POLICY SOLUTION FROM THE ICLEI SOLUTION GATEWAY ON EFFICIENT STREET LIGHTING USING LED

Define a policy outlining the requirement to use energy efficient technology in all governmental operations and in all systems providing lighting services to the community. This policy goes hand-in-hand with a public procurement policy, by ensuring sustainable procurement requirements are included relevant to lighting and lighting systems.

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ICLEI
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The Solutions Gateway provides a knowledge catalogue of possible actions (solutions) to tackle climate change. Each Solution/Package offers general guidance. This means each local or regional government should still assess the feasibility of the Solution/Package in the local context, prior to implementation. The impacts, benefits and co-benefits indicated are generally valid but may not materialize in all circumstances.

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CONTENTS

BRIEF DESCRIPTION

Define a policy outlining the requirement to use energy efficient technology in all governmental operations and in all systems providing lighting services to the community. This policy goes hand-in-hand with a public procurement policy, by ensuring sustainable procurement requirements are included relevant to lighting and lighting systems.

MOTIVATION/ RELEVANCE

Such a policy is often part of the policy portfolio to respond to climate change and to transition to sustainable energy solutions. The policy enables an approach to defining cost-effective energy efficient lighting. An easy action, this typically falls within the mandate of the government level that also oversees its implementation, or which is outsourced by the government to a third party – and directed as per the requirement.

MAIN IMPACTS

A clear policy can help to improve lighting services in the community, but also provide market signals in terms of demand for energy efficient technologies, accelerate the introduction and uptake of new technologies, and strengthen and enforce minimum energy performance standards for lighting (International Energy Agency, IEA, 2011).

A policy translates targets (such as access to energy or greenhouse gas emission reduction targets) into actions that require clear mandates and responsibilities, as well as market-based approaches, financial mechanisms, and consumer/ corporate programs.

This policy, when implemented, can ensure efficient lighting services are provided to the community, reduce energy demand, and improve energy efficiency.

The IEA provides an estimation of the possible impact of policy recommendations on energy efficiency. Lighting is included as one of seven priority areas. The IEA estimates that recommended energy efficiency policies could save as much as 7.6 Gigatonnes (Gt) of carbon dioxide per annum (CO2/year) by 2030. Here lighting policies can contribute up to 5% of total CO2 savings potential (IEA, 2011).

BENEFITS

- **Reduced electricity consumption** while providing the same or improved lighting levels. Street lighting has been reported to be responsible for up to 40% of municipal energy bills. LED systems have higher lumen efficacy, resulting in 40 - 70% reductions in electricity consumption, compared to conventional options.
- **Lower lifetime costs due to energy savings and other avoided costs** in maintenance, part repair and replacement. The total cost of ownership (TCO) of a LED street lighting system can be lower by more than 50% of a conventional option (Development Finance International, Inc. (DFI), 2014). Los Angeles annually saves over US$ 9 million from 63% reduced energy consumption and US$ 2.5 million in reduced maintenance (City of Los Angeles, 2018).
- **Reduced GHG emissions** equivalent to the grid electricity emission factor for each kWh saved. Pilot trials and large-scale rollouts showed reductions of as much as 50-70% (Development Finance International, Inc. (DFI), 2014).
- **Opportunity to re-assess current and future lighting needs** of the community and possibilities for infrastructure modernization, e.g. through smart systems.
- The policy can be an e**nabler of fast action** in the lighting sector.

SUGGESTED INDICATORS FOR MONITORING RESULTS

To develop and monitor effective energy efficiency strategies and policies, subnational governments need to collect reliable, timely and detailed data on energy end uses, markets, technologies and efficiency opportunities in all sectors (IEA, 2011).

The IEA offers an annual energy efficiency data template which can be referred to by local and regional governments when determining what data to collect (IEA, 2011).

TYPICAL LOCAL GOVERNMENT ROLES INVOLVED IN THIS POLICY

- Policy maker
- Regulator
- Advocator
- Planner
- Role model
- Investor
- Coordinator
- Operator and service provider

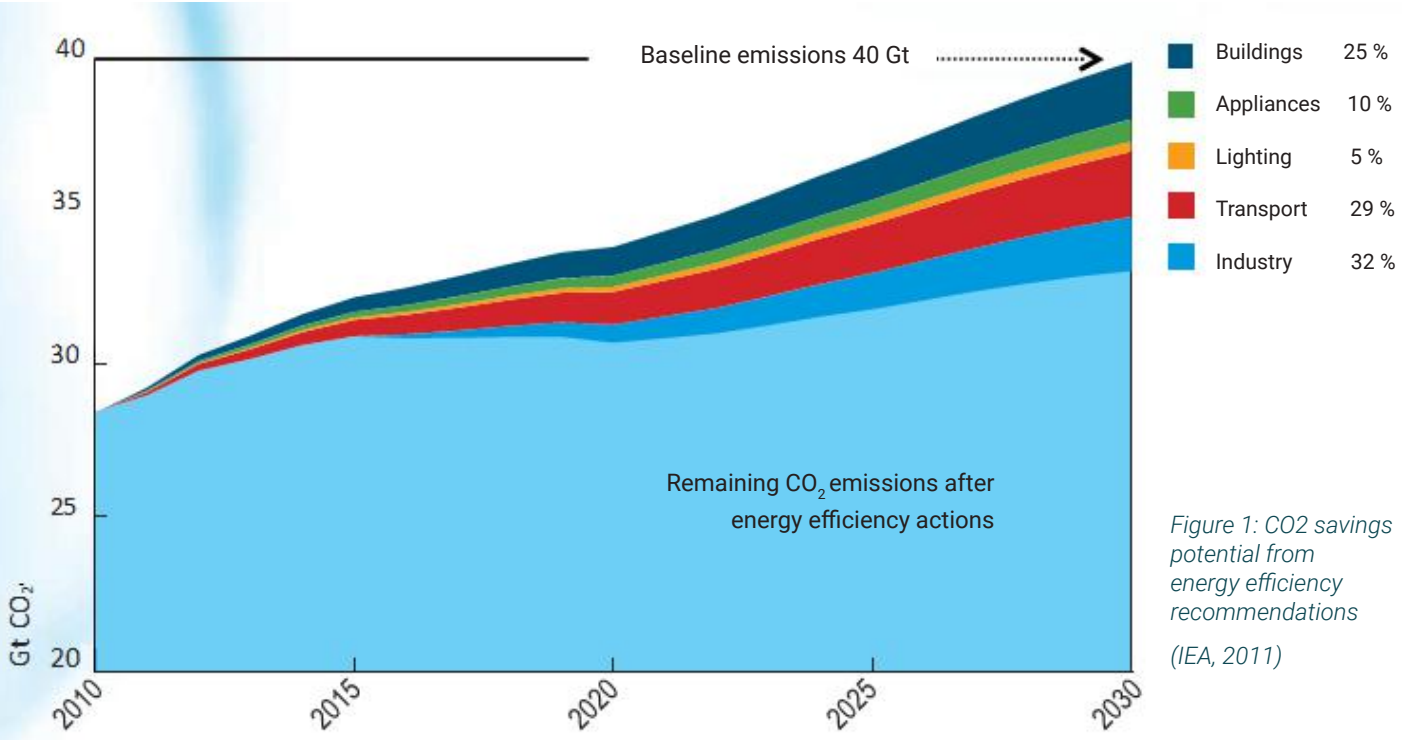

Figure 1: CO2 savings potential from energy efficiency recommendations

(IEA, 2011)

INTEGRATED SOLUTION OVERVIEW

	ENABLER ACTIONS	REQUIRED ACTIONS	MULTIPLIER ACTIONS
Policy	Identify and assess existing relevant policies and framework conditions, at local and national levels.	Ensure policy coherence with the target(s) set, other policies, as well as with all energy, environmental, and economic strategies and plans.	Align all policies and programmes to help scale up energy-efficient lighting systems, both in government operations and at community level.
Stakeholder	Ensure all departments of the local/regional government are informed and engaged.	Identify and engage with key stakeholders who own or manage lighting systems, to be addressed by the policy, either immediately or in the near future.	Inform community stakeholders (residents and private sector) of policy and its intended impact, calling for reciprocal action in their own spheres of influence.
Governance	Ensure that city development plans or development regulations promote the use of natural/LED light and include Minimum Energy Performance standards (MEPS) for lighting systems (IEA, 2011).	Adopt lighting quality, reliability and minimum energy performance standards (MEPS) for new and existing lighting products (IEA, 2011).	Coordinate policies in a way that addresses barriers such as higher initial capital costs.
Capacity building	Build capacity of the policy team defining the new policy/policies, to ensure an optimized approach is defined.	Enhance staff ability to compile end-use data and report to policy- and decision-makers.	Promote results to other cities and regions, share experiences and learn how to further enhance or scale.
Technical	Ensure the policy allows cutting edge technologies and modern systems solutions.	Require and promote improved lighting systems design and management to relevant stakeholders in the private sector including the lighting industry. Provide technical infrastructure to support identifying gaps and achieving targets by cities and regions in installing LED lights within their jurisdictions.	Assess opportunities for energy efficiency improvements in the lighting sector and prioritize action and end uses in which subnational government policies are most likely to yield the largest, most cost-effective improvements (IEA, 2011).
Finance	Identify budget lines used to pay for lighting.	Define investment needs for a system-wide change, and ensure the policy includes this short to long term perspective. Identify investment options and finance models for consideration to implement the policy.	Align long-term investment plans with the cross- sectoral framework for energy efficiency pertaining to LED lights.

PROCESS PHASES

1 PREPARATION

GOVERNANCE

Set up systems for energy efficiency data collection and monitoring. Local or regional government should define relevant criteria for determining what data to collect, taking into account local circumstances and identified needs. Inform all departments of the proposed policy.

POLICY

Take stock of existing lighting and energy policies. Identify existing policy measures that can be built upon or improved to modernize the approach to implementing energy efficient lighting.

TECHNICAL

Explore various approaches to formulate policies that can be applicable to the broader energy efficiency system as a whole. Regulatory measures, such as energy labelling and lamp and ballast minimum energy efficiency requirements can be taken as examples (Waide & Tanishima, 2006).

2 FEASIBILITY ASSESSMENTS

STAKEHOLDER

Conduct multi-level, multi-stakeholder consultations on the possibility of establishing incentives. For example, subsidies for the purchase of efficient equipment can be one element of such a multi-stakeholder consultation within the jurisdiction of cities and regions.

POLICY

Consultations need to focus on gathering input from stakeholders regarding establishment of guidelines or mandatory requirements. It is recommended that the core discussion also cover the efficiency of new and/or retrofit lighting installations in cities and regions.

TECHNICAL

Another component of stakeholder consultation is to discuss lighting levels (lumens/lux, uniformity etc.), efficiency, (watt/lumen), operating hours, dimming during late night/early mornings, etc. and set minimum requirements for these aspects. This can involve the imposition of maximum lighting-system power-density limits (power use per unit floor area) as well as specification of minimum requirements for lighting controls at the subnational level (Waide & Tanishima, 2006).

3 IMPLEMENTATION

STAKEHOLDER

During the implementation stage, local and regional governments may want to consider creating synergy with overarching energy efficiency frameworks at the national level by applying multilevel governance approaches. For example, in the United States and Canada, it is estimated that a mixture of federal component standards, state building regulations that have come into force from 1990 onwards, and numerous utility energy-conservation programmes are currently saving 171 TWh of lighting energy demand each year compared with what would have been the case had they not been implemented (Waide & Tanishima, 2006). This multilevel governance on efficient lighting policies has led to 20% of current lighting energy consumption in the region and amounted to annual savings of over 500 kWh (the energy consumption of a typical refrigerator) per capita (Waide & Tanishima, 2006).

CAPACITY BUILDING

Additional solutions can be combined with energy efficient lighting policies by cities and regions. For example, the IEA reports that there is a degree of evidence that lighting energy consumption in some European countries has been limited by relatively successful efforts to curb lamp operating hours and utilize daylight (Waide & Tanishima, 2006), which can be readily replicated at local and regional levels.

FINANCE

For local and regional governments, there is a large cost-effective potential to reduce energy demand and greenhouse gas emissions. This is implanted through more energy-efficient lighting by providing policy incentives to use lighting systems that minimize life-cycle costs (The life-cycle cost of a lighting system is the sum of its initial cost (the sum of the purchase price and the installation cost) and the discounted operating costs (the energy and maintenance costs discounted over time to take account of the time-dependent value of money) (Waide & Tanishima, 2006). In this analysis a real discount rate of 5% is assumed.), which is estimated to lower the average cost of light by more than one-quarter (Waide & Tanishima, 2006).

4 MONITORING, EVALUATION AND LEARNING (MEL) MECHANISM

GOVERNANCE

Subnational governments need to setup mechanisms for Monitoring, Evaluation and Learning (MEL). This is important for ensuring adequacy in monitoring, enforcing, evaluating, and periodically updating energy efficiency policies and measures in their jurisdictions.

POLICY

Local and regional governments need to evaluate periodically whether their policies and programmes for enhancing the effectiveness of street light systems have made an impact. A methodology used here is to compare data during and after implementation, with the results used as an input to subsequent decision making (IEA, 2011).

CAPACITY BUILDING

Monitoring and evaluation, with baseline assessments and periodic review and reporting, should be established when new policies and measures are implemented. Non-compliances should be identified with a fair and transparent process, and should be reported and made public. Associated penalties should be clear and serve as constructive deterrents to non-compliance.

REALITY CHECK

In which situations is this Solution applicable?

Accelerating, encouraging and enabling innovation in the lighting sector is critical for an effective, long-term global response to climate change and promoting energy efficiency and sustainable development. Subnational governments which are willing to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels in support of their countries' Nationally Determined Contributions (NDCs) are well suited to apply this Solution.

Required preconditions

A significant buy-in from the local and regional government side is needed in order to scale up their climate actions related to strengthening of energy efficiency in the lighting sector. Subnational governments are well advised to monitor, enforce, evaluate, and periodically update, energy efficiency policies and measures in the lighting sector under a national climate action framework guided by NDC-related national policies.

Success factors

Policy and programme effectiveness should be evaluated during and after implementation of street light replacement with LEDs, with the results used as an input to subsequent decision making. Monitoring and evaluation (M&E), with baseline assessments and periodic review and reporting, should be established when new policies and measures are implemented in addition to the existing policy measures for efficient lighting systems within jurisdictions of cities and regions (IEA, 2011).

Follow-up needed / recommended

A follow-up on policy alignment is key. After local and regional governments establish regulatory requirements for the use of innovative efficient lighting technologies, they need to ensure that other relevant regulations are well aligned with the new set of energy efficient lighting systems regulations such as those regarding safety (Waide & Tanishima, 2006).

Barriers

- The lack of policy leadership by a subnational government in mobilizing to accelerate the development of LEDs within cities.
- The lack of appropriate capacity building support for city officials who need to bring together the main actors in energy efficient lighting systems to pool resources and formulate policies for accelerating product development by the industry.
- The lack of understanding on how to effectively tighten cooperation between industry, academia and diverse institutions within their local and subnational jurisdictions to accelerate innovation and product development, foster awareness and develop the professional skills base (Waide & Tanishima, 2006).

Risks

In setting up local and regional level LED policies, it would be important to keep in mind not to fall into any of the risks listed below.

- **Not earning enough political buy-in from the key stakeholders** who are crucial for implementing the lighting solution policy measures due to a lack of proper consultation. Deploying LED street lights requires properly discussing relevant information and sharing with stakeholders.
- **Blockage in the level of policy implementation efficiency** this can be caused when a new policy measure has been introduced and it has not been properly communicated to key stakeholders. Policies around LED street lighting need regular updates and follow ups by local and regional governments.
- **Issuing policies that are mismatched with the national framework on LED street lighting and energy efficiency in general.** Maintaining and open channel of communications with the national government can address the risk of mismatch in policymaking. Ensuring coherence in LED lighting policies at all levels of government will minimize the risk of sending out mixed policy signals.

CLIMATE CHANGE MITIGATION POTENTIAL

Local and regional governments can encourage phasing-out of inefficient lighting products as soon as technically feasible and economically viable within their jurisdictions as a way to build a circular economy. Subnational policies can be formulated in such a way that they require and promote improved lighting systems design and management. This should be done by ensuring that development plans promote the use of LEDs and include minimum energy performance standards (MEPS) for lighting systems (IEA, 2011). Local and regional governments can further support the development, use and regular updating of international test standards and measurement protocols in the lighting sector in order to reduce industry compliance costs and to support national policy requirements with to enhancing implementation of their Nationally Determined Contributions (NDCs).

NATIONAL AND SUBNATIONAL INTEGRATION IN THE CONTEXT OF THIS SOLUTION

BENEFITS TO LOCAL AND REGIONAL GOVERNMENTS

One of the core benefits for local and regional governments is to be a policy entrepreneur in formulating and regularly updating their subnational strategies and action plans for improving energy efficiency in the lighting sector. This will make a significant contribution to accelerating implementation of a national framework for energy efficiency in lighting and achieving of vertical integration in terms of monitoring, enforcing and evaluating energy efficient lighting policies and measures at all levels of government.

RESOURCES

CASE STUDIES

- City of Los Angeles, USA
- Buenos Aires, Argentina

OTHER RESOURCES

- Transformative Actions Program (www.tap-potential.org)
- The carbon*n*® Center (www.carbonn.org)

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