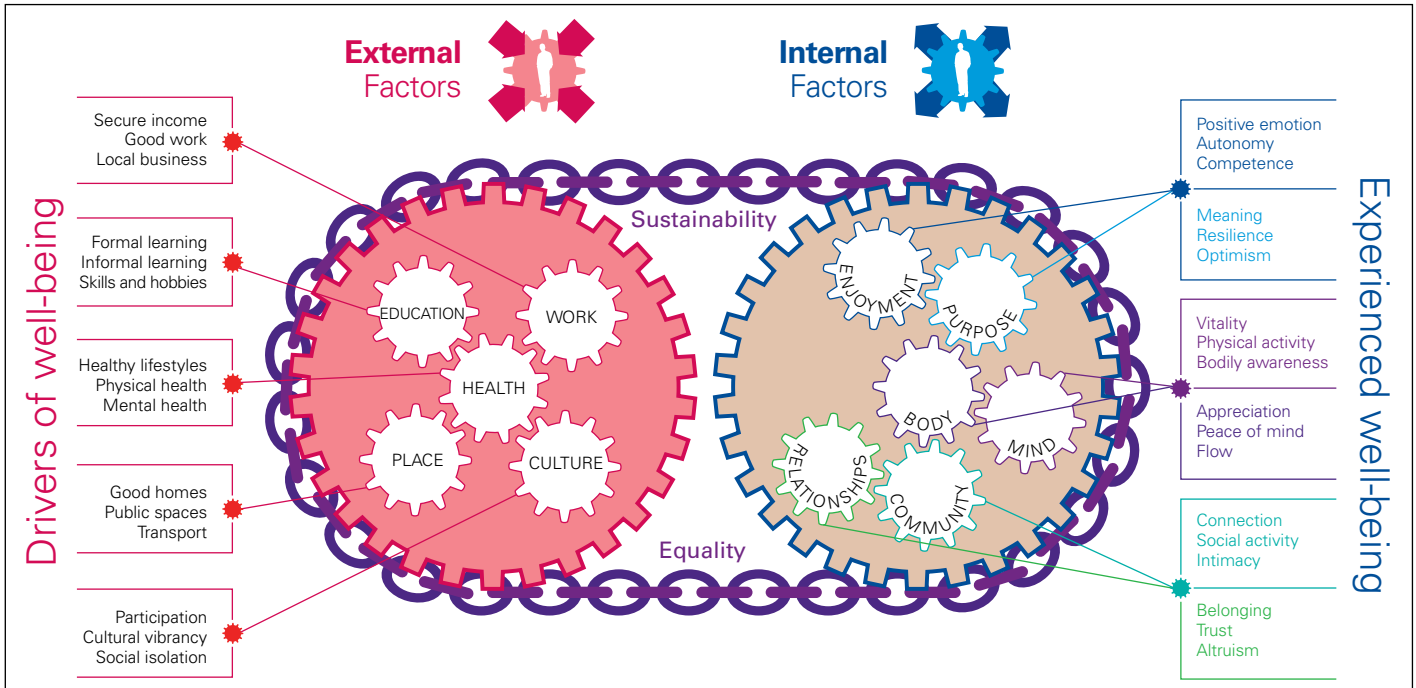
A larger-scale pilot study will reveal factors that make a difference on a neighborhood or street level. This can help determine specific interventions to improve well-being.

For more information, see www.happycity.org.uk/content/happy-city-index.

"The Happy City Index can move us towards a single common measure that every agency — public, private or business — can sign up to and measure its success against. Using this as a common benchmark, we have a powerful tool for joining up public services and driving real public-sector reform that can be used all over the country and beyond."

— Paul Taylor
Head of the Executive Office
Bristol City Council

Figure 5: The Happy City Index



Source: http:// www.happycity.org.uk

Case study: Tokyo Metropolitan Government

With the 2011 tsunami shutting down 30 percent of Japan's energy supply and Tokyo set to host the Olympic Games in 2020, the Tokyo Metropolitan Government needed an energy optimization strategy that could be implemented across more than 1,300 assets.

Objectives

The Tokyo Metropolitan Government wanted to reduce energy and carbon consumption by 20 percent and to achieve annual energy cost savings of ¥20 billion (US$175 million). It asked KPMG in Japan to undertake an assessment of its real estate asset portfolio in order to identify energy consumption and CO_2 emission reduction in areas such as heating and cooling, ventilation, lighting and asset replacement improvements.

Method

Benchmarking was conducted and unique formulas were developed to calculate the energy and carbon reduction potential of various improvements. Criteria were established for the evaluation of energy consumption, and CO_2 emission reduction targets were set for each facility/bureau.

Challenges

Due to the large volume of government assets being studied, data assembly was one of the most significant challenges. Among the 1,312 owned and occupied assets, comprising 9,258,379 square meters, were offices, forum and event spaces, schools, hospitals and public sporting facilities.

The assessment was based on data and did not include site visits, and this made it difficult to find deeper opportunities for savings.

Results

As well as achieving its stated objectives of energy savings and carbon reduction, the project outlined how to realize the following benefits:

— to reduce the government cost base with limited capital investment

— to reduce carbon emissions

— to improve the indoor environment for occupants of the real estate assets

— to improve air quality, leading to better public health and well-being

— to provide a successful government example for the market to follow.

Key recommendation

It is important to start with a macro assessment. It is then possible to create a plan that prioritizes the worst performers, outlines how to bring all assets up to average performance and then eventually brings them up to high performance.

Case study: Region of Waterloo, Canada

With over half a million people, the Region of Waterloo is one of Ontario's growth areas. Its population growth rate from 2006 to 2011 surpassed both the provincial and national averages, becoming the 10th largest metropolitan area in Canada and the fourth largest in Ontario. Over the next 20 years, the Region is projected to gain an additional 200,000 residents.

This growth and expected future growth has caused both the elected and the unelected leadership of the Region to think about the efficiency and effectiveness of regional service delivery, and possible changes to services and service levels.

Objectives

As with all municipal and other orders of government, the Region must balance service expectations against financial constraints. Carrying out service reviews that consider opportunities to enhance the efficiency and effectiveness of service delivery while taking into account fiscal and service impacts is one strategy to ensure the community receives the best value.

The Region engaged KPMG in Canada to conduct a service review with the following objectives:

— to determine whether the Region was providing the desired level of service as efficiently and effectively as possible

— to consider whether any changes to the level of services should be undertaken

— to recommend mechanisms to improve the efficiency and effectiveness of ongoing service delivery.

Method

Project planning

Meet to clarify expectations.

Refine lines of inquiry.

Develop a work program for the review.

Service profile development

Develop an inventory of programs and services provided by the Region, using KPMG's Municipal Reference Model.

The inventory of programs and services was created through a series of workshops with the leadership of each Regional department, interviews with Council members and a review of key corporate documents (budget, financial statements, operational plans, etc.). An online survey was also used to ask the public what services were important to them.

Benchmarking

Survey five comparative municipalities.

Benchmark the Region's services to identify potential cost savings and improved efficiencies.

Conduct public engagement.

The benchmarking results were included in service profiles of each Regional department.

Analysis

Identify potential opportunities to achieve the most efficient and operationally effective approaches to service delivery.

Opportunities were grouped into those already in process, those worth pursuing and those not to be pursued. A workshop identified the five top opportunities for deeper analysis, which KPMG in Canada then conducted.

Final report

Develop and present a final report containing practical and achievable recommendations on service delivery.

Challenges

It was necessary to understand all the businesses of the municipality. Each different business was inventoried and benchmarked on service level, type and performance. The Municipal Reference Model was used to standardize the language in which the Region's operations were described so that they could be explained consistently both within and beyond the organization.

Inevitably, Regional staff and Council members had a vested interest in certain services that were delivered by the municipality. Region of Waterloo staff were particularly concerned about the childcare delivery model, and Council members were preoccupied with the municipal airport. The service review provided fact-based evidence of opportunities to increase the effectiveness and efficiency of Regional operations significantly and cut through the protectionist approach of affected groups.

Results

The final report offered five concrete recommendations for optimizing service delivery value:

- Stop competing with non-profit employment agencies.
- Create a regional consortium of municipalities and establish a shared data center and desk support service for member municipalities.
- Restructure the road maintenance agreement between member municipalities in the Region to establish the same rate structure for all participating municipalities.
- Test the market for private-sector interest in the municipal airport, not only to drive operational and strategic goals but also to reduce the operational costs and lessen the impact of airport costs on the property tax levy.
- Develop a five-year plan to phase out children's centers owned by the Region and use the savings to expand the number of subsidized childcare spaces offered by other community childcare providers.

Key recommendation

The in-depth analysis was presented in the form of five business cases. The project team responded well to having the top five opportunities analyzed in greater depth, as this added value to the project. Providing detailed fact-based evidence of measurable, achievable cost savings and efficiencies is essential to the success of a service review.

Measuring the impact of a program or service

Cities measure their total sustainability but they also want to understand the impact of specific programs and services. When interpreting the impact any of these activities, several factors must be considered.

Input, output and impact measures

It is increasingly recognized that the choice of key performance indicators (KPIs) often reflects what matters to individual program managers rather than the goals of the funders or program recipients. For example, we may care about how much money is given to a school or how many teachers that pays for and the effect on exam results, but we may not consider how these factors affect the students' well-being and prospects.

More often than not, the most important KPIs are unavailable, or cannot be directly altered by program management — or they are seen as subjective. The measurement of the 'impact' of a program is often far more subjective than the direct inputs and outputs. Determining the impact may also require a degree of interpretation and may not be evident until months or years after the management action is taken.

It is therefore important to understand the distinctions between input, output and impact KPIs.

Input KPIs	Output KPIs	Impact KPIs
Input KPIs are measures of the resources that go into a service, such as: — budget allocated — people involved — resources deployed — time available — target market.	Output KPIs are direct measures of the results of the deployment of resources. Often referred to as service management KPIs, they measure short-term changes as a result of inputs, such as: — number of people reached — projects implemented — change in output — change in behavior.	Impact KPIs reflect long-term effects that are closely related to the purpose of the activity. Many cannot be measured within program timeframes. They usually involve changes to well-being or performance as a result of behavior change.

Pathways of change and timeframes

Some stakeholders will be more interested in inputs (e.g. finance departments, politicians), some in outputs (e.g. program managers, press) and some in impacts (e.g. program beneficiaries, community groups, healthcare and education providers).

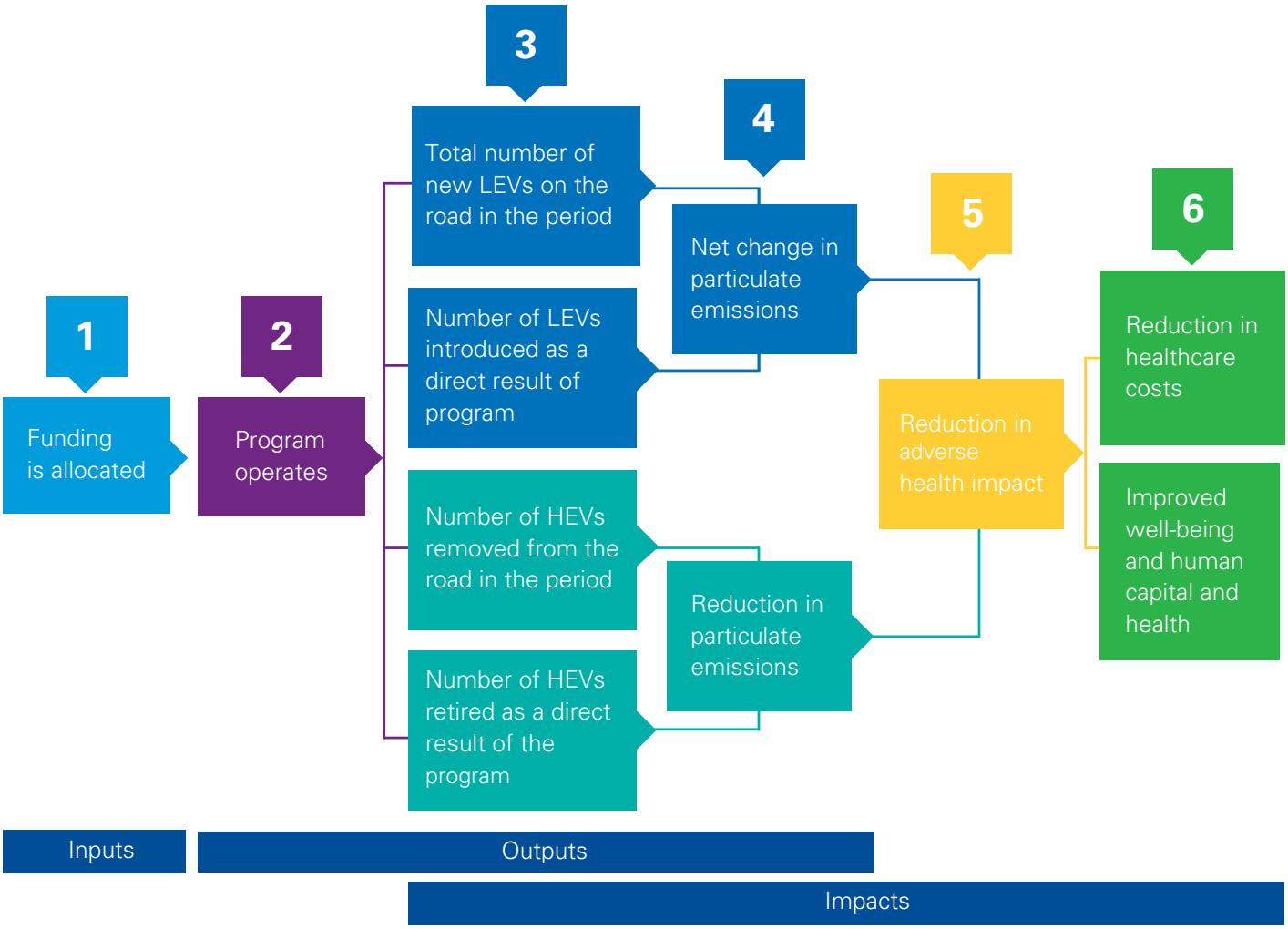
When choosing which measures to report, it is important to consider who will want the information and when. The nature of modern government means that many stakeholders want information on the progress of a program before its real impacts have been felt. This leads to an overreliance on output KPIs.

For example, a program to encourage companies to switch to low-emission vehicles (LEVs) may measure the number of LEVs introduced to the city. The study may also quantify how many high-emission vehicles (HEVs) were replaced and seek to determine how many of the new LEVs were introduced as a direct result of the program. More difficult would be measuring a change in air quality, illness related to air quality, and associated cost savings from a reduction in illness, and clearly attributing those changes to the program.

The diagram on the next page is a very simple example of an outcomes pathway based on the theory of change. The theory stipulates that several steps, both sequential and parallel, are required in order to achieve change. As completing these steps takes time, it isn't possible to assess directly and quickly whether the final desired change is going to be achieved. Instead, measuring certain proxy factors along an outcomes pathway can provide some assurance that the actions being taken are leading to the final change.

Constructing an outcomes pathway is an approach to defining all the building blocks required to bring about a long-term goal.

Pathways of change and timeframes



The pathway shows how the input of allocated funding allows the program to operate (column 1).

Operational activities then produce outputs (column 2) such as number of advertisements placed or people reached with respect to the program. Column 3 shows the impact of the example program, and columns 4, 5 and 6 show subsequent impacts. Each successive column shows impacts that are further beyond the control of the program manager and therefore often harder to demonstrate.

Obtaining reliable data becomes more challenging the further along the outcomes pathway an impact occurs, and it also becomes more difficult to attribute changes to the program itself because external influences will come into play. At the same time, the further along the pathway a measurement is taken, the more accurately it will determine whether the desired impact has been achieved.

There is some overlap between output and impact KPIs because stakeholders or program managers tend to consider factors that are under their direct control, the quantity of resources that can be allocated to measurement and the timeframe over which the program is measured. The lower the level of

control and the shorter the timeframe, the closer to the beginning of the pathway the chosen KPIs will be.

If the program were an advertising campaign to encourage businesses to purchase LEVs, for example, the output KPIs (such as the number of advertisements placed) would occur in column 2 and the impact would be shown in columns 3 and, potentially, 4. If the program were instead a long-term market intervention to provide financial incentives to purchase government-supported LEVs, column 3 would show outputs (because the program manager would have much more control over the number and type of vehicles purchased) and the impacts would occur in column 4 (air quality) and column 5 (health).

Key message

When planning what to measure about the sustainability of a program, consider how to measure the impact of an action, not just the outputs that arise from it.

If there is limited appetite or resources to measure impact, construct an outcomes pathway and find more measurable KPIs that will have a positive impact on the program goal.

The four-step approach below outlines what needs to be considered when measuring the sustainability of a program.

Four-step approach to measuring the sustainability of a program

1. Decide what you want to achieve	2. Assess the contribution to long-term impacts	3. Focus on outcomes that will achieve the desired impacts	4. Monitor, adjust and report
— Prioritize what is important to the city's vision and to key stakeholders. — Determine how to make the greatest impact with the resources available. — Establish timelines.	— Differentiate outcomes from impacts. — Consider community and business benefits.	— Group activities according to what they are intended to achieve. — Align measurement tools with resources and chosen metrics.	— Drive the quality of your investment of resources. — Report on the achievements to stakeholders, including those who are affected.

Lessons from working with measurement data

It is vital to consider the purpose of data before gathering and presenting it. In KPMG's experience, there are some common pitfalls.

KPMG's top tips

- Communicate progress to stakeholders, including inputs, outputs and impacts.
- Be transparent about how reported measures are defined and calculated.
- Use a combination of quantitative and qualitative information to tell the story of the activities.
- Be transparent about areas for improvement and feed this learning back into all related programs.
- Verify the data and reported information.

Pitfall	Possible solutions
Working with too much data	Understand the purpose of the data by talking to stakeholders.
Using available data instead of needed data	Regularly examine what sort of data is being gathered and whether it fits the purpose. Find out where the data goes instead of assuming that because it has always been collected it must have a use.
Presenting data in inappropriate units	Per capita, per family, per journey and similar units of measurement are often far more useful than a total, even if they are only averages.
Using data over the wrong timeframe	Keep in mind that many data sets are seasonal or change only over long periods.
Examining data at too high or too low a level	Consider whether stakeholders are interested in city-wide statistics or much more local metrics.
Drawing incorrect, misleading or biased conclusions on behalf of the stakeholder	Unless specifically asked to draw conclusions, it is often best to let the stakeholders come to their own conclusions and to include appropriate caveats that explain any assumptions that have been made.
Making incorrect assumptions about users' understanding	Determining how the stakeholder will react to and use the data is important. Users can have different levels of familiarity with and understanding of the data.
Mistaking the level of confidentiality	Although it is important to be as transparent as possible, it is also necessary to be careful. Consider what can be released, and do not assume everything is confidential all the time.
Applying inappropriate averages	Mean, modal and median averages can be powerful tools, but sometimes the range and distribution of data points tell the most important story, such as income distribution or equality metrics.
Expecting greater certainty than is possible	Seeking a suitable or 'good enough' level of confidence in the data may make better use of resources than seeking perfect data.

The future measurement of sustainability

The world of sustainability measurement is evolving rapidly. Lessons learned in the corporate world are being applied in the public sector and vice versa. In their role as the working group for the Bristol 2015 initiative, KPMG in the UK and members of the Green Capital Partnership Measurement Group brought together a range of stakeholders to discuss and develop a new and more flexible approach to reporting sustainability.

That experience can help other cities understand their progress in becoming happier, healthier and more sustainable.

Why create a new framework?

The group reviewed several existing approaches to measuring city sustainability, but although these had advantages, they were not flexible enough to measure how much happier, healthier and more sustainable Bristol had become as a result of being a European Green Capital.

The biggest challenge was that many existing measurement frameworks did not take the theory of change into account sufficiently. Almost all the KPIs measured some of the ultimate impacts of an intervention, but the group wanted to assess the impacts of the Bristol 2015 program over the course of the year, in order to determine whether the activities being undertaken would have a positive impact on longer-term goals that were months or years in the future.

The criteria that the group used to develop a measurement framework are widely applicable.

Criteria for selecting a framework

A framework should:

— be credible

— be globally recognized

— provide a clear structure

— incorporate the city's themes but function independently of them

— consider every aspect of the city

— take account of the theory of change

— be flexible enough to adapt or expand as assessment proceeds.

Criteria for selecting a measure or KPI

— The indicator is already being measured or can be measured with little extra effort.

— Appropriate baselines exist for comparison.

— The measurement will show change over a year.

— The indicator can be compared with that of other cities.

— The indicator is meaningful to residents and other stakeholders.

— The indicator is on the appropriate change pathway.

The Integrated Reporting Framework

No existing measurement tool for sustainable cities was appropriate for the purposes of Bristol 2015. Instead, the working group chose to use the Integrated Reporting (IR) Framework developed by the International Integrated Reporting Council (IIRC) to assess the city's change in sustainability over the year.

Originally developed for reporting in business, the IR approach is now being extended to government. It is designed to create a 'clear, concise and comparable format' for measuring sustainability that will bring consistency to sustainability reporting.

The six capitals and their application to cities

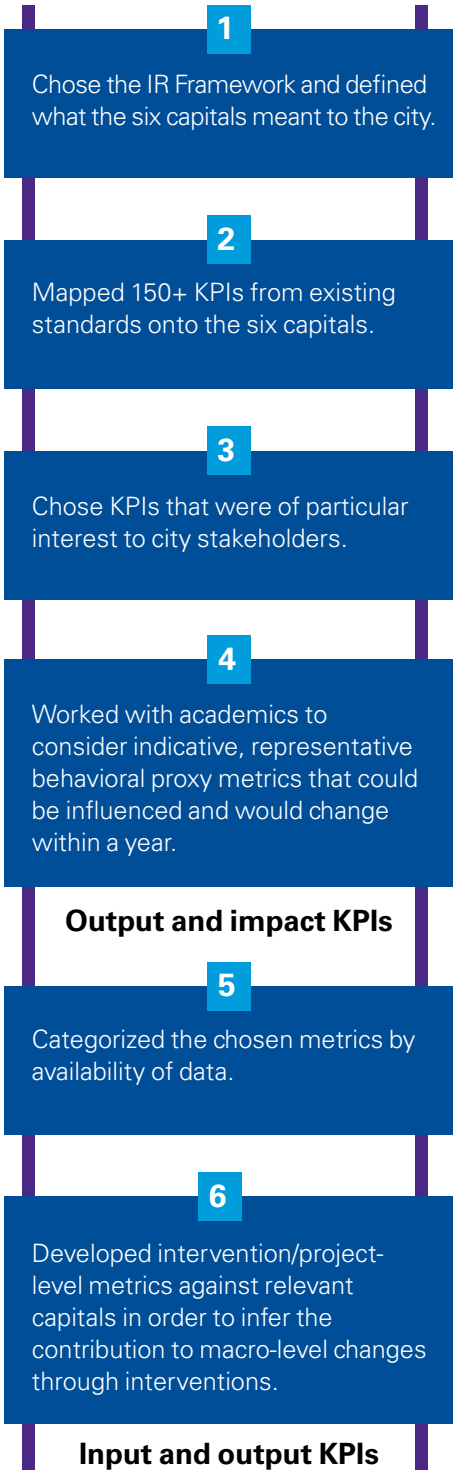
At the heart of IR is the concept of the six capitals. Put simply, to achieve true long-term sustainability, six types of value that exist in any organization, group or society must be optimized. The approach recognizes that too often we focus on economic or financial value at the expense of investing resources in human, natural or intellectual capital. The IR Framework encourages us to think about how values can be moved between the various capitals. For example, economic capital (money) is used to pay for new roads or to develop new healthcare solutions that in turn improve human capital (health).

- **Economic capital:** GDP, tax revenues, jobs, employment, investment
- **Social capital:** community cohesion, connection, integration, diversity, crime
- **Natural capital:** areas of natural beauty, biodiversity, wider ecosystem services
- **Human capital:** happiness, well-being, education levels
- **Manufactured capital:** roads, railways, water infrastructure
- **Intellectual capital:** patents registered, students, ideas, common knowledge

The flexibility of the IR Framework allows city leaders to examine the various capitals, choose suitable KPIs from among the best tools reviewed and then examine the change pathways required for those KPIs.

For Bristol 2015, this process made it possible to decide on which behavioral change to encourage during the year and to develop a way to measure that change. Encouraging the right behaviors by residents and businesses would then provide positive outcomes for the broader sustainability of the city in the long run. The process that the working group followed can be outlined in six steps.

Integrated Reporting Framework process



KPMG insight

What is my city worth?

What is your local park, library, bridge or swimming pool worth? We can easily put a dollar figure on infrastructure, but that can never truly reflect the long-term return that an asset provides to a city. Cities need to take a much wider set of measurements to make informed judgments about where to allocate their increasingly scarce resources.

Disbursements from central governments have been reduced over the past few years, as has revenue from taxing hard-pressed business. Simultaneously, demands on welfare services have grown. From Sydney to Shanghai, cities have to do more with less.

Under this pressure, it would be easy to put more value on infrastructure that generates economic growth, but that could be a mistake. New factories can create economic growth, but if those factories pollute the water supply, their effect on the population's health and well-being would be damaging — not to mention the economic harm caused by the pollution of natural resources.

While working with Bristol in 2015 during its year as the European Green Capital, KPMG used the six capitals model along with our True Value approach to consider how cities can more consistently measure the value of their services and assets. Considering these six capitals can help cities assess the broader contribution of their assets to their long-term viability and well-being.

The six areas of capital are as follows:

- **Economic capital:** the earnings of business and individuals across the city
- **Manufactured capital:** the value of the constructed physical assets of the city, including roads, buildings, vehicles, dams and so on
- **Human capital:** the health and well-being of citizens
- **Intellectual capital:** the cumulative know-how and collective skills of the city
- **Social capital:** the strength and effectiveness of the relationships within the city, including families, communities, business and the perception of the city by others (e.g. tourists)
- **Environmental capital:** the natural resources that benefit the city or, considered negatively, the costs imposed by carbon emissions and other pollution.

Measuring value in this way lays bare how services that look like costs can in fact generate long-term value elsewhere. It also gives us a way of thinking that recognizes we can often create value by optimizing the trade-offs between capitals instead of focusing on one or two at the expense, or without thought, of others.

For example, many libraries have been forced to close in cities in recent years, but a library creates intellectual capital through access to learning materials and information. It improves local people's job prospects and increases a city's social capital by providing a venue where older people who would otherwise be isolated can enjoy human contact, children can attend playgroups or adults can get a boost simply by meeting friends for a coffee.

Closing that library would generate a short-term cost saving but could have an extremely detrimental effect on the longer-term cohesion of the community and the skills of the local workforce.

The majority of existing measurements focus too heavily on output indicators, like the number of buses, libraries or schoolbooks you get for your money. It is considerably harder to measure the impact of that investment, as that could take years to filter through the system. However, if we truly want our decisions to affect the long term, we must start to factor in True Value much more.

By measuring the True Value of each aspect of a city's capital, we can have an evidence-based discussion about the areas that genuinely create value for the city and its residents. Linking the beneficiaries of the True Value of a service or asset with its funding can create a fairer approach to funding city infrastructure.

What are the next steps?

The work of KPMG in the UK and the members of the Green Capital Partnership Measurement Group for Bristol 2015 has produced what we believe is one of the leading frameworks for thinking about the long-term sustainability of a city. It allows us to think about how we transfer value between the six capitals to ensure that the most important aspects of a city's sustainability goals are optimized.

KPMG is currently working on an extension to this process, merging a number of approaches that have already been applied to the public sector.

Municipal Reference Model

The Municipal Reference Model (MRM) provides a consistent framework for examining all the services and activities within a city, whether they are provided by the city government, the private sector or others. These include justice, education, parks, water, power, communications and culture, among other areas. This broad approach is important because it allows comparisons across cities and stakeholders when services may be provided by various mixes of city, state, private and third-sector organizations.

Integrated Reporting Framework

The IIRC Integrated Reporting Framework offers a way to capture the positive and negative contributions to each of the six capitals made by any given city activity.

KPMG's True Value methodology

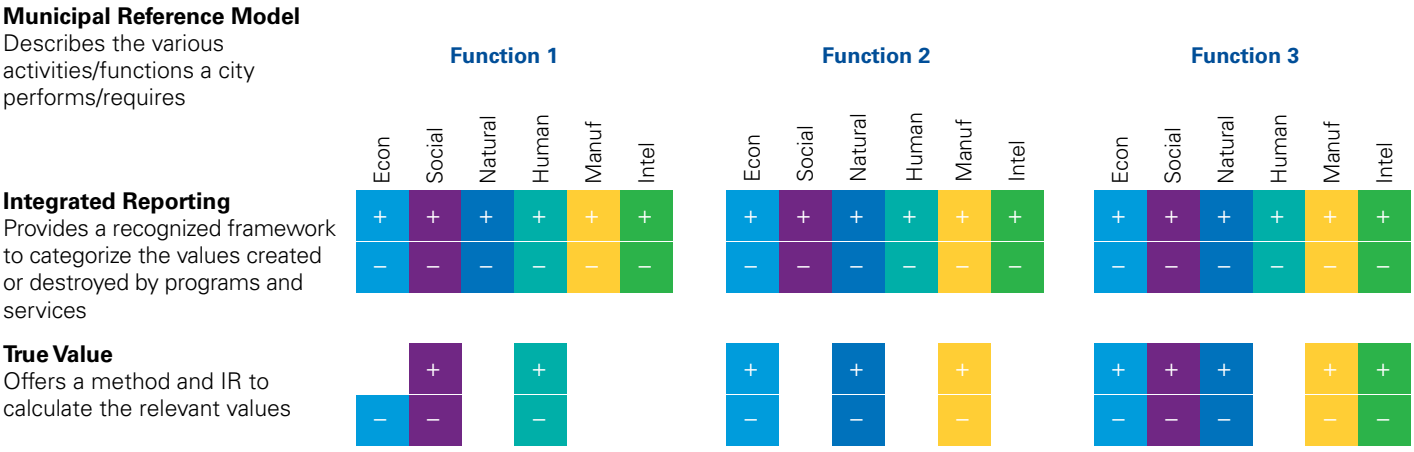
KPMG's True Value[2] approach recognizes that although we need to expand the focus beyond simple economic valuation, it is far easier to compare the six capitals when they use the same measure. Using a wide range of sources, the methodology selects measures from the most important capitals and converts them into financial values, making it easy to compare actions across all six capitals.

For example, we conduct studies on the value of every square kilometer of parks in a city, and use that information to indicate a return on investment for a city's parks service that can be compared to other spending allocations.

The diagram below demonstrates how various types of city activity are linked within the IIRC's Framework and identifies where some of their True Value may lie. Each of the activities and functions described within the MRM can have positive and/or negative impacts on the six capitals encompassed by the IR Framework. Only some of these impacts, however, will be significant to the whole program or to particular stakeholders. True Value recognizes this distinction and calculates the material contributions of each activity to the relevant capitals.

Some sustainability measurement work has already been carried out for various national infrastructure operations such as long-distance rail and telecommunications. This approach is right at the forefront of city measurement, and KPMG welcomes discussion with any city interested in trialing the approach. Please contact joanna.killian@kpmg.co.uk.

KPMG's True Value methodology



[2] For more information, go to www.kpmg.com/truevalue

Where do we go from here?

This module has shared examples of what others are doing in measuring the sustainability of their cities. It is almost certain that every city in the world has some form of data collection, and that it will include sustainability metrics — although they may not be called that.

The experiences of the cities described in this report suggest some key questions that any city should consider when planning next steps.

Questions to ask when measuring sustainability

— Why am I measuring? What impact do I want to make?

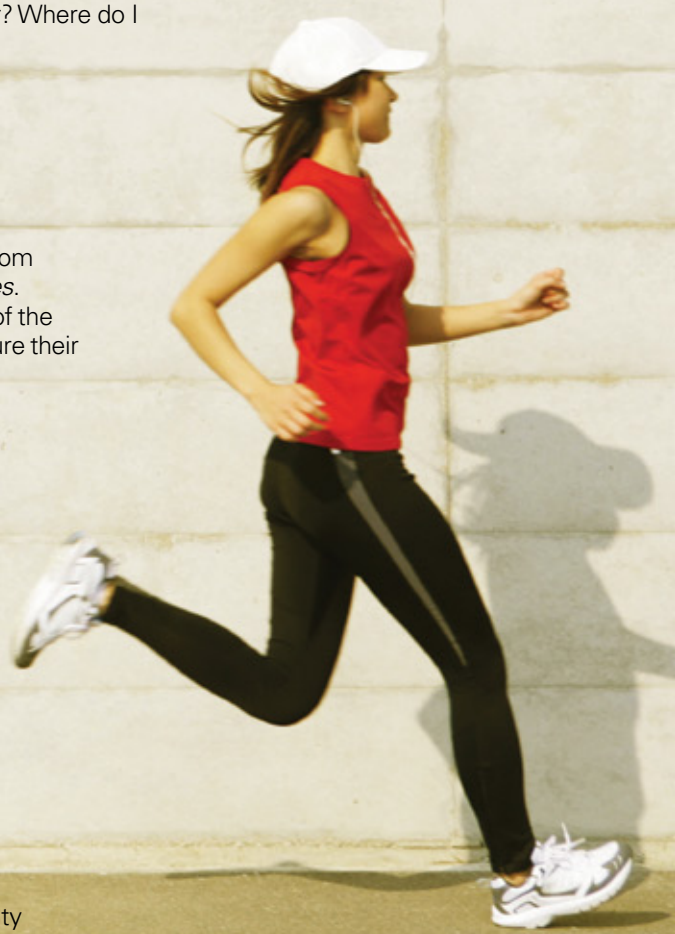
— Do I want to measure behavior as outcome, or results as impact?

— What data already exists?

— Who will want to know the results of measurement? May I speak with them? What do they want to know, and how will they use the data?

— Who can I work with?

— How long can I wait for answers? What level of certainty am I looking for? Where do I stop on the change pathway?



Acknowledgments

KPMG's Global Sustainability and Cities practices worked with stakeholders from around Bristol to produce the initial version of this module of *The future of cities*. The case studies are written by those involved in sustainability work. The rest of the paper is written by KPMG based on insights from helping organizations measure their sustainability for more than 20 years. For further information, contact:

Joanna Killian
Partner, Local Government, Public Sector and Health
KPMG in the UK
joanna.killian@kpmg.co.uk

Stephen Beatty
Americas and India Head of Global Infrastructure
Head of Global Cities practice
KPMG in Canada
sbeatty@kpmg.ca

Alan Mitchell
Executive Director, Global Cities practice
KPMG in Canada
amitchell@kpmg.ca

We would also like to thank Mike Zeidler and Sam Wren-Lewis of the Happy City Index, Alex Minshull and Mark Leach of Bristol City Council, and Grant Patterson of the International Integrated Reporting Council.

Without their contributions, this paper would not have been possible. The authors wish to thank the faculties of the University of Bristol and University of the West of England for their contributions to the section on measuring the impact of programs and services.

Contacts

Richard Wagenmakers
Partner KPMG Advisory
T: +31 20 656 8243
E: wagenmakers.richard@kpmg.nl

Sander Grunewald
Senior manager KPMG Real Estate
T: +31 20 656 8447
E: grunewald.sander@kpmg.nl