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Policy Brief

G20 MEMBER COLLABORATION TO ACCELERATE ENERGY CONSERVATION THROUGH PUBLIC STREET LIGHTING PPP PROJECTS

Task Force 8

**Inclusive, Resilient, and Greener
Infrastructure Investment and Financing**

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Abstract

The government of Indonesia committed itself in the Paris Agreement mandate to reduce greenhouse gases by 29 percent in 2020-2030. One of the aims is to support energy conservation programs that can be done through Public Street Lighting (PSL) infrastructure provision at the subnational level. More environmentally friendly and energy-efficient street lighting infrastructure is essential to improve public safety and produce multiplier economic growth. On the other hand, the post COVID-19 pandemic situation has affected government fiscal capacity mainly at the subnational level. Thus, Public-Private partnership (PPP) schemes are being considered as alternative financing solutions for such infrastructure development, although literature shows that certain minimum preparation-transaction costs may make PPP schemes unsuitable for small-scale projects. This policy brief is developed to propose small-scale PSL PPPs to accelerate the achievement of energy conservation in the economic recovery mainly through collaboration with the Group of 20 (G20).

Challenges

The provision of Public Street Lighting (PSL) infrastructure has multiple benefits and is not limited to illuminating public roads. Based on several revitalisation projects or road developments in Indonesia, the objectives are to prevent accidents and crime, encourage economic growth, increase investor confidence to invest in the area and of course increase the comfort of the community. The background of PSL improvement in Indonesia is in line with the research of Painter and Farrington (1999). PSL is basically a public infrastructure facility that has an important role for regional and interconnectivity development, considering basic deliverables to reduce the rate of traffic accidents and increasing security, which generate multiplier economic growth through more conducive and longer periods of activity in a region. Moreover, the revitalisation and development of PSL also has benefits in terms of more efficient use of energy through energy efficiency mechanisms. We take the example of conditions in Indonesia with the aim of reflecting on developing countries. According to Energy and Mineral Resources Ministry statistics in 2017, Indonesia has 225,249 units of PSL, still predominantly using conventional technology lighting and an inefficient measurement system, consuming up to 3,504.47 GWh/year, absorbing a national budget of around Rp 5.14 trillion. Besides that, PSL has also contributed to producing Green House Gas (GHG) emissions that affect global climate change. By using a grid emission factor for Indonesia of up to 0.851 kgCO₂/kWh in 2016, the PSL national energy consumption contributed carbon dioxide emissions of up to 2.98 million tons per year (PT PLN, 2015). The government of Indonesia has committed to reducing GHG emissions after 2020 by up to 29 percent without support and an optimistic 41 percent with support from various international institutions (Energy and Mineral Resource Ministry, 2013).

Based on the explanation in the previous two paragraphs, from the economic, commercial and social point of view, improving PSL in emerging markets is urgently needed. However, this is no easy task for developing countries because they face challenges, especially during the COVID-19 pandemic. Some of these challenges are as follows:

1. **Limited capacity at the subnational level** (province/district/city). In the case study of Indonesia, the responsibility for providing PSL is at the subnational level. The COVID-19 pandemic has massively hit regional governments' budgets, reducing average economic growth by 3.5 to 0.5 percent (World Bank, 2020). Again, using Indonesia as a reference for developing countries, according to the Finance Ministry, 25 of the 34 provinces were listed in the category of underprivileged fiscal capacity. Thus, efforts are needed to obtain alternative and creative financing to improve and develop PSL amid a limited fiscal capacity.

2. **The government's limited fiscal capacity has an impact on the difficulty of selecting creative financing schemes.** According to APMG (2016), the minimum project size for Public-Private Partnerships (PPPs) set by governments around the world ranges between US\$20 million and \$100 million, given the relatively high transaction costs that can make PPPs below a certain size unviable. The literature explains that PPP size limits might change over time, given governments' better understanding of project sizes that are more suitable to PPP schemes. This means PPP type contracts cannot be used for smaller projects. However, several subnational levels of government in Indonesia are trying to use PPP schemes as creative financing with an investment value of around \$6 million to \$7 million.
3. **The limited availability of local technology providers with high energy-efficiency and more environmentally friendly PSL in low-to-middle-income countries** means the latest up-to-date technology needs to be imported, which makes it more expensive. PPP schemes are regarded as a solution to this limited government funding;
4. **The implementation of quality infrastructure is the result of good planning and preparation.** Currently, the capacity of the planners and implementers involved in PSL still needs to be developed. In the case study of Indonesia, several regions still have limitations in preparing and implementing PSL based on energy conservation (Energy Ministry, 2014). Through PPP schemes, it is expected that regional governments as project owners will be developed in their capacity and guided by expertise as transaction advisors.

A breakthrough is necessary to improve future energy conservation development through PSL projects. With the Indonesian G20 presidency, it is expected that G20 collaboration and networks will organise more efficient and environmentally friendly PSL, providing socio-economic benefits for society and implementing sustainable development. This policy brief will explain the need to collaborate with G20 countries to achieve energy mix targets and economic recovery at the subnational level of low-middle income countries by delivering more sustainable PSL projects as part of the energy conservation through PPP schemes.

Proposals for G20

Based on the existing challenges as explained above, the authors propose a solution for developing PSL as a form of energy conservation with PPP schemes through the collaboration of G20 countries. The reason for bringing PPP schemes into the proposal is because they are regarded as a form of creative financing in infrastructure development that can provide optimal service outcomes to the community through the implementation of measurable service level agreements and best value for money, which can be a solution for limited fiscal capacity, and provide socio-economic benefits. The following are the proposals that we put forward in this policy brief:

1. G20 member collaboration in knowledge transfer in implementing PSL projects in low-middle income countries

In general, changing ordinary bulbs into Light Emitting Diode (LED) bulbs and accompanied by a metering system can reduce electricity use by up to 50 percent and if real time automation through control management systems is instituted, efficiency can be achieved of up to 70 percent (Feasibility Study of Ongoing PPP Street Lighting Project in Indonesia, 2021). In the case of Indonesia, the average Capital Expenditure (Capex) of PPP projects for PSL at the subnational level is below \$10 million. Based on the capex value, PPPs can be included in small-scale projects. However, based on APMG (2016), the government can implement PPPs only in projects worth \$20 million to \$100 million. Considering the current state of fiscal capacity at the subnational level and the urgent need to revitalise PSL, the G20 can collaborate through the following activities:

a. Building capacity at the subnational level to redefine the PPP small-scale category

According to APMG (2016), PPP schemes do not require certain capital investment by the government, where the final cost of a project is not known until procurement is concluded. It goes on to explain that the relatively high transaction costs of implementing a PPP can make PPPs below a certain size unviable. A size limit may mean PPP type contracts cannot be used for smaller projects. Therefore, governments define a minimum size (or value) to deliver projects through a PPP framework, which limits changes over time as well as the government gaining a better understanding of the size of projects that are suited to a PPP. The minimum size of PPP projects in Singapore is over US\$50 million, Brazil's PPP law (Law 11079 2004) sets a minimum size of \$11.7 million for individual projects. Moreover, British Columbia, Canada, has a policy in which PPP projects must be worth over \$100 million, this is partially because experience shows that PPP projects under \$100 million are typically not viable, but

also in response to pressure from the local construction industry. G20 countries can collaborate through the following steps:

- 1) Developing the capacity and capability of human capital at the subnational level and national consultants to simplify the process and reduce preparation costs;
- 2) Developing a PPP agreement document model and guidelines for sectors that are possible to be implemented through small-scale PPPs;
- 3) Developing a small-scale PPP mechanism (different from PPPs in general) with the aim of shortening the time in the planning-preparation-transaction phases while still managing the governance of PPP principles, effectiveness and efficiency.

PSL, as small-scale projects through PPP schemes, may not attract international investors, given that according to literature and practitioners' information, the relatively high costs of preparing, procuring and managing PPPs do not vary significantly with the size of the project, which makes it difficult to justify undertaking small scale PPPs (Kupisz R., 2019). On the other hand, smaller scale PPP projects means smaller capex requirements and simpler structure and scope, which means there is potential to increase the role of local investors, as well as increasing the socio-economic benefits for the community.

b. Knowledge sharing from research and precedents of successful projects to improve project structure feasibility.

A number of countries allow small-scale projects to be bundled as a way of economising on preparation and transaction costs (Kupisz R., 2019). For example, the Pennsylvania Bridges Project bundled the rehabilitation of 558 bridges spread across several counties across the state into one large project with concessionaires required to complete construction by the end of 2017 and to be responsible for most of the design, financing and maintenance risks over the 28-year term of the concession (APMG, 2016). This can also be seen in the various public entities/managers/transaction advisors in the municipal solid waste (MSW) sector of India procured through bundling the components of the value chain into an integrated PPP project (Dolla and Laishram, 2019) Greece set up a scheme in 2004 bundling projects with an average value of \$15 million, which covered economic and social infrastructure (including tourism, environment, energy, parking, real estate, industrial parks, marinas and sports), improving the bankability by funding the authorities' financial obligations under PPP contracts. The precedent of these small-scale PPP projects merits conducting further research to find out effective success factors that are able to be used in developing PSL PPP projects at the subnational level of low-middle income countries.

c. Providing access to creative financing and alternative sources of funding through green infrastructure programs.

The implementation of PSL infrastructure as PPP projects is designed using a project finance scheme so that the capital structure consists of debt and equity components (Yescombe, 2002). In Indonesia's case, the average debt proportion is around 70-80 percent and equity 20-30 percent (Finance Ministry, 2022). Thus, the amount of interest earned by the project will significantly affect the value of the project and the amount of return on investment that must be paid by the government, especially at the subnational level. PSL PPP project is a form of energy conservation that can be categorised as green infrastructure so that it is expected to get access to financing through sustainable infrastructure or green financing schemes. G20 countries can provide access to financing schemes within the framework of sustainable/green financing to encourage the implementation of energy-conservation projects through PSL projects.

2. Accessibility to more reliable and efficient current technology in PSL

One of the challenges in realising environmentally friendly PSL is the limited capacity and capability of personnel in government institutions as project owners who are responsible for ensuring the whole cycle, including preparing the PSL in the PPP concept, which requires the precautionary principle and specific capabilities. G20 countries certainly have experience in implementing supporting policies to prepare energy-conservation projects in line with G20 policies. Some types of experience that can be shared are as follows:

- a. **The perspective of advanced energy efficiency.** There is a vast range of data and information on PSL in G20 countries (IEA, 2021). Australia's presidency with the support of France and Mexico placed a greater priority on energy efficiency than the G20 had seen before. In the United States, the city of Chicago has embarked on the largest city LED smart streetlight programme in the country. The city has cut energy use by up to 75 percent by replacing 85 percent of bulbs with smart city lights. The smart street lighting can lower peak power demand. In 2019 India's Ministry of Power announced it had installed 10 million smart LED streetlights under the Street Lighting National Programme, helping India avoid almost 1,161 MW of peak energy demand and reducing annual CO₂ emissions by 4.8 million tons;
- b. **Smart PSL can also provide new streams of revenue through dynamic digital signage systems.** In addition to providing traffic management, public communication or emergency information services, digital signage can be rented to advertisers, as shown in New York City, which is expected to generate over \$1 billion in advertising revenues in its first 12 years of operation. An ICT company has signed an agreement to deliver Wi-Fi-enabled solar streetlights to a community of 2,500 households in the informal settlement of Western Cape, South Africa. Buenos Aires, Argentina, became the first metropolis in Latin America to use

100 percent LED lights for PSL. A digital platform allows remote monitoring of the streetlights, optimising maintenance for instance, and increasing security levels through integrated cameras, just like in Italy where an application allows citizens to report faults in the city's lighting system on their smartphones (IISD, 2015).

PSL projects in the energy-conservation sector at the subnational level put a priority on achieving value for money (Fischer et al., 2006). It is expected that this will ensure the project structure will increase investor attractiveness and provide an optimal service. Value for money is measured by increased security and reduced accident rates that have a multiplier effect on economic growth, and higher energy efficiency with more environmentally friendly technology as well.

3. Relevance to the G20

The G20 call to encourage further international collaboration on energy efficiency comes with a series of concrete work streams that target key sectors as well as collaboration with financial institutions. Through the spirit of the Indonesian G20 presidency “Recover together, recover stronger”, the writers expect to broaden global insight and references to recover together with all nations from the COVID-19 pandemic, along with putting a high priority on energy conservation to achieve an energy mix target through PSL projects. To succeed in these aims, low- and middle-income countries need to adopt a holistic approach within the G20 that addresses the different types of constraint as follows:

- Identifying the best supporting policy practices and frameworks that can accelerate exchange in policy design and/or implementation in smaller-scale projects; incentive policy regulation that is able to increase the interest of energy conservation technology providers in investing in more environmentally friendly technology that can lower emissions for PSL projects;
- Second, identifying most promising energy-efficient technologies or systems. The authors believe developing cooperation with G20 members to access and absorb knowledge transfers on more reliable and efficient technology for PSL will improve the ability of developing countries to plan and implement the projects;
- The expertise of G20 members is also needed to ensure the suitable schemes to optimise plan and preparation costs are more efficient, one of the effective considerations for which is through bundling mechanisms.
- Furthermore, Indonesia also needs the support of the G20 in accessing global alternative sources of funding and creative financing through offering lower rates that will improve a project's financial feasibility for green energy, energy efficiency and energy conservation. The G20 should open accessibility to various green financing and funding schemes for small-scale PSL projects that are included in the green infrastructure sector.

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