Intelligent Urban Exchange (IUX)  
Intelligent Energy – for Adaptive Streetlight Optimization

Digital Software and Solutions

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Cities worldwide are establishing energy objectives to save money, comply with government-mandated sustainability targets, and encourage safe, energy-efficient cities. Streetlights, essential to the safety and livability of cities, consume a large part of cities’ energy resources, making smart lighting the top energy priority for cities globally. Streetlights that make communities better and safer places to live, work, and play consume as much as 40-50% of a city’s entire energy budget. In response, cities must find solutions that help to reduce city energy consumption to meet sustainability targets and reduce costs.

Tata Consultancy Services’ (TCS’) Intelligent Energy for Adaptive Streetlight Optimization – part of the Intelligent Urban Exchange (IUX) smart city suite – is a scalable, integrated planning and monitoring solution that makes city light systems adaptive to real-time changing city dynamics. It optimizes streetlighting using analytics that enhance existing lighting systems, protect cities’ infrastructure investment, and deliver energy savings.

Overview
As with many cities’ underlying infrastructure, legacy streetlight systems are prone to failure, costly to manage, time-consuming to implement, and lack advanced real-time optimization capabilities.

Current Streetlight Control & Management Systems (CMS) follow static or fixed schedules and rely on manual operation. These sensors-based streetlight control creates city light pollution and is capital intensive with high operational and maintenance costs. Conventional streetlight systems lack real-time data and depend on history and a city operations manager’s experience.

Intelligent cities and city partners require integrated adaptive streetlighting management systems that provide end-to-end monitoring, management and real-time recommendations to help reduce energy consumption and costs and meet city sustainability objectives. IUX for Adaptive Streetlight Optimization acts as a virtual energy advisor, optimizing streetlight operation based on real-time factors such as weather, traffic, footfall, crime rate patterns, and events. The solution uses an advanced analytics model based on city specific parameters, along with self-learning algorithms that responds to changing city dynamics to optimize streetlights for maximum savings. With easy integration and actionable analytical output that feeds current streetlight control systems, IUX for Streetlight Optimization can help cities optimally manage city light infrastructure, minimize energy consumption, and manage citizens’ safety and security.

Our Solution
TCS IUX Intelligent Energy for Adaptive Streetlighting is a modular solution built on the Big Data, IoT-enabled TCS Connected Intelligence Platform. The offering features:

- Real-time performance monitoring and analysis: Based on real-time and historical data, the solution monitors and analyzes streetlight energy performance against set energy efficiency targets. It monitors the ‘as-is’ energy landscape down to the city streetlight. Using a goal-based approach, IUX benchmarks performance against industry standards to identify areas of improvement. It quickly identifies lights that are underperforming on the energy efficiency scale to focus on a real-time view and alerts, such as a key performance indicator breach, controller / lamp failure, on/off status, and more.

- Adaptive Streetlight Optimization with Recommendations and Actions: IUX Intelligent Energy delivers recommended actions using a unique optimization model and a proprietary real-time edge analytics agent that communicate with existing systems. The pre-built energy data model captures city street dynamics such as traffic, people movement, street type, weather to identify optimal operation. An optimized streetlight schedule adapts to a city priority for that area, such as maximum energy savings, minimized consumption, carbon reduction, and more. The solution can override existing lighting schedules with new ones in real-time.

- Plug and Play Integration: IUX Intelligent Energy features easy integration with existing streetlight infrastructure systems with an energy-specific data model. The robust TCS Connected Intelligence Platform ingests data from all types of sources and allows cities and partners to rapidly and easily extend the solutions’ pre-built data model to unique use cases.

Benefits
TCS IUX Intelligent Energy for Adaptive Streetlight Optimization solution helps cities: Meet sustainability targets Manage streetlight energy consumption to attain city sustainability targets Leverage real-time city data for traffic, footfall, and more to optimize energy and minimize city light pollution Lower operational and capital expenditures with optimized streetlighting

The TCS Advantage
TCS’ unique value differentiators include:

- Industry solutions: Our software has been created by experts with proven experience in energy conservation. Our Intelligent Energy solution with domain-specific data models incorporates the latest technology innovations and expertise from TCS R&D.
- Faster deployment: IUX’s open standards platform enables faster solution implementation and integration with your enterprise’s existing lighting systems. The out-of-the-box IUX for Optimized Streetlighting application with pre-built domain-specific use cases accelerates smart lighting deployments. APIs help you rapidly build and integrate custom applications.
- Lower cost of ownership: IUX’s modular architecture lets you buy only what you need now with the option to add capabilities later, making it the perfect fit for any budget. The common, scalable IUX Platform extends economically across multiple domains such as water and transportation for collaborative city initiatives.
- Simplified business and engagement models: We offer As-a-Service subscription pricing that does not require capital outlay. Our cloud-based offering includes applications that are accessible online or on mobile devices.
- Experience Certainty commitment: Our corporate culture is one of superior delivery and customer certainty. Our consulting clients know the quality of our work, and now, companies can get that same level of quality, speed, and certainty with our preconfigured software and solutions.
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Our Solution
TCS IUX Intelligent Energy for Adaptive Streetlight is a modular solution built on the Big Data, IoT-enabled TCS Connected Intelligence Platform. The offering features:

- **Real-time performance monitoring and analysis**: Based on real-time and historical data, the solution monitors and analyzes streetlight energy performance against set energy efficiency targets. It monitors the ‘as-is’ energy landscape down to the city streetlight. Using a goal-based approach, IUX benchmarks performance against industry standards to identify areas of improvement. It quickly identifies lights that are underperforming on the energy efficiency scale to focus on a real-time view and alerts, such as a key performance indicator breach, controller / lamp failure, on/off status, and more.

- **Adaptive Streetlight Optimization with Recommendations and Actions**: IUX Intelligent Energy delivers recommended actions using a unique optimization model and a proprietary real-time edge analytics agent that communicate with existing systems. The pre-built energy data model captures city street dynamics such as traffic, people movement, street type, weather to identify optimal operation. An optimized streetlight schedule adapts to a city priority for that area, such as maximum energy savings, minimized consumption, carbon reduction, and more. The solution can override existing lighting schedules with new ones in real time.

- **Plug and Play Integration**: IUX Intelligent Energy features easy integration with existing streetlight infrastructure systems with an energy-specific data model. The robust TCS Connected Intelligence Platform ingests data from all types of sources and allows cities and partners to rapidly and easily extend the solutions’ pre-built data model to unique use cases.

Benefits
TCS IUX Intelligent Energy for Adaptive Streetlight Optimization solution helps cities:

- **Meet sustainability targets**
  - Manage streetlight energy consumption to attain city sustainability targets
  - Leverage real-time city data for traffic, footfall, and more to optimize energy and minimize city light pollution

- **Lower operational and capital expenditures with optimized streetlighting**
  - Forecast traffic, footfall, and other city parameters and set targets with goal-based approach based on integrated optimization algorithms
  - Automate using adaptive scheduling agents to replace costly and inaccurate manual analysis
  - Deploy ‘as-a-service’ cloud solution

- **Accelerate implementation and benefits realization**
  - Integrate key city data into the data model using REST APIs to speed integration
  - Streamline management of multiple energy data sources
  - Scale efficiently with Big Data Connected Intelligence Platform

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