URBAN TRANSITIONS MISSION

Signify

In collaboration with

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

A City Assessment on Lighting Development in Climate Action Plans

Premise

This publication presents the results of a survey conducted among a panel of 41 cities from five continents. While the relatively limited size and geographic distribution does not allow for statistically representative conclusions, the results still offer a qualitative overview of the landscape and current uptake of integrated lighting technologies in cities.

The publication includes a detailed quantitative analysis of each question posed through the survey, offering insights, explaining trends, identifying outliers, and suggesting actionable recommendations for cities, especially their relevant technical departments and other key decision-makers.

The authors, including experts from the Global Covenant of Mayors (GCoM), Urban Transitions Mission (UTM), and Signify, applied a multidisciplinary approach to data interpretation, with the aim of informing an open and constructive dialogue among stakeholders.

All responses have been anonymized to safeguard privacy and ensure full compliance with applicable data protection regulations. Each participating city has given consent to benefitting frim a personalized report outlining an individual benchmarking profile among all respondents. Unauthorized distribution, reproduction, or disclosure of this document is strictly prohibited. The data contained herein is protected under relevant privacy and data protection laws.

The photos used in this report are for explanatory purposes only and represent best practices in lighting installations.

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Executive summary

Progressing in the lighting journey

Cities today stand at the forefront of some of the world's most complex challenges. Climate change and environmental resilience remain urgent priorities—but they now unfold against a backdrop of intensified fiscal stress, policy uncertainty, rapid technological disruption, and mounting infrastructure and urbanization pressures. In this evolving landscape, city leaders are expected to do more with less—balancing short-term service delivery with long-term sustainability, digitalization, and resilience goals.

These dynamics call for new capabilities: deeper sectoral expertise, innovative financing strategies, and stronger cross-sector collaboration. Municipal officials increasingly need to pair technical knowledge with strategic, managerial, and digital competencies to navigate an era of accelerated change.

Lighting as a strategic enabler of urban transformation

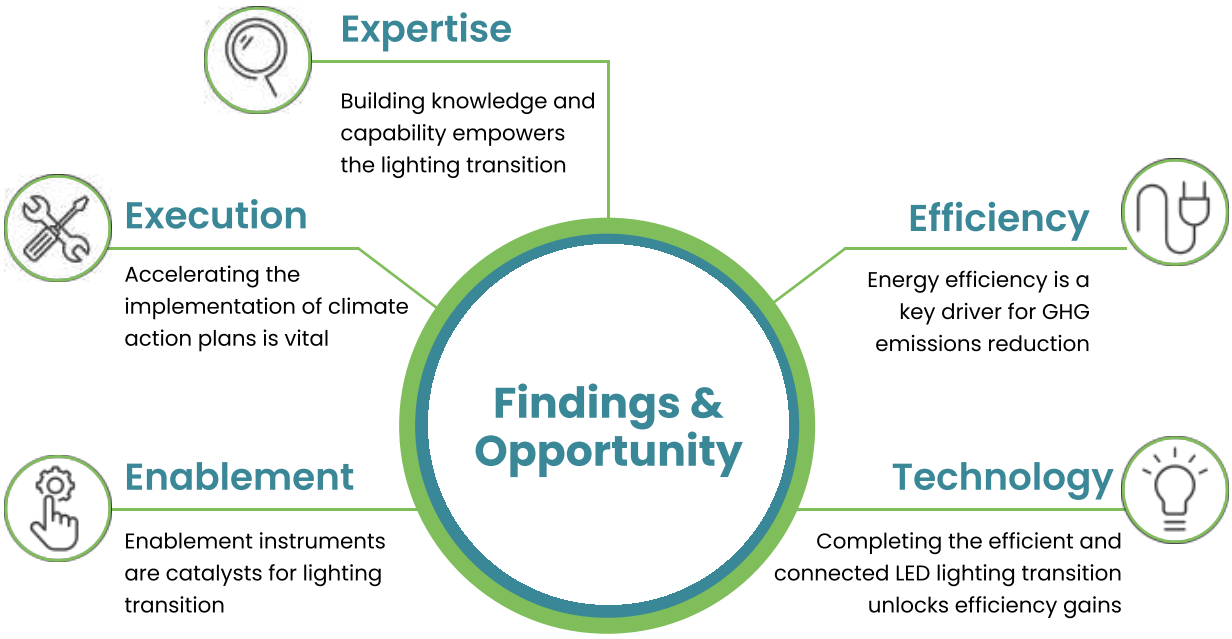
The lighting sector offers a powerful, tangible entry point to accelerate climate and energy transitions. LED and connected LED lighting technologies combine proven energy efficiency gains with immediate environmental and social impact—reducing greenhouse gas emissions, improving public safety and well-being, and strengthening the liveability of cities. With low investment thresholds, rapid returns, and scalable business models, LED lighting represents a targeted, intelligent intervention that can deliver meaningful results for cities.

Urban Transitions Mission (UTM) and Signify, in collaboration with the Global Covenant of Mayors for Climate & Energy (GCoM), have partnered to better understand how cities are advancing their lighting transitions, and how such efforts may contribute to broader climate and energy goals. A global survey and direct dialogue with city representatives have helped to identify both the progress made and the barriers that remain.

In the introduction, we explain the methodology used to conduct the survey, how responses were clustered, and how the analysis was structured to provide strategic direction. A detailed analysis of the survey results is presented in Chapters 1, 2, and 3. Each question is linked to one or more icons representing the five key topics, indicating the thematic origin of the findings.

Five key areas for action

The findings reveal that cities increasingly see lighting as a cornerstone of their climate action plans, but making progress requires coordinated action across five interconnected domains.



1. Execution

Accelerating the implementation of climate action plans is vital. While progress has been made, valuable opportunities exist to speed up the execution of climate action plans. Leveraging reliable innovations unlock environmental, economic, and social benefits more quickly. To execute effectively, cities need support in planning and monitoring solutions that harmonize multiple applications, overcoming bureaucratic hurdles, ensuring budget availability, and securing political commitment.

2. Efficiency

Improving energy efficiency is a key driver and powerful lever for reducing greenhouse gas emissions. Improving efficiency and reducing emissions are mutually reinforcing goals, such that every step toward efficiency also contributes to climate targets. Cities benefit from clear and harmonized strategies, measurable targets, and shared frameworks to align efficiency goals with climate commitments. Both short- and long-term planning is needed for energy reduction, as is quantifying and measuring impact.

3. Technology

Completing the efficient and connected LED lighting transition unlocks efficiency gains. The shift to LED technology is ongoing, and completing it—especially by integrating connected lighting systems—offers significant potential for additional energy savings, cost relief, and emissions reductions. Cities must develop technical expertise and knowledge of efficient LED lighting solutions. They must also understand how to map new solutions onto existing infrastructure and what to rely on when implementing smart city infrastructure. Designing, configuring and integrating connectable solutions includes developing competencies in planning and business case creation.

4. Expertise

Building knowledge and capability empowers the lighting transition. Investing in skills, training, and knowledge empowers cities to make effective decisions and adopt innovative lighting solutions faster. Human capital is a key enabler of technological progress. Cities must not only understand the evolution of lighting technology toward LED and connected LED, they also must develop proficiency in comparing and selecting vendors and skills in tendering and procurement of sustainable solutions. This requires a combination of technical and financial expertise with specific competences in lighting.

5. Enablement

Enablement instruments such as policy tools, financial incentives, blended financing mechanisms, and technical support act as catalysts for accelerating the lighting transition. When these instruments are well-designed and accessible, they help to overcome barriers to adoption and scale up impact.

From insights to implementation

This results of this survey underscore the fact that cities are not starting from zero—many have already demonstrated success with LED and connected LED lighting. However, to realize the full potential of the lighting transition, cities must move from planning to execution, supported by an enabling ecosystem of finance, expertise, and innovation.

Foreword

Public lighting and climate action: a shared opportunity for cities and local governments

The Global Covenant of Mayors for Climate and Energy (GCoM) is the largest global alliance for city climate leadership. As a powerful response to climate change from cities around the world, GCoM unites 13,800+ cities across 147 countries, representing over 1.2 billion people. These cities are dedicated to addressing the causes and effects of climate change, as well as tackling issues of energy access and energy poverty.

Based on current targets and actions, GCoM cities and local governments have the potential to collectively cut global emissions by the equivalent of 4.2 $GtCO_2$ per year by 2050. It aims to do so by encouraging local governments to implement ambitious and measurable actions through Action Plans that outline commitments to address climate change challenges and the transition to sustainable energy, and are structured around three pillars: climate change mitigation, adaptation to climate change, and energy access and energy poverty. Mitigation stands as the most extensively implemented and monitored pillar by GCoM signatory cities, largely due to enhanced capabilities in data collection and analysis. For these reasons, 6,882 cities have a plan that includes mitigation actions (GCoM Impact Report, 2024).

Among mitigation actions, public lighting represents a significant area of intervention. GCoM cities monitor the progress of their actions through the GCoM Common Reporting Framework, according to different sectors.

The energy sector is one of the largest contributors to GHG emissions in cities accounting for 71–76% of CO_2 emissions from global final energy use (UN-HABITAT, 2024). This sector is made up of many subsectors and public lighting is one of them. With regard to public lighting, action plans may include measures such as replacing light bulbs and luminaries by efficient ones, installation of renewable energy powered street lighting and traffic lights systems, optimal regulation of light intensity in response to changing environmental conditions. There is an impactful collective emission reduction as a result of street lighting focused municipal projects.

13 800+

GCoM Signatories

4.2 $GtCO_2$

emission reduction potential by 2050

Electricity for lighting accounts for nearly 15% of global power consumption and contributes to 5% of global greenhouse gas emissions and a global transition to efficient lighting could reduce these emissions by over one-third.

Energy has been one of GCoM's topical areas to address in terms of knowledge gaps and prioritized climate action in cities as a part of the Global Research and Action Agenda (GRAA). As one of GRAA's systems approaches, decarbonizing energy systems is a recognized need for enhanced climate resilience and integrated sustainable practices to meet the challenges of rapid urbanization. Efficient lighting systems play a significant role in helping cities to achieve this, making it one of the most cost-effective options for climate mitigation and achieving local climate goals. GCoM therefore advocates this action as a foundational pillar.

Benjamin Jance IV

Director, Climate Action Innovation, Research, and Impact

Global Covenant of Mayors for Climate & Energy

Lighting the path from commitment to implementation of net-zero, resilient and inclusive cities

The city of the future is a powerful promise: net-zero, resilient, and inclusive — a vibrant engine of human potential. A growing number of communities has pledge to drastically reduce emissions and exponentially strengthen resilience adopting ambitious, net-zero targets. Yet, a significant chasm remains between climate commitment and concrete implementation on the ground. This gap is more than often a matter of driving ambition forward into implementation: turning local vision into practical, systemic transitions that can be planned, financed and implemeted on the ground.

The Urban Transitions Mission (UTM) of Mission Innovation was launched with the aim to empower cities with to shape urban transitions based on robust knowledge and powerful innovation. By acting as a broker of solutions, UTM supports cities at every stage of their climate transition journey, across sector and governance systems. The Mission currently works with 117 cities across 47 countries, reaching over 120 million people worldwide.

Cities consume over 75% of global energy and account for 70% of greenhouse gas emissions, a footprint that grows daily as the urban population expands, with public lighting accounting for up to a quarter of a municipality's electricity use. Lighting, an ubiquitous component of the urban environment, can go a long way to support cities in their trajectories of decarbonization, offering an effective way to reduce energy consumption, enhance public safety, and support broader climate goals.

337 cities

pledged to net-zero target as of 2025

2.55 billion

people represented worldwide

Ever present in local sustainable energy and climate action plans, measures addressing the improvement and optimization of lighting systems are often considered among the “low-hanging fruits” of climate action, yet, too often these measures are limited to a simple switch between old and newer technologies.

Similarly to urban transitions, the evolution of lighting systems must be holistic, embracing the co-benefits that make a city truly inclusive. This is about more than watts and lumens: it is about safety, health, and well-being. Looking at the city of the future, the real opportunity lies in transforming lighting from a fixed utility into a connected, multi-purpose system for the city. This will help administrations to save energy, while also offering real-time data - from street usage to air quality - allowing infrastructure to adapt dynamically to events or emergencies.

According to a recent study by the World Bank, resilient and low-carbon urban investments in all low- and middle-income countries will cost between USD 256–821 billion per year through 2050, depending on the scenario. USD 78 billion annually will be needed for building and energy alone, including retrofitting, renewables and energy efficiency measures. These growing investment needs will necessarily demand the explorations of new models and a fully circular economy mindset. New approaches, such as Light-as-a-Service, can allow cities to access innovation and new technology without prohibitive upfront capital.

This publication, a collaboration between the Urban Transitions Mission, the Global Covenant of Mayors for Climate and Energy and Signify, wants to put forward a direct challenge to the implementation gap. Offering food for thoughts on the current state of play, this publication shares actionable blueprints for city practitioners, and shed lights on actionable recommendations to accelerate and scale the uptake of sustainable lighting in cities.

Giorgia Rambelli

Director Mission Innovation Urban Transitions Mission

Switching on the future: the power of efficient and connected urban lighting

Urban areas are projected to expand significantly by 2050, intensifying the climate and energy challenges that cities face. City leaders play a pivotal role in shaping urban environments that are safe, sustainable, inclusive, and resilient. Achieving this vision requires strategic investments in infrastructure, public services, and environmental initiatives, with active engagement from citizens, businesses, and researchers.

Energy sufficiency is essential to unlock resources for building renovations and to support a fair and just energy transition. In this context, lighting plays a crucial role. It represents one of the simplest and fastest ways to improve energy efficiency, often requiring only the replacement of outdated systems with LED technologies. These upgrades can deliver immediate savings without the need for major infrastructure changes.

Connected LED lighting systems further enhance efficiency by integrating smart sensors and IoT technologies, enabling real-time monitoring and adaptive control.
This is valuable in both buildings and outdoor spaces, where lighting can respond to human presence and environmental conditions. Efficiency in lighting involves three key aspects: high light efficacy, smart controls to prevent unnecessary usage, and connected systems for optimized performance.

These measures reduce operational costs and environmental impact, contributing to broader sustainability goals.
Connected lighting solutions also allow cities to respond dynamically to changing needs—enhancing comfort, safety, and even cognitive performance in spaces like schools and offices.

193,000 GWh

Potential electricity consumption reduction per year

$31 billion

Potential electricity costs savings per year

The potential is impressive: transitioning all conventional lighting to LED globally could save 193,000 GWh annually, cut 86 $MtCO_2$ emissions, and reduce electricity costs by $31 billion—enough to charge 57 million electric cars, 857 million electric bikes, or 2 million electric buses for one year.

By embracing these innovations, cities can unlock significant savings and ensure that their infrastructures meet today's needs while planning for a sustainable future. Collaboration among city officials, designers, suppliers, and system integrators is essential to making the lighting transition a reality. With its extensive reach and partner network, Signify can support cities in planning and executing this transition effectively.

Survey results confirm these opportunities, highlighting how cities can accelerate the transition to intelligent, energy-efficient lighting by removing roadblocks and adopting already available technologies. The question is no longer if these changes should be made, but how quickly we can implement them to create a better, brighter future for all.

Sophie Breton

President Professional Business Unit Europe Signify

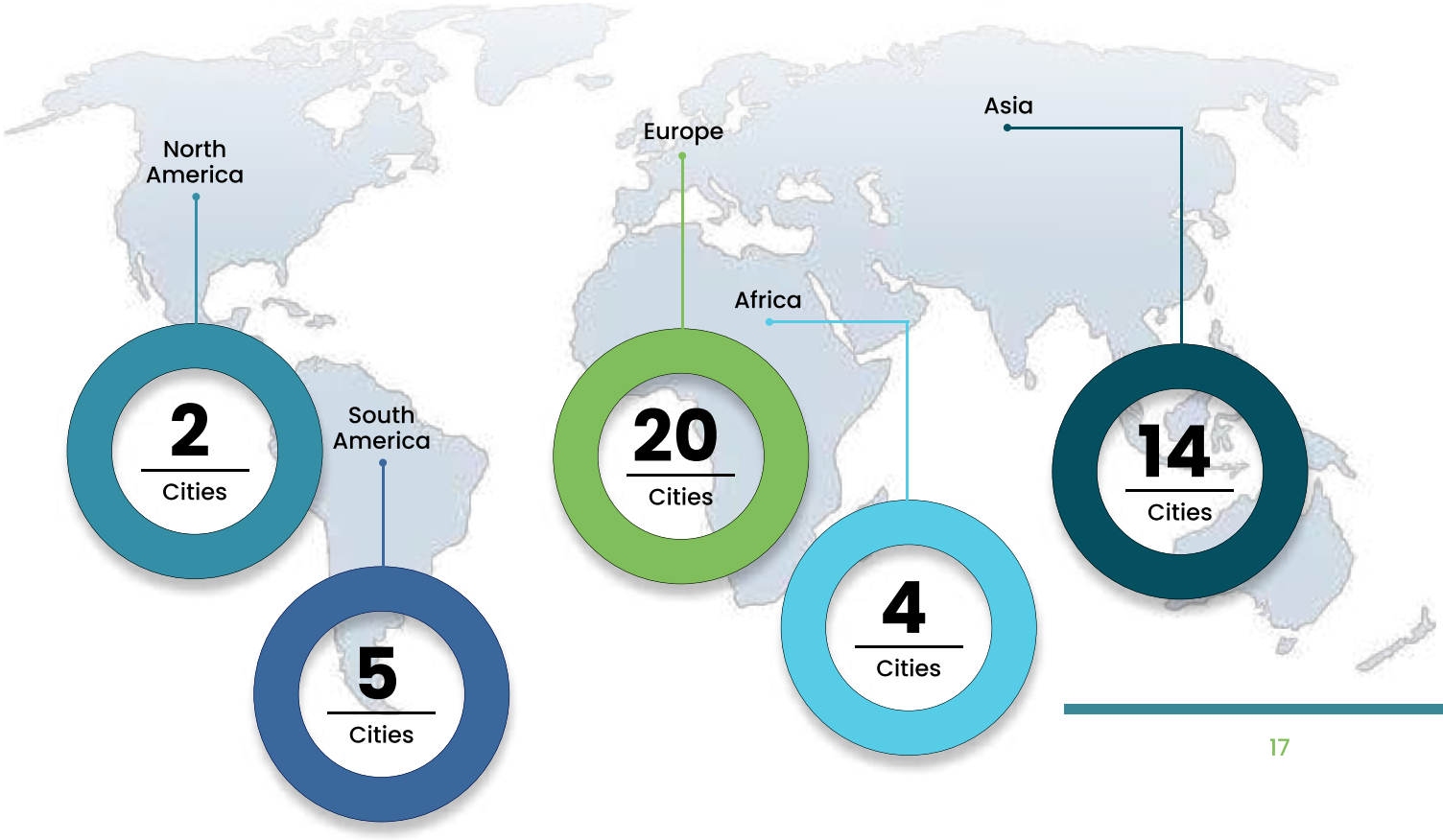
Introduction

Cities interviewed

Before presenting the core analysis of the assessment, it is important to outline the survey's coverage.

We acknowledge that the number of respondents is relatively small and not statistically representative of global or regional city populations. Additionally, responses were self-reported by individuals in various municipal roles and may reflect departmental perspectives rather than official city-wide positions. The data has not been independently verified, so its accuracy and completeness cannot be guaranteed. Therefore, findings should be interpreted as indicative rather than definitive.

Nevertheless, the primary aim of the survey is to stimulate dialogue, raise awareness about the importance of lighting in urban transformation, and provide fact-based insights. These insights are intended to help other cities feel part of a broader community with shared goals, challenges, and expectations—while also offering practical solutions to overcome common barriers. A total of 45 cities participated in the assessment by completing the survey. The respondents represent five continents, with the majority coming from Europe and Asia.

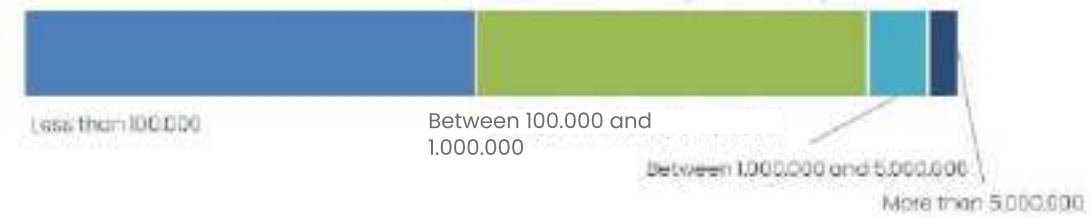


The cities participating in the survey are evenly distributed between small cities (less than 100 km²) and medium-sized cities (between 100 km² and 500 km²). City size **(Q1)** is a relevant parameter because the geographical spread and surface area directly influence the extent and layout of roads and streets managed by the municipality. This, in turn, has a significant impact on urban lighting strategies, particularly street lighting.

Q1. How large is your city?

The surveyed cities are fairly balanced in terms of population **(Q2)**, with most falling below 100.000 inhabitants or between 100.000 and 1.000.000. Only a few cities have populations exceeding one million. Population size is a key factor, as it affects the allocation of public services and the number of municipal facilities—both of which influence, among other aspects, the lighting requirements for public buildings.

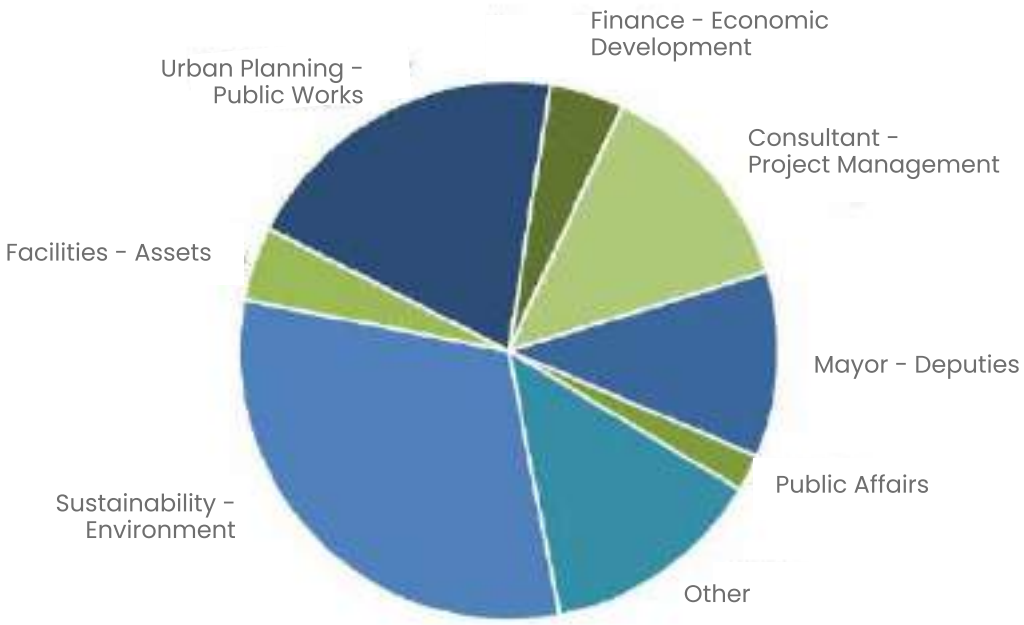
Q2. How many people live in your City?



The respondents hold a diverse range of roles within municipal administrations **(Q3)**. The most represented departments are dedicated to sustainability and environmental affairs.

However, other areas are also well represented, including finance, facilities and asset management, as well as political figures such as deputy mayors and mayors, offering a broader governance perspective.

Q3. What's your function in the City administration?



The assessment explained

The goal of this survey is to assess the current status of lighting infrastructure in urban areas and explore how cities can enhance their systems to support their transformation into net-zero-emission and resilient communities. The survey aims to identify the main barriers preventing cities from making progress, highlight key areas for improvement, and propose actionable recommendations. The findings can also provide guidance for governments and institutions in developing effective strategies that integrate efficient lighting systems into supporting tools, incentives, and policy mechanisms.

The survey methodology

The assessment is structured around three interconnected cascading thematic areas:

1. **Climate action plans**
2. **Energy transition plans**
3. **Lighting transition plans**

Since it is most relevant to this topic, the lighting transition plans are the core focus of this survey, and therefore represent the most substantial portion of the assessment.

The survey questions have been grouped, scored, and weighted to enable a comprehensive analysis of the key factors influencing and impacting the lighting transition in urban areas. Detailed information on the methodology used is available upon request.

The survey uses closed questions to ensure a structured and efficient data collection process. This format allows for quick responses, consistent interpretation, and straightforward analysis. It enables scoring, benchmarking, and comparison across different groups, while reducing ambiguity and bias. Closed questions also support the creation of visualization tools, making them ideal for decision-making, performance evaluation, trend identification, and the development of policies and strategies.

Multiple-option questions are included where flexibility and depth are needed, capturing a broader range of perspectives and behaviors. This approach avoids forcing respondents into a single choice that may not fully reflect their views. Analytically, multiple-option questions provide richer data for segmentation and pattern recognition, enhancing the overall insight quality of the survey.

Each individual response is presented in a dedicated chapter. However, it is worth highlighting here two main visualization tools developed to support the analysis:

- **The Lighting Transition Matrix**, which maps cities' positioning across key dimensions of lighting transformation
- **The Lighting Transition Radar Map**, which provides a visual overview of strengths and gaps across multiple performance indicators

These instruments help simplify complex data and offer actionable insights for stakeholders.

The lighting transition matrix

The Lighting Transition Matrix is a strategic visualization tool designed to map cities based on their progress in the transition toward advanced lighting systems. It evaluates each city along two key dimensions:
• **Technology transition** – The extent to which a city has adopted modern lighting technologies (e.g., LED, smart lighting, IoT integration)
• **Level of adoption and implementation** – The degree to which these technologies have been implemented and scaled across the city

Depending on their position in the matrix, cities fall into one of four categories:
• **Inspired** (top right) – Cities that are both technologically advanced and actively executing large-scale lighting initiatives. They are leaders and role models in the transition.
• **Ready** (bottom right) – Cities with strong technological readiness but lower levels of achievement. They are well-positioned to scale up quickly.

• **Observer** (top left) – Cities that are exploring or piloting new technologies but have not yet committed to full-scale adoption
• **Hesitant** (bottom left) – Cities with limited technological transition and low implementation. They may face barriers such as funding, policy, or awareness

This matrix helps:

- benchmark cities against each other,
- identify leaders and laggards,
- tailor support and policy recommendations,
- track progress over time.

The lighting transition radar map

The Lighting Transition Radar Map is a strategic assessment tool used to visualize a city's maturity across six key capabilities that are critical to the successful adoption and scaling of new lighting technologies—the lighting transition. Each capability reflects a specific aspect of the city's transition journey and helps identify where focus and support are most needed.

1. Technology
The level of technology defines to what extent the city knows the new technologies. It provides a general estimation of the city’s maturity and capability in technological development–in other words, its tech-savviness. This reflects awareness and understanding of available solutions.

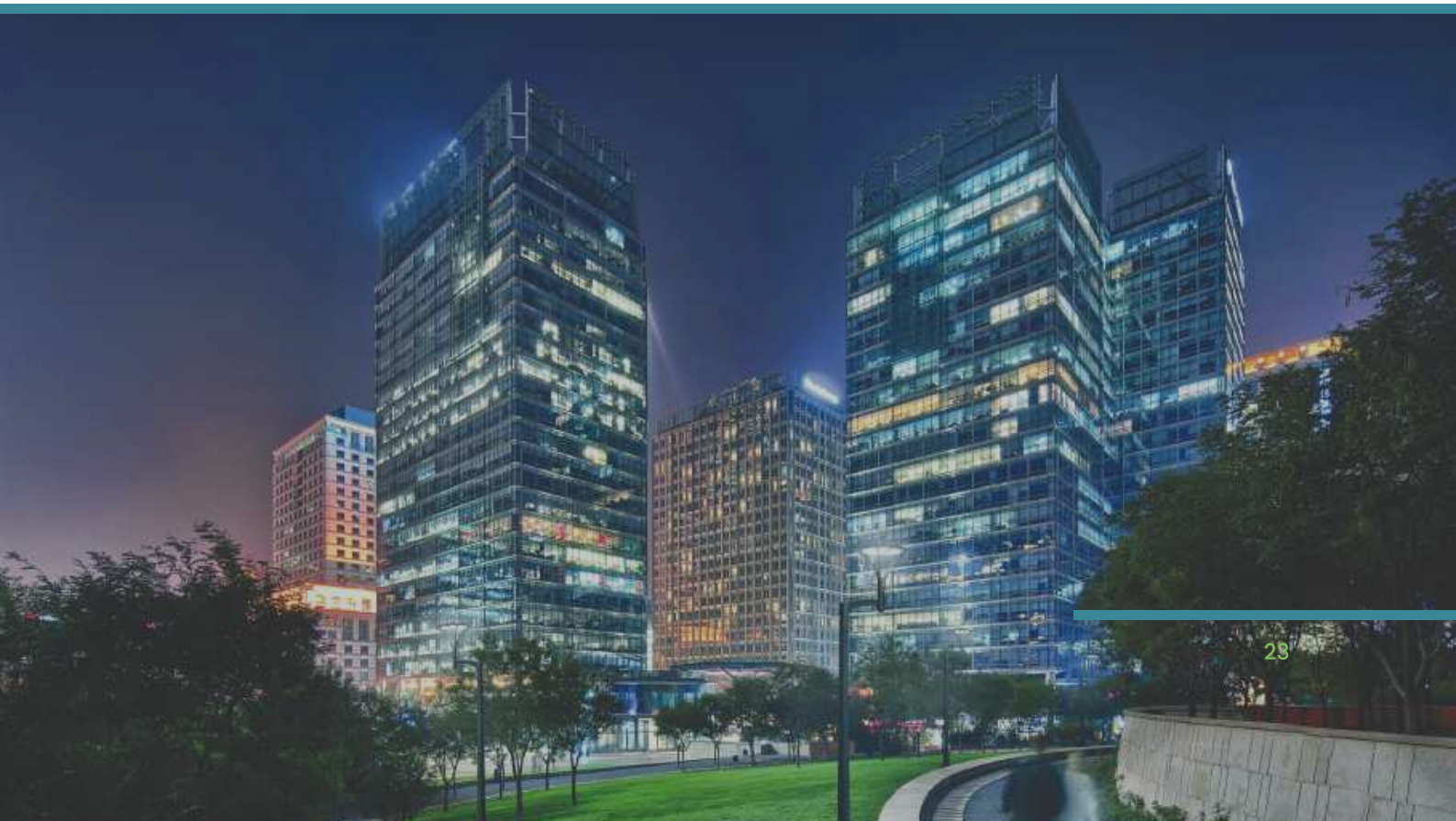
2. Adoption
The level of adoption defines to what extent the city is able to use and manage new technologies and is prepared for their quick adoption. It reflects the city’s operational capability, including the systems, processes, and internal assurance required to deploy and scale technologies effectively.

3. Standing
The level of standing defines the current use of new technologies in buildings and outdoor infrastructures. It indicates how far the city has progressed in actual implementation, showing tangible results of its transition efforts.

4. Confidence
The level of confidence defines to what extent the city is experienced in the process of testing, piloting, and adopting the basic components of new technologies. It reflects the city's exposure to innovation and its willingness to experiment, which are key to building momentum before full-scale deployment.

5. Readiness
The level of readiness defines to what extent the city is organized for the quick implementation of new technologies. This includes having the necessary knowledge, planning, and internal alignment to adapt to new conditions and move efficiently from strategy to implementation.

6. Enablement
The level of enablement defines to what extent the city has the tools, capacity, and capability to accomplish the transformation, by connecting with the right partners and using the range of financial instruments available and required. It reflects the city's ability to mobilize resources and stakeholders to support and sustain implementation.



1.

Where we are today in the climate transition plan

Exploring the role of climate and energy framework in municipal planning

We begin this assessment by examining the presence and structure of climate action plans within participating cities. These plans serve as the foundation for any systematic approach to energy efficiency and emissions reduction—areas where public lighting, both street lighting and public buildings lighting, plays a significant role. Understanding whether a city has a climate action plan allows us to gauge its strategic commitment to sustainability and provides context for evaluating its energy transition roadmap.

From this starting point, we explore how cities are planning and implementing broader energy transition strategies. These plans often encompass multiple sectors, including transportation, buildings, and public infrastructure, with lighting being a key operational component. Our goal is to understand how lighting fits into these larger frameworks and to assess its contribution to climate and energy objectives.

It is important to note that lighting initiatives can also exist independently of climate or energy transition plans. In such cases, these initiatives are typically driven by immediate needs—such as replacing obsolete installations, addressing safety concerns, or achieving urgent cost savings. However, when lighting projects are not embedded within a broader strategic framework, there is a higher risk of fragmented implementation and reduced long-term effectiveness. Integration ensures harmonization, scalability, and alignment with citywide sustainability goals.

We acknowledge that the sample of cities included in this assessment—as members of the Global Covenant of Mayors or Urban Transitions Mission network—may slightly influence the analysis. These cities are generally more advanced in their sustainability efforts and have a formal mandate to develop climate action and energy transition plans. As such, their inclusion may skew the results toward more structured and proactive approaches.

Nevertheless, this survey presents a valuable opportunity to explore how lighting strategies are integrated into broader climate and energy frameworks. For a more comprehensive analysis of the depth and quality of these plans, we refer to the work conducted by the organizations that co-signed the assessment. These organizations have carried out in-depth evaluations of climate planning and implementation across the participating cities, offering valuable insights into their strategic approaches and levels of ambition.

8%

of the cities are well advanced in execution of climate goals

49%

of cities are making progress in implementation but far from complete

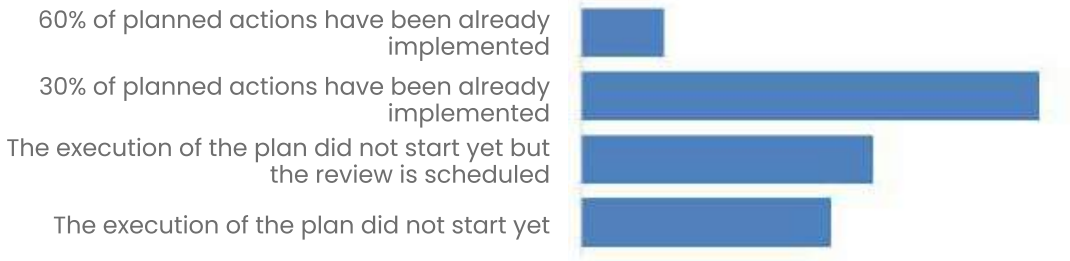
More than two-thirds of the surveyed cities either already have a climate action plan in place or are in the process of developing one **(Q4)**, with the intention of formally publishing it within the year. It's important to note that the survey was conducted during the first half of 2025. Only a small portion of cities—despite their commitment to climate goals and sustainability—have not yet initiated a formal planning process. This highlights a strong overall engagement with climate planning among the participating cities.

Q4. Has your City a Climate Action Plan?

However, execution is lagging: only 8% of cities are well advanced, having completed around 60% of their plans, while 49% are making progress with approximately 30% completion. This means that almost half of the cities have not yet started implementation, despite their planning efforts.

The main barriers hindering the execution of climate action plans are primarily financial constraints and administrative burdens, which make it difficult for cities to transition from planning to implementation **(Q5)**. Limited budgets often restrict the ability to invest in necessary infrastructure or technologies, while complex bureaucratic procedures slow down decision-making and project approvals.

Q5. What is the level of completion of the Climate Action Plan?



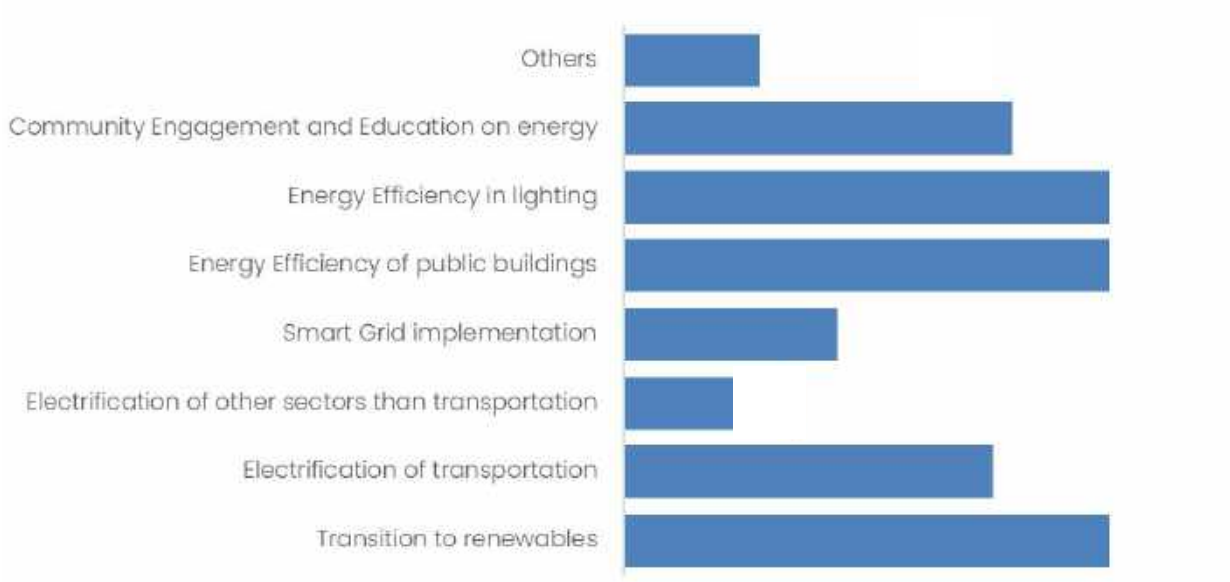
In addition, a shortage of capacity and technical expertise within local administrations plays a significant role in delaying progress. Many cities lack the skilled personnel needed to manage, coordinate, and execute climate initiatives effectively.

Even when political will is strong and administrative processes are streamlined, infrastructure limitations often prevent cities from fully leveraging the technological solutions available on the market. For example, outdated energy grids, insufficient public transport systems, or lack of digital infrastructure can significantly reduce the impact of otherwise promising climate technologies.

Overall, climate action plans are well-structured and comprehensive, particularly in their approach to energy. Most plans adopt a harmonized strategy that combines energy-saving measures through improved efficiency with a transition toward renewable energy sources **(Q6)**. This dual approach ensures both immediate reductions in consumption and long-term sustainability.

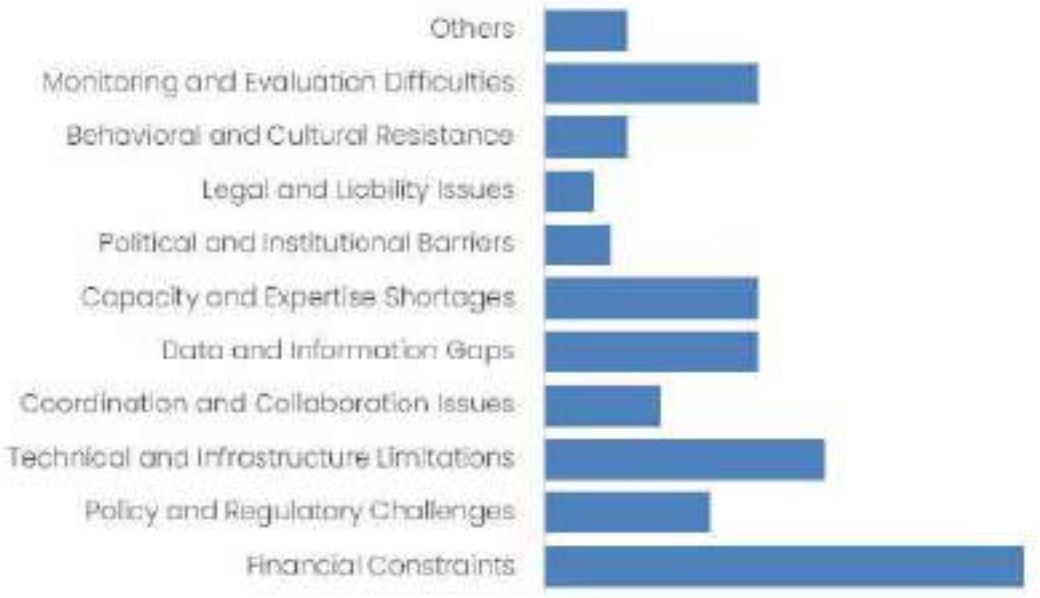
In parallel, there is a strong push for modernization through electrification and the deployment of smart grids. These technologies not only support cleaner energy systems but also enable better monitoring, management, and optimization of energy use across urban infrastructures.

Q6. Which of the following actions are included in your Climate Action Plans?



Importantly, the success of these plans often hinges on the active involvement of individuals and communities. Local champions—people with initiative and commitment—play a crucial role in driving engagement, raising awareness, and educating citizens **(Q7)**.

Q7. Which are the main barriers for the execution of the Climate Action Plan?



In Chapter 2, we will provide an overview of energy transition plans, setting the stage for Chapter 3, where we will explore the role of lighting within climate action plans in depth.

2. A spotlight in the energy sector

Energy: a strategic challenge for cities

Energy is undeniably a major issue for cities. As highlighted by our survey, a significant portion of municipal budgets is dedicated to energy costs. For 45% of the cities surveyed, more than 5% of their annual budget is spent on energy, with 15% of cities reporting peaks of 10% or more. These figures underscore the financial burden energy consumption places on local governments **(Q8)**.

Despite this, cities do not benefit from preferential pricing or subsidies from national or regional authorities **(Q9)**. They are subject to standard market rates, which limits their flexibility and increases the pressure to identify cost-saving solutions—primarily through energy efficiency and renewable energy adoption.

Q8. What percentage of the total city budget is spent for energy?

Q9. How much do you pay the energy ($/kWh)?

In a rapidly evolving landscape, the energy topic is becoming increasingly complex due to several emerging trends:

- Electrification of public and private transport
- Grid congestion and the need for smart infrastructure
- Integration of renewable energy sources with storage solutions
- Social equity in energy access and the fight against energy poverty
- Citizen engagement—from behavioral change to data sharing and privacy concerns

This increasing complexity goes beyond the scope of a basic survey like this one. However, we can still extract valuable insights—particularly regarding energy efficiency and the role of lighting, which is the focus of this assessment.

Municipal leaders increasingly recognize that reducing CO_2 and other GHG emissions is closely tied to lowering energy consumption, especially electricity use **(Q10)**. These goals are interdependent and essential for building a sustainable and resilient urban future. Energy efficiency is not only an environmental imperative—it's also an economic enabler.

By optimizing energy use, cities can:

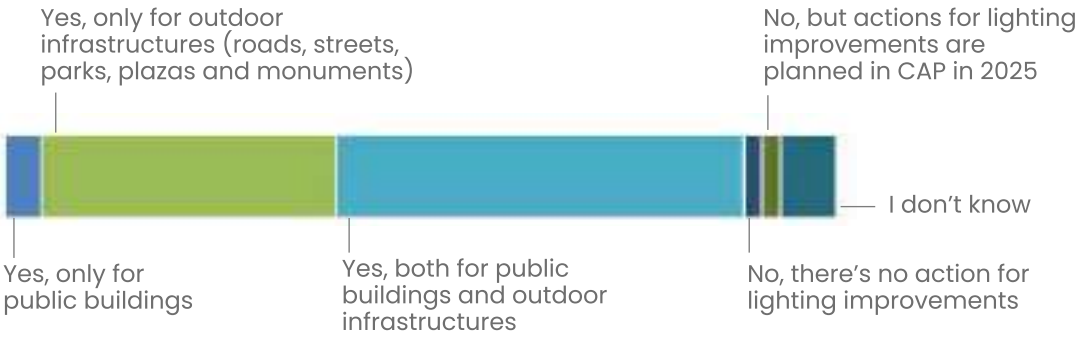
- Reduce operational costs
- Free up resources for further climate initiatives
- Strengthen the financial sustainability of climate action plans

Additionally, when paired with strategic investments and incentives, energy savings reduce reliance on external funding and reinforce long-term climate strategies.

Q10. Which of these goals related to emissions and energy consumption are in scope of the city climate action plan?

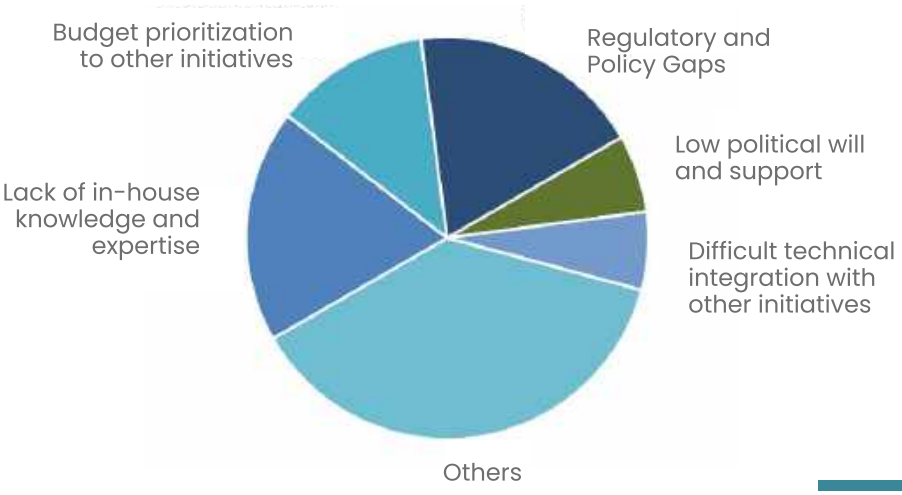
Lighting is a high-impact opportunity. Lighting improvements are widely included in climate action plans, with nearly 90% of cities implementing measures to upgrade lighting infrastructure **(Q11)**. The initial focus is typically on outdoor lighting—especially roads and streets—due to its visibility, scale, and ease of implementation.

Q11. Does the climate action plan already include an action for lighting improvements?



However, indoor lighting in municipal buildings is often overlooked. These upgrades are more complex, involving multiple technologies (e.g., HVAC, insulation, lighting systems) and requiring cross-departmental coordination. Despite their significant energy-saving potential, indoor lighting improvements tend to lag behind **(Q12)**.

Q12. If not, why does the climate action plan not include an action for lighting improvements?



This is a missed opportunity, considering that lighting accounts for more than 5% of total electricity consumption in half of the cities surveyed, and over 10% in 18% of cases. Any improvement in lighting efficiency can therefore have a substantial impact on municipal energy bills **(Q13)**.

Q13. What percentage of the total city electricity consumption is by lighting in roads, streets, parks, plazas and monuments and public buildings?

This is precisely what we will explore in the next chapter—how lighting efficiency can serve as a strategic lever for cities to reduce energy costs and advance their climate goals.

3.

Assessing the lighting technology transition

Lighting the way: a strategic assessment of city readiness

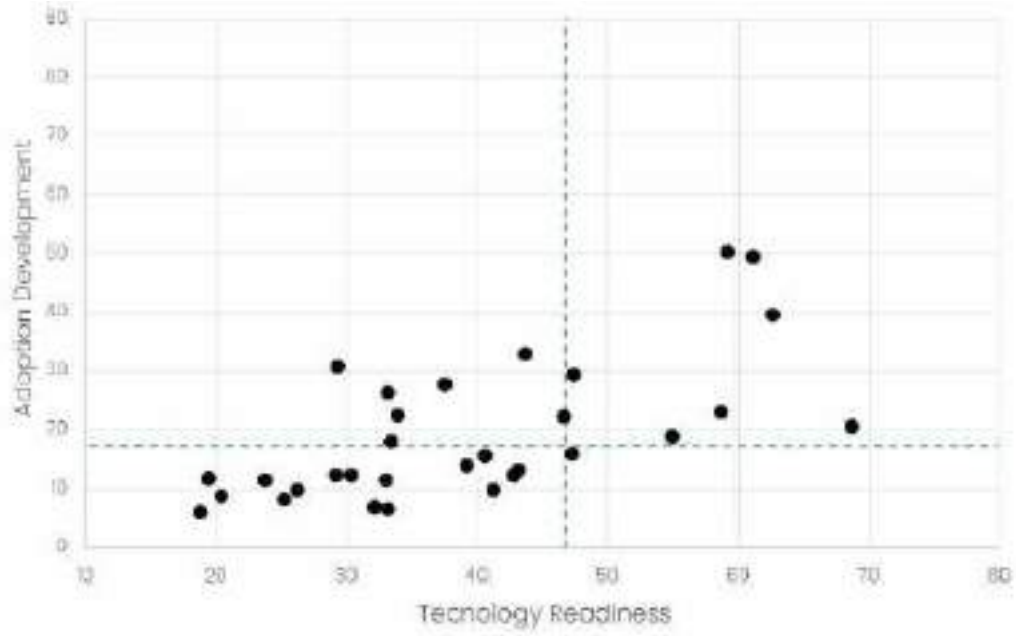
In this chapter, we focus on the core topic of the assessment: lighting. We begin by summarizing the responses using two key analytical tools: the Lighting Transition Matrix and the Lighting Transition Radar Map. These visualizations provide an overview of city-level progress, followed by a deeper dive into each individual survey question, accompanied by brief commentary and key findings.

As introduced earlier, the Lighting Transition Matrix is a strategic framework that tracks how cities are progressing in their adoption of modern lighting systems. It evaluates two dimensions: the degree of technological transition—such as the use of LED, smart lighting, and connectivity—and the level of execution, meaning how extensively these technologies have been implemented across the city. Based on these factors, cities are grouped into four categories: Inspired, Ready, Observer, and Hesitant. This classification reflects their readiness and helps benchmark performance, identify leaders and laggards, and guide policy and planning.

Figure 1 shows that cities are generally distributed along a diagonal, indicating a direct relationship between technological readiness and execution. Once a city begins adopting modern lighting technologies, implementation tends to accelerate. This positive feedback loop suggests that confidence in technology drives faster adoption.

However, aside from a few standout performers, overall technological readiness remains relatively low. This points to significant room for improvement—and a promising opportunity. The potential gains from advancing lighting systems are substantial, both in terms of energy savings and climate impact.

Figure 1. The lighting transition map

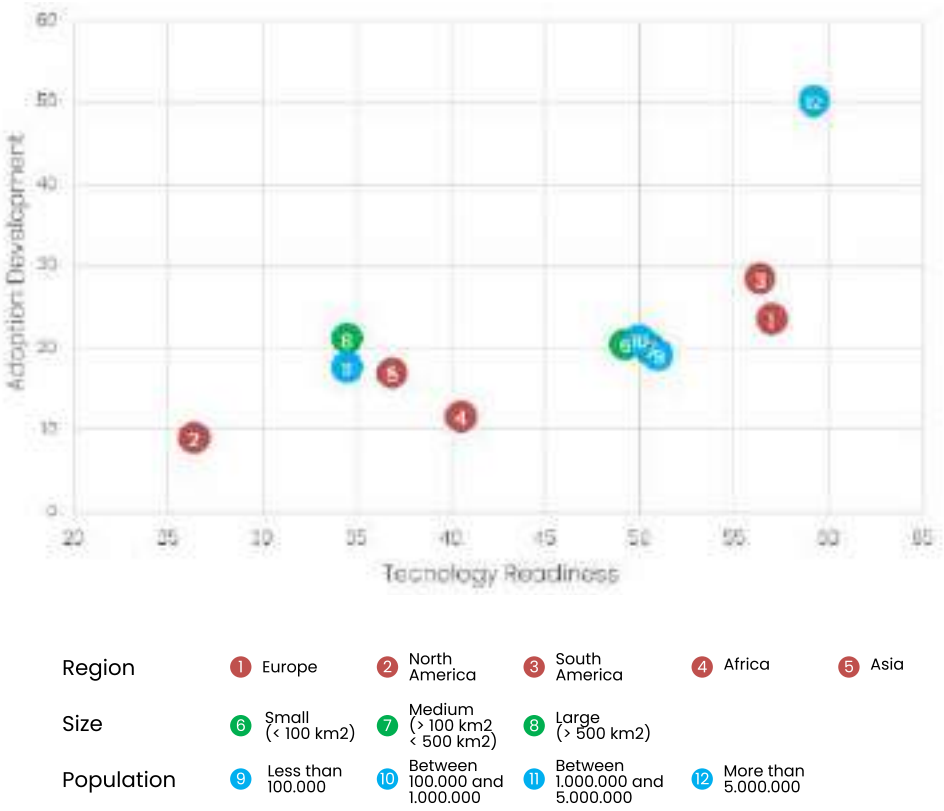


By mapping cities within the Lighting Transition Matrix and grouping them into similar categories, we uncover several interesting insights, as shown in **Figure 2**.

From a geographic standpoint, and excluding the Americas due to low survey participation, Europe and Asia show comparable performance in terms of adoption development but not for technology readiness, while Africa lags behind. In Asia, the wide gap between highly advanced and less developed countries may skew the regional average.

When considering city size and population—again excluding very large cities due to limited attendance—no significant differences emerge. This suggests that access to lighting technologies and their adoption are not dependent on city size. The underlying challenges, as we'll explore later, appear to be common across both small towns and large urban centers.

Figure 2. The lighting transition map



As explained in the introduction, the Lighting Transition Radar Map is used to identify areas for improvement in cities' lighting strategies. It assesses a city's maturity across six key capabilities: technology awareness, operational adoption, current infrastructure use, confidence in piloting innovations, readiness for implementation, and enablement through partnerships and financial tools. Each dimension represents a specific aspect of the city's transition journey and helps pinpoint where support and focus are most needed to accelerate progress.

On average, we can identify two main areas for improvement: enablement and confidence **(Figure 3)**. To accelerate and scale the lighting transition, cities must strengthen collaboration across the entire ecosystem—manufacturers, installers, system integrators, energy service companies (ESCOs), and lighting designers. Relying solely on internal expertise and past experience can slow progress and risk missing valuable opportunities for improvement and innovation—and of course cost saving.

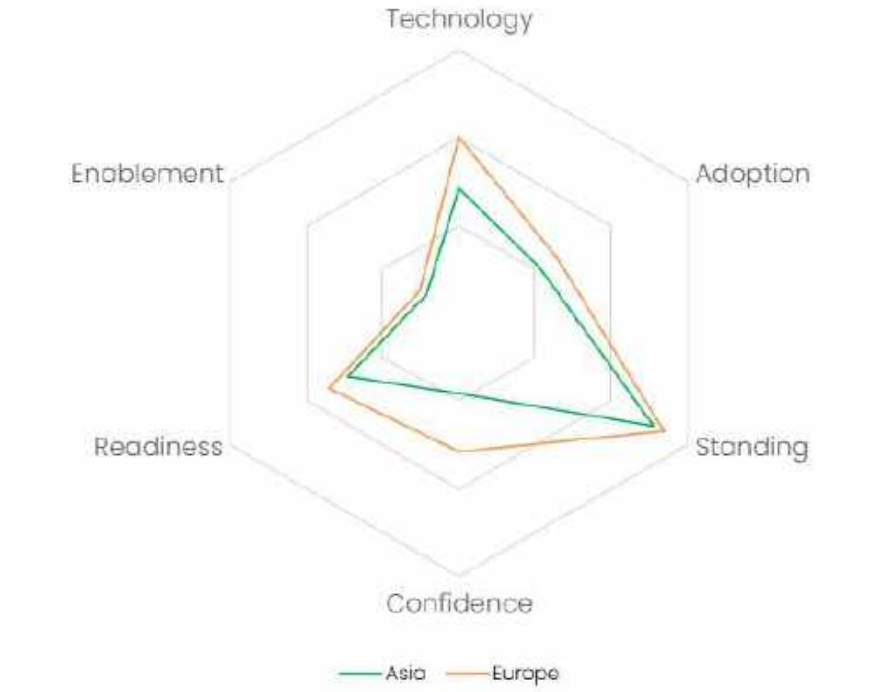
Looking across the six dimensions of the Radar Map, one positive insight stands out: cities are beginning to see tangible results from the implementation of new lighting technologies in buildings and outdoor infrastructure, as reflected in the Standing dimension. Additionally, many cities are showing signs of readiness, indicating that they are building the necessary knowledge, planning, and internal alignment to move from strategy to execution.

Although cities acknowledge a lack of confidence and the need to explore diverse approaches, they are actively working to prepare for the transition. This proactive attitude suggests a growing momentum, even if full-scale deployment still lies ahead.

Figure 3. Average improvements areas

Geographically, and again excluding the Americas and Africa, the situation appears quite similar for Asia and Europe – the most represented continents in the survey **(Figure 4)**. Enablement and confidence consistently emerge as the key areas for improvement. Europe shows slightly higher levels of confidence, likely influenced by its long-standing commitment to sustainability, further reinforced in recent years by the European Green Deal. This historical focus may have helped build greater familiarity and trust in innovative lighting technologies.

Figure 4. Improvements areas per region



The same pattern holds when considering city size **(Figure 5)** and population **(Figure 6)**: there are no significant differences, suggesting that access to and adoption of lighting technologies are not dependent on how large a city is, but rather on shared structural challenges.

Figure 5. Improvements areas per size

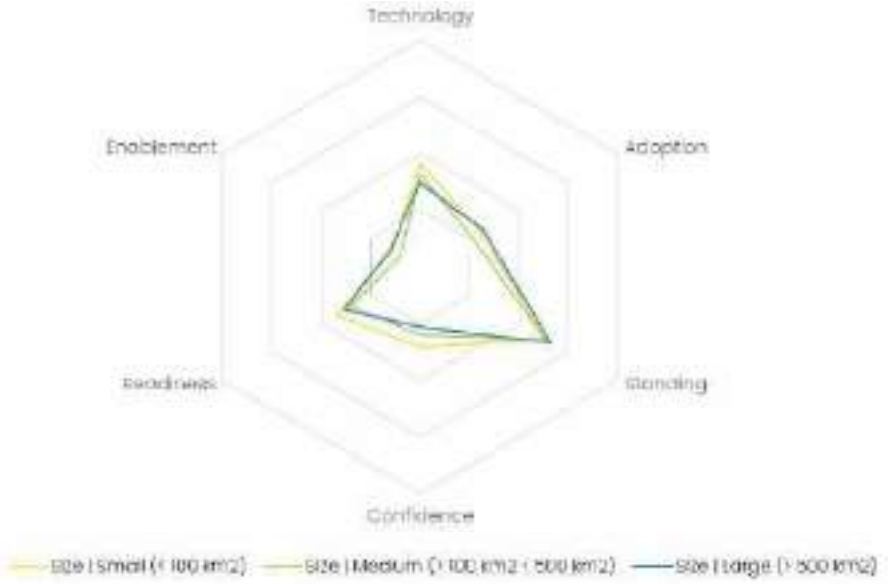
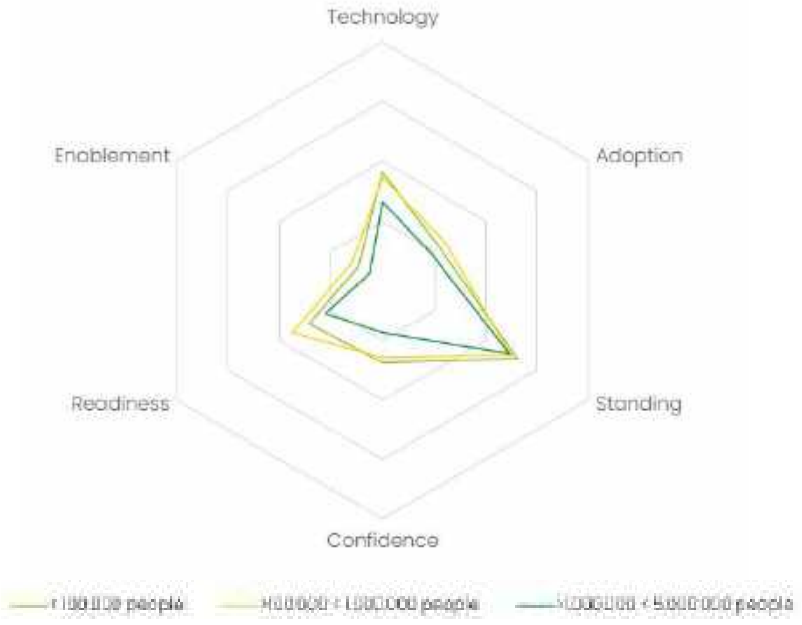
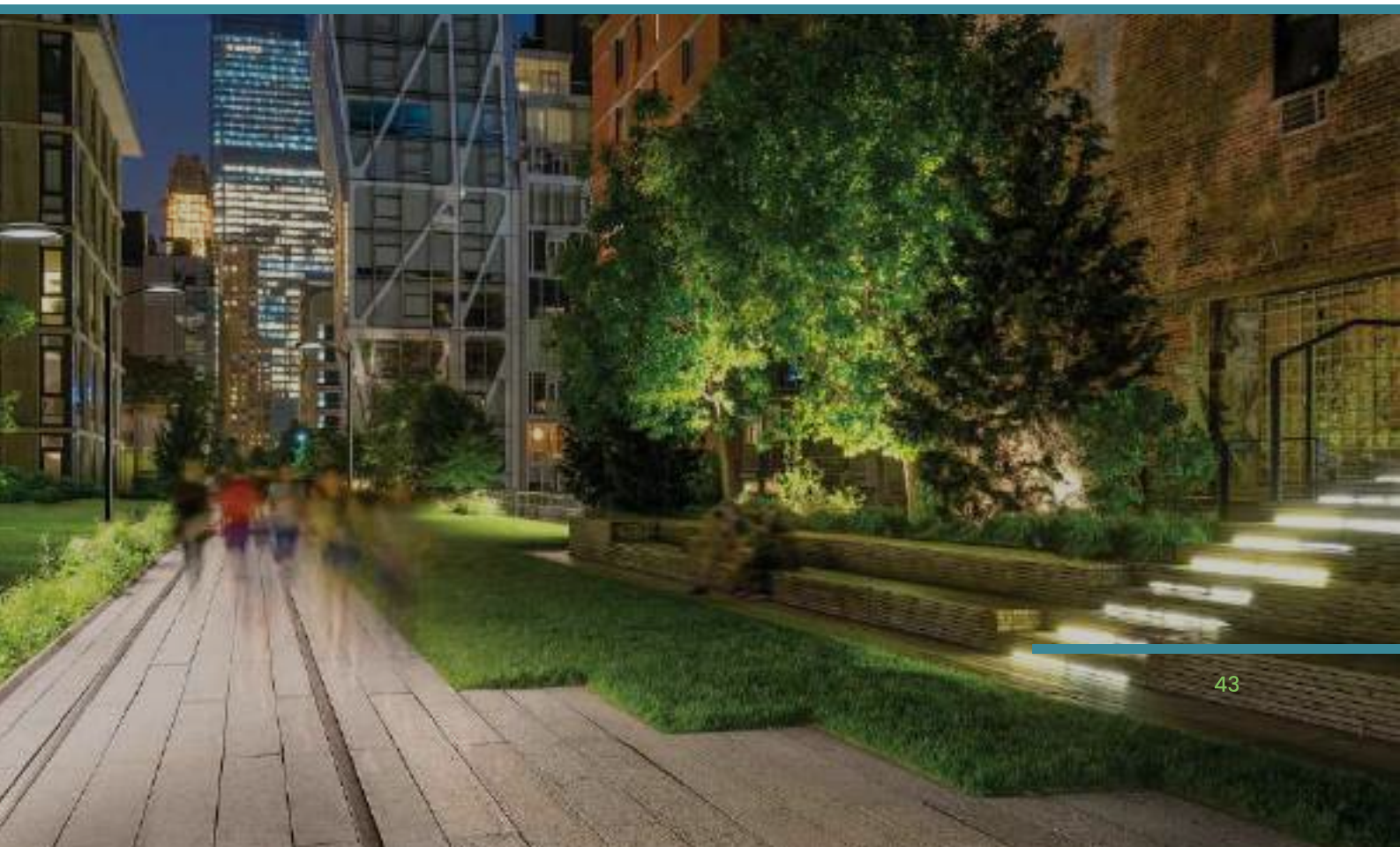


Figure 6. Improvements areas per cities population



By deep diving into each individual question, we uncover more granular and insightful findings that enrich our understanding of the lighting transition framework. These detailed responses reveal specific strengths, challenges, and opportunities that may not be visible in broader assessments, offering valuable input for targeted actions and strategic planning.

Although sales of conventional lighting technologies—mainly discharge and fluorescent lamps—have dramatically declined, largely as the result of regulatory bans in some regions, the transition to LED is still incomplete. This is primarily due to the legacy of older installations that remain in place from several years ago.



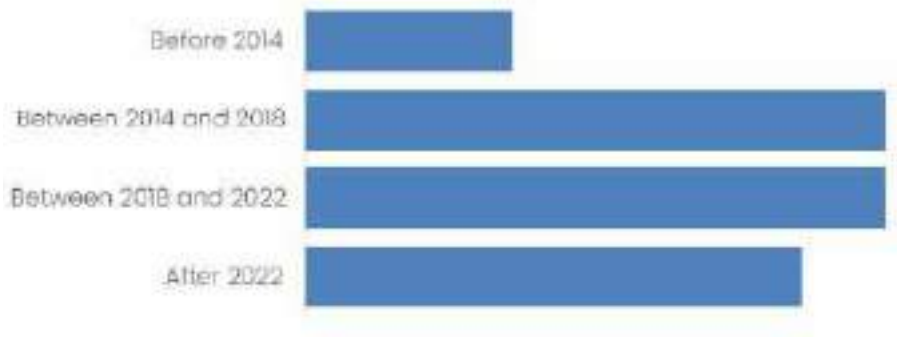
In outdoor applications such as street lighting **(Q14)**, historical areas and monuments, parks and plazas, and sports facilities, 20% of cities are fully equipped with LED lighting. Nearly half of the surveyed cities still have around 20% of non-LED solutions in use, while in one-fifth of the cities, conventional technologies still make up the majority of the installed base.

Regarding the timeline of adoption, most cities began their transition journey between three and seven years ago **(Q15)**, with another significant group starting between seven and 10 years ago. Notably, in 22% of cities, LED adoption only began within the last three years, highlighting a clear delay in implementation across many urban areas.

Q14. Which is the lighting technology installed in outdoor infrastructures?

Note: Conventional technology refers to discharge or fluorescent lighting.

Q15. When were the first LED light points installed in outdoor infrastructures?

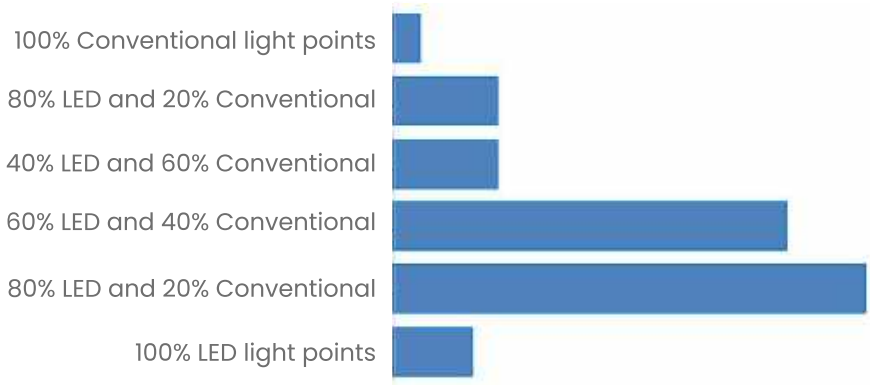


The situation in municipal buildings—such as offices, schools, and hospitals—is notably different from outdoor lighting **(Q16)**. Only 7% of cities are fully equipped with LED lighting indoors, which is three times less than in outdoor applications. Around one-fourth of cities report a balanced mix of conventional and LED technologies.

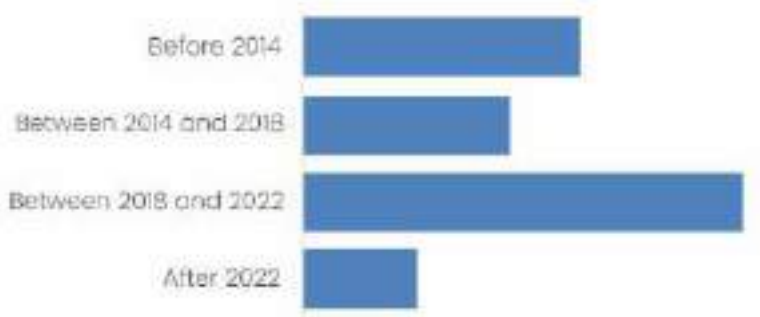
This slower transition **(Q17)** is likely due to the complexity of renovating existing buildings, where multiple systems—such as lighting, ventilation, heating, and air conditioning—require coordinated upgrades, and structural changes to the buildings might have to be made. Street lighting, in contrast, is a relatively standalone service, often just involving replacing luminaires on poles.

Q16. Which is the lighting technology installed in public buildings?

Note: Conventional technology refers to discharge or fluorescent lighting.



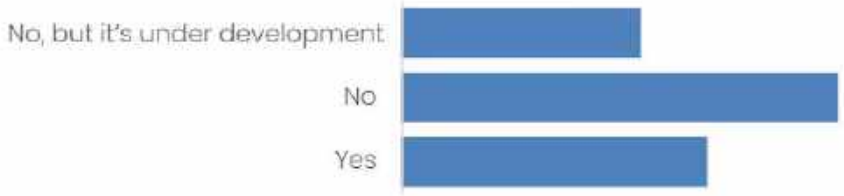
Q17. When were the first LED light points installed in public buildings?



One of the key reasons behind the slow adoption of new lighting technologies is clearly illustrated in the following charts: only 31% of cities have an urban lighting plan in place **(Q18)**. This means that in two-thirds of cities, lighting improvements are not strategically planned or harmonized across the territory and municipal facilities. As a result, cities often rely on isolated initiatives, leading to inefficient resource allocation, administrative burdens for project approvals, uneven lighting quality and coverage, and projects too small to attract funding. Ultimately, this lack of planning causes delays in the lighting transition and missed opportunities for impact.

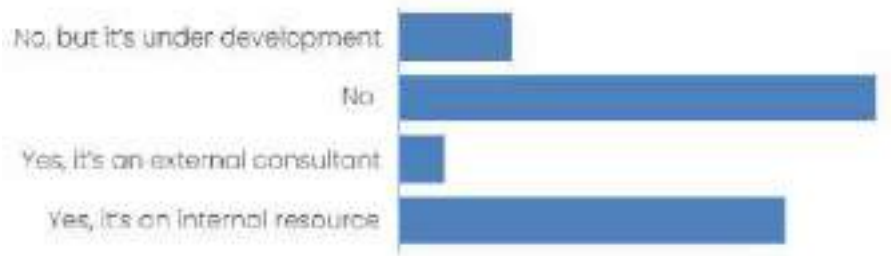
Only about half of the surveyed cities have a dedicated role with expertise and a clear mandate in lighting **(Q19)**: this gap is one of the key reasons for delays in the transition. On a positive note, at least 11% of cities are planning to hire such professionals in the near future. The absence of dedicated lighting experts hinders the modernization of lighting infrastructure —both strategically and operationally. Without specialized knowledge and leadership, cities face slower implementation, inefficient planning, and wasted energy and resources. Having qualified professionals is essential to drive coordinated, impactful, and timely lighting upgrades.

Q18. Does your City have an Urban Lighting Plan in place?



Q19. Does your City organization have a designated Lighting Manager?

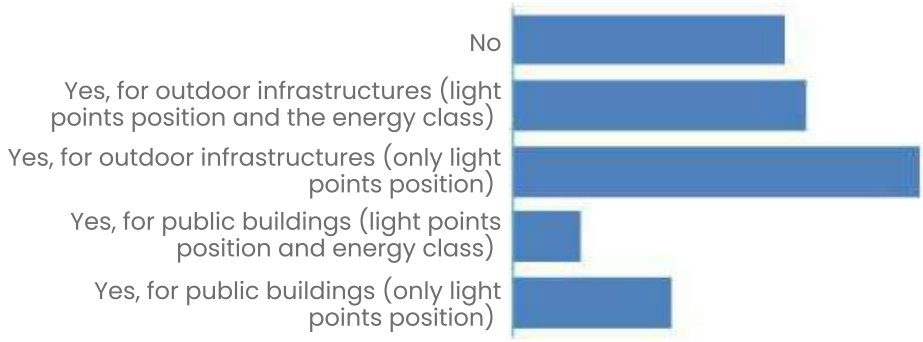
Or a similar role clearly dedicated to lighting planning, management and renovation



The fact that almost 80% of cities have a database of installed light points **(Q20)** confirms the earlier observation about growing readiness. Such a database is a strong starting point for mapping, assessing, and tracking investments, and later for monitoring execution. Outdoor lighting is generally easier to manage than indoor lighting, due to the relatively lower number of light points and their accessible locations.

However, having a database is only part of the solution. Knowing the energy class of each light point would significantly improve decision-making, allowing cities to prioritize upgrades more effectively and maximize energy savings. This level of detail is essential for strategic planning and efficient resource allocation.

Q20. Does your City have a database of the light points installed?



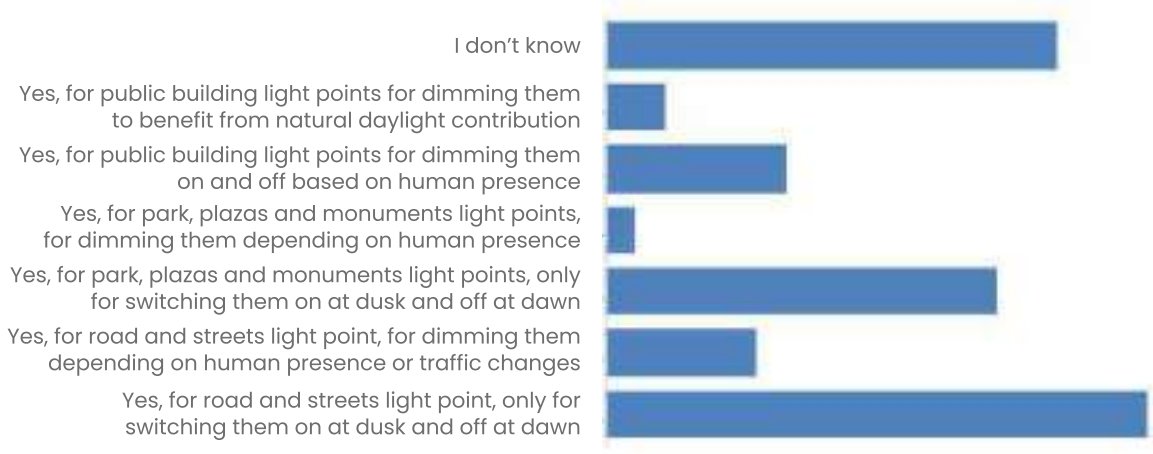
One simple way for cities to achieve energy savings—beyond improving lighting efficiency—is by scheduling lights to switch off when not needed. Currently, only 48% of cities meet this minimum requirement **(Q21)**. The very good news is that the remaining two-thirds have systems in place to dim lights when possible, maintaining a minimum level of service, safety, and visibility.

Dimming strategies are especially effective during low-traffic hours at night on roads and streets, or in buildings where natural daylight is sufficient or tasks require less lighting **(Q22)**.

Q21. Does your City dim the light points using time schedules?

Changing the light levels during the whole day.

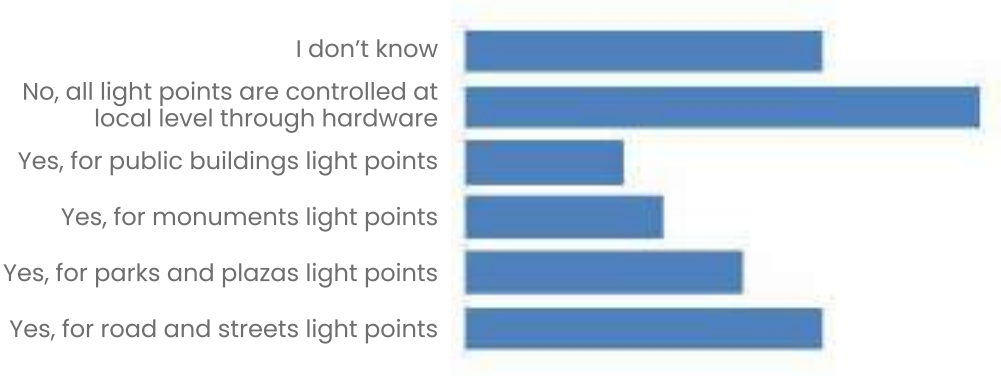
Q22. Does your City use sensors to control the light points?



There is considerable potential to further enhance city lighting systems, particularly in terms of cost savings through improved energy efficiency and structured maintenance. In fact, 64% of cities can benefit from such improvements in a straightforward way by adopting remote monitoring and control technologies **(Q23)**. These systems rely on digital devices managed by a central platform and are currently more widely used in outdoor settings, accounting for 55% of implementations, while only 9% are found in public buildings.

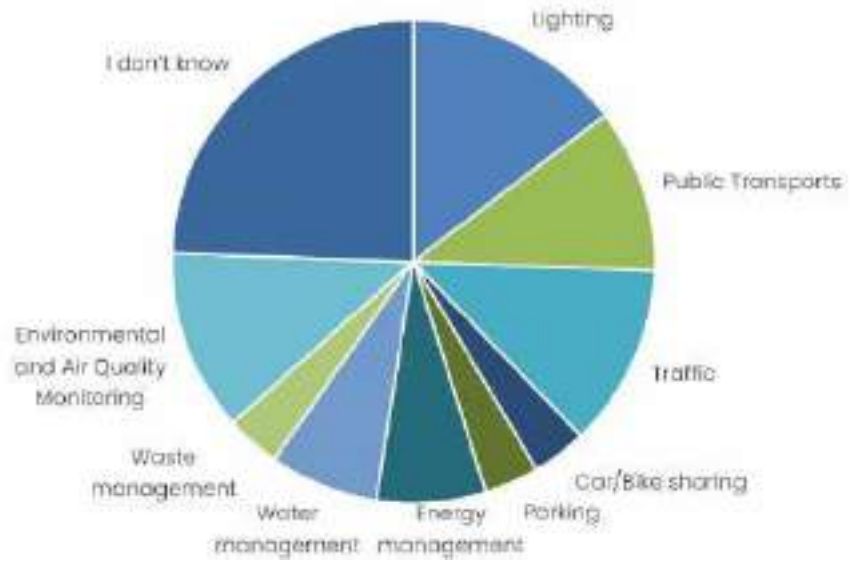
Beyond basic energy savings, remote monitoring and control offer more advanced benefits. Lighting can be adjusted in response to overall city energy consumption, helping to reduce strain on the grid. Connected lighting systems can also respond to specific events or temporary needs for increased illumination, support proactive maintenance planning, and collect usage data to inform better long-term strategies.

Q23. Does your City monitor and control the light points using a central software system?



An additional benefit arises from integrating lighting systems into a broader smart digital infrastructure. This involves sharing data from sensors and creating synergies across different urban verticals. Such integration is already well established and evenly distributed among the respondent cities **(Q24)**. To enable effective interconnection and data exchange between systems, open platforms are essential.

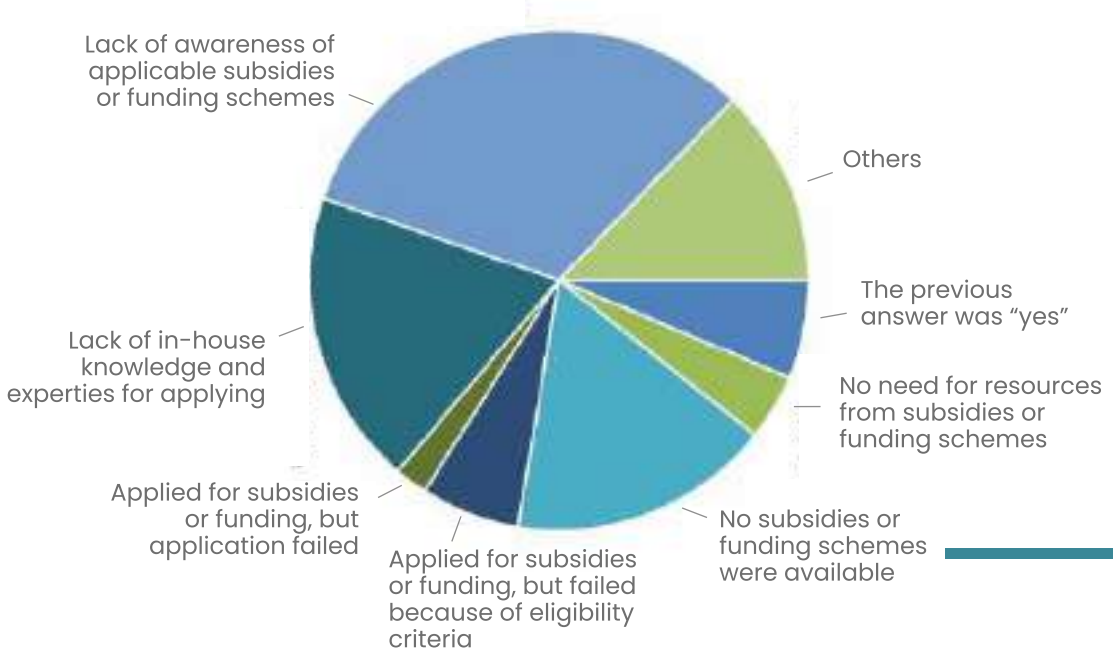
Q24. Does your City have a smart digital infrastructure?



As highlighted earlier, one of the key areas for improvement is exploring alternative financing options beyond the annual city budget. This need is underscored by the fact that more than 60% of cities still rely solely on their annual budgets and do not take advantage of external funding or financing mechanisms **(Q25)**. When this happens, public funding remains the most commonly used approach, while public-private partnerships (PPPs) and private financing are far less frequent. The use of energy performance contracts is virtually nonexistent. The main reason cities do not access alternative financing is a lack of awareness about available subsidies and limited knowledge of how to apply for them **(Q26)**. In only a few cases were applications rejected due to errors or eligibility issues, which further reflects a general lack of confidence in exploring new financing models.

Q25. Did your City access dedicate financial instruments for lighting in addition to the standard City annual budget in the last 5 years?

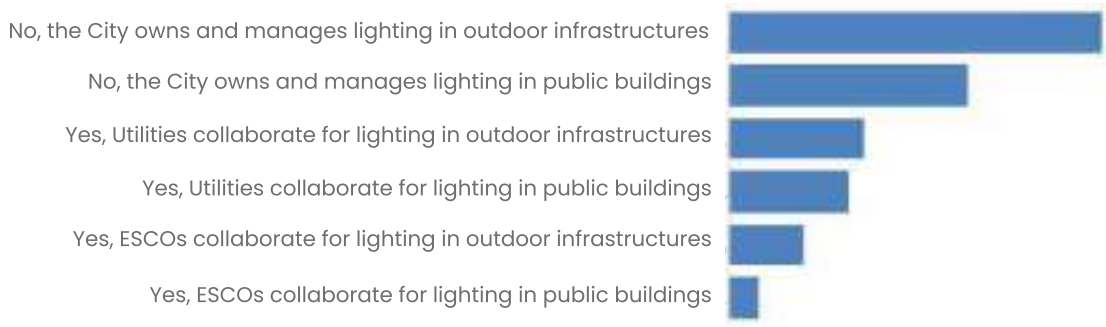
Q26. If no, why didn't your City access dedicated financial instruments for lighting in the last 5 years?



Finally, the need to foster stronger collaboration across the entire ecosystem aligns with the low enablement dimension observed in the Radar Map, especially when considered alongside the financing challenges previously described. Collaboration with utilities—though slightly better—is still limited, and engagement with ESCOs is notably poor among the respondent cities **(Q27)**. Such lack of cooperation restricts access to essential capabilities, financial resources, and the speed required to adopt and implement new technologies.

Yet collaboration is consistently a win-win approach. Energy-performance-based partnerships have been successfully demonstrated in countless case studies worldwide. What often appears complex or unaffordable at first is, in reality, more accessible than expected. Once cities gain experience with these models, they can be scaled across multiple applications with significant benefits.

Q27. Does your City collaborate with ESCOs or Utilities for lighting management?



Conclusions

Wrapping up

By analyzing the challenges and priorities of 45 global cities, this report aims to shed light on the forces shaping their future in the lighting transition, which is a critical part of the broader strategic approach to Climate Transition Plans.

Our intention is to offer a stimulating platform for open dialogue—one that helps deepen an understanding of the challenges cities face and the support they need at all levels. We are committed to assisting cities through dedicated tools, programs, initiatives, and tailored solutions that respond to their specific contexts and ambitions.

Looking ahead, we plan to regularly re-assess the situation over the years to monitor evolving dynamics, track progress, and identify further emerging trends. This will allow us to continuously adapt our strategies and offerings to better align with the needs of cities and support their journey toward a more sustainable, resilient, and inclusive urban future.

We sincerely thank the cities that participated in the survey. Their valuable input has been instrumental in bringing attention to the five key topics explored throughout this document. Their engagement not only enriched the analysis but also helped shape a clearer understanding of the current state and future direction of the lighting transition within the broader climate strategy.

Support and tools to accelerate the transformation journey

Both the Urban Transitions Mission (UTM) and the Global Covenant of Mayors for Climate & Energy (GCoM) provide cities with a comprehensive set of tools, resources, and collaborative frameworks to support their journey toward climate neutrality and resilience.

The Urban Transitions Mission acts as a global platform for knowledge exchange, offering cities access to evidence-based solutions and international best practices. It promotes advanced frameworks for climate neutrality policies and fosters learning and capacity-building across different levels of governance. These resources help cities strengthen their climate and energy action plans by identifying gaps, leveraging co-benefits, and adopting systemic approaches to achieve net-zero emissions.

Through its Global Innovation Alliance, Urban Transitions Mission mobilizes partners such as Signify to pilot and scale innovative urban solutions, encouraging public-private partnerships and digital innovation.

In 2024, Urban Transitions Mission launched a series of training modules focused on lighting (link). These cover topics such as the co-benefits of well-planned public lighting for safety and security, the management and control of lighting through connected systems, principles of sustainable and circular lighting, and innovations for public building renovations and advanced indoor lighting.

In 2025, Urban Transitions Mission and Signify co-published the guidelines "Connected lighting for resilient, inclusive and decarbonized cities", a key resource offering actionable insights for city practitioners to drive sustainable lighting transitions (link).

The Global Covenant of Mayors, as the largest global alliance of cities committed to climate and energy action, supports municipalities through a structured pathway that guides them from commitment to implementation and monitoring. This includes the development of greenhouse gas inventories, climate risk assessments, and mitigation and adaptation plans.

The Global Covenant of Mayors provides a Global Common Reporting Framework (link) with standardized guidelines for climate action planning and reporting, integrated with global platforms such as CDP-ICLEI Track. Additionally, the Multilevel Climate Action Guide (link), developed in partnership with WRI, helps cities align local actions with national and global climate goals while strengthening governance across levels.

The Innovate4Cities Conference (link) serves as a platform for knowledge exchange and innovation, offering cities opportunities to showcase AI-powered and tech-driven climate solutions. Cities are encouraged to stay informed and register for updates. One of the practical tools available to municipalities is the City Lighting Assessment survey, which enables self-evaluation of progress, identification of key areas for improvement, and structured reviews of specific sectors—such as lighting.

On the industry side, Signify, the global leader in lighting, supports municipalities through a wide portfolio of brands including Philips, Hue, WiZ, Dynalite, Interact, Color Kinetics, Fluence, TruLiFi, BrightSites, Cooper Lighting, Genlyte, and Telensa. This diverse ecosystem allows Signify to assist cities in multiple ways.

It begins with knowledge building, supported by the Signify Academy's extensive training library (link), and extends to technical auditing services and innovative financing models such as Light-as-a-Service (link).

Simple tools like the Green Switch Savings Calculator (link), available in 27 languages, can help cities identify opportunities for improvement, which can then be developed further thanks to Signify's global reach and deep business ecosystem. This facilitates the scalability of solutions and the engagement of various stakeholders—from designers to system integrators —who help manage the complexity of connected lighting systems.

With decades of experience in lighting, Signify can work consultatively with municipalities to shape their renovation strategies. The Interact platform, combined with a wide range of sensors and interoperability across multiple standards, enables cities to optimize lighting management through real-time and historical data analysis.

Support is readily available. Cities simply need to connect with Signify, the Global Covenant of Mayors, or the Urban Transitions Mission to begin their transformation journey.

Recommendations to policymakers for advancing urban lighting for sustainable and inclusive cities

Urban lighting is no longer just a matter of infrastructure—it is a strategic lever for climate action, public health, and social inclusion. As cities face increasing pressure to decarbonize and become more resilient, they must also navigate budget constraints driven by rising energy costs and aging infrastructure. In this context, we urge policymakers to consider the following integrated recommendations.

Broaden the scope of lighting policy

To fully harness the transformative potential of lighting in urban environments, policymakers must adopt a holistic approach that goes beyond traditional infrastructure upgrades. Lighting should be embedded within broader urban policies that promote health, well-being, and social inclusion. This includes not only improving road and street lighting but also renovating municipal buildings with energy-efficient, human-centric lighting systems that enhance public service delivery and community engagement.

Strengthen multilevel governance

Effective implementation requires improved multilevel governance. National and local governments must collaborate to align climate goals and urban development strategies. The Multilevel Climate Action Guide provides a valuable framework to catalyze governance reforms and foster integrated planning. Lighting is inherently cross-sectoral—touching energy, transport, urban planning, public health, and productivity—and can serve as a connecting element in initiatives that advance climate resilience and urban equity.

Create synergies across policies
Policymakers should harmonize lighting-related policies to accelerate smart city development, ecological preservation, and efficient resource use. Adaptive lighting can support biodiversity by reducing light pollution, while dynamic systems enhance safety and vibrancy in nightlife zones and improve well-being and productivity in buildings. Today, cities often struggle to comply with a complex web of national, regional, and local regulations—many of which are overlapping, inconsistent, or even contradictory. This regulatory fragmentation hampers effective planning and implementation of lighting strategies, delays project execution, and increases administrative burdens.

Improve green procurement practices
Governments must strengthen and strongly enforce minimum energy performance standards (MEPS), and also establish clear, consistent rules for sustainable and circular public procurement. These standards should prioritize long-term performance, includinglifecycle performance, durability, repairability, and environmental impact,over short-term cost savings to ensure public investments in lighting deliver lasting value. This can significantly optimize the use of financial resources, enabling cities to redirect investments to other priority areas.

Support cities with funding and capabilities
Dedicated funding schemes are essential to support cities in infrastructure renovation, outdoor environments, and built enviroments. Investments in lighting yield immediate savings in costs and emissions, freeing resources for more complex or less bankable projects. Electricity saved can be redirected to sectors with growing demand, reducing the need for additional generation and sourcing. Funding should also support capability development, enabling municipalities to lead innovative lighting projects and fully leverage existing efficient and connected solutions.

Accelerate innovation and efficiency
Platforms like the Urban Transitions Mission and Global Covenant of Mayors should be used to scale innovation and share knowledge. These hubs promote cross-sector best practices and facilitate the adoption of automation and efficiency technologies that reduce operational costs and emissions, while at the same time delivering benefits for people.

By embracing these recommendations, policymakers can unlock the full potential of lighting as a strategic tool for sustainable urban transformation—enhancing quality of life, advancing climate goals, reducing operational costs, and fostering inclusive and resilient communities.

Key takeaways

1. Integrate lighting into holistic urban policies for healthier, inclusive cities.
2. Enhance multilevel governance to align climate goals and urban development.
3. Harmonize lighting policies to boost sustainability, safety, and smart city growth.
4. Adopt green procurement standards to ensure lasting, sustainable public investments.
5. Provide funding and training to empower cities for sustainable lighting.
6. Leverage global platforms to scale innovation and accelerate lighting efficiency.

Contributors

URBAN TRANSITIONS MISSION

About the Urban Transition Mission

The Urban Transitions Mission (UTM) mobilizes decision makers across all levels of government to prioritize climate neutral and net-zero pathways enabled by clean energy and systemic innovation across all sectors and in urban governance. By accelerating capacity-building and closing the gap between research, development, and deployment, the Mission will empower cities to adopt innovative solutions and help reach tipping points in the cost and scale of those solutions for urban transitions.

Signify

About Signify

Signify is the world leader in lighting for professionals, consumers and the Internet of Things. The company's Philips products, Interact systems, and data-enabled services deliver business value and transform life in homes, buildings, and public spaces. In 2024, Signify had sales of EUR 6.1 billion, approximately 29,000 employees and a presence in over 70 countries. Signify unlocks the extraordinary potential of light for brighter lives and a better world. The company has been in the Dow Jones Sustainability World Index since its IPO for eight consecutive years and has achieved the EcoVadis Platinum rating for five consecutive years, placing Signify in the top one percent of companies assessed.

In collaboration with

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

About the Global Covenant Of Mayors

The Global Covenant of Mayors for Climate & Energy (GCoM) is the largest global alliance for city climate leadership, uniting a global coalition of over 13,800 cities and local governments and 100+ supporting partners. The cities and partners of GCoM share a long-term vision of supporting voluntary action to combat climate change and towards a resilient and low-emission society. GCoM serves cities and local governments by mobilizing and supporting ambitious, measurable, planned climate and energy action in their communities by working with city/regional networks, national governments, and other partners to achieve our vision. Led today by UN Special Envoy on Climate Ambition and Solutions Michael R. Bloomberg and European Commission Executive Vice-President Teresa Ribera, the coalition comprises cities across 6 continents and 147 countries, representing over 1.2 billion people or more than 13 percent of the global population.

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