

# SMART PUBLIC NODES



**TNO** innovation for life

Streetlights are everywhere, they are connected to the power grid, they are close to vital infrastructures such as roads, water-, sewage-, drainage-, gas- and telecom networks. With more than 317 million streetlights worldwide, they surely are an ideal platform to support the sensor and advanced communications infrastructure smart communities need? But if streetlights and other public infrastructures really are ideal, why are there yet few examples of large-scale deployments? TNO and partners investigated the economic viability of Smart Public Nodes, and what is holding us back.

## OPPORTUNITY

Infrastructures such as streetlights or cabinets are strategic assets for local communities. However, most streetlights are over 30 years old, often use energy-wasting light sources and should be replaced in the foreseeable future. This replacement cycle creates an opportunity to expand the functionality of the light posts to a multipurpose platform for a variety of sensors, actuators and small communication cells, turning light posts into 'Smart Public Nodes'. By making infrastructure smarter, communities can create and benefit from new services and business models. This offers opportunities for forms of public-private partnership, provided the business case works for all parties.

## CHALLENGES AND QUESTIONS

As exciting as the opportunity sounds, the 'how' is unclear. Which sensors are the

'right' sensors to invest in? What is the rollout plan? How much must be invested, and who provides the money? To whom accrue gains from the gathered data, and how can this gain be distributed? Who has the right to build, and who wants to build? What impact does regulation have? In many cases, the lack of overarching answers to these questions paralyses policy makers and investors, resulting in numerous proof-of-concepts and trials, but very few coherent strategies.

## THE PROJECT

In 2017, TNO, together with Dutch and Swiss partners from both the public and private sectors, met the challenge head-on. On request of a Dutch city, we did the analysis and ran the computations. The result?

The business case for Smart Public Nodes is positive over the lifetime of the infrastructure, *if*:

- costs are shared amongst a set of services
- services are offered where demanded
- the public and private sector cooperate closely

## METHODOLOGY

To arrive at the business case, we first had to identify the costs (of sensors and required infrastructures) and the revenue (from services relying on sensor data).

To do that, the project had three separate but interrelated streams.

- The Distribution Stream analysed the basic zonal archetype of the city under study. This was important to understand the market for services, which feeds into the types of services which can be profitably offered.
- The Services Stream, in which a (limited but diverse) set of services was analysed in terms of market, value chain, potential revenues per geographic zone and its technical requirements.
- The Requirements stream where we captured overall technical requirements placed on the Smart Public Node, the physical coverage needs per service and overarching requirements in terms of data storage and interfaces to service developers/providers.

Using our internal know-how, tools and experience, enriched with the invaluable real-life input from our partners we were able to generate coverage maps, specify the costs and project the revenues.

## FINDINGS

The services selected at the start of the project have differing characteristics. Some provide societal benefits and are obviously ‘public good’ services (e.g. smart public lighting), others generate tangible short-term revenues and could well be provided ‘for profit’ to the retail or wholesale market. Some services are clearly local in nature, whilst others could tie into national or even global service offerings.

This variability results in complex value chains with differing amortisation time-

lines, differing ownership structures, and differing requirements in terms of sensors, data and infrastructure.

Nevertheless, if the value chains are understood, players have a clear understanding of their roles and are willing to share costs between their services, Smart Public Nodes is an economically viable concept.

## RECOMMENDATIONS

If you are interested in ‘smartening up’ public infrastructures, we recommend:

- 1 Consider public lighting ownership and management roles: develop a Smart Public Nodes business- and exploitation model together with public and private parties to capture the potential value of Smart Public Nodes.
- 2 Align investor expectations with reality: Smart Public Nodes infrastructures are long-term investments. Whilst the service landscape may change rapidly, the underlying physical infrastructure has long amortisation cycles.
- 3 Break the silos: create a digital ecosystem based on an open platform around the Smart Public Nodes and the data they provide. Cooperate with platform providers, app developers and service providers to ensure that they have access to the data they need. Remember: the services generate the revenue!
- 4 Allow for failure: create ‘living labs’ to explore, develop and evaluate Smart Public Nodes-based services and concepts. Ensure ideas can be rapidly developed and tested by end-users to see if they catch on.
- 5 Privacy and security by design: all relevant privacy and security aspects must be an integral part of the development of Smart Public Nodes and the surrounding ecosystem.

## CALL TO ACTION

TNO can calculate a business case tailored for your business. A good business case requires in-depth understanding and modelling of sensor coverage, technical requirements and constraints, digital ecosystems, business and value chains, urban planning, data privacy and security issues and of course economics. With our in-house knowledge and based on the concrete data provided by the partners and you, such a case gives you insight into the value potential and dynamics of smart public nodes either for your own business, or from a potential competitive view. Interested? Don’t hesitate to contact us!



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