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LUMIROUTE®

OPTIMISING THE BALANCE BETWEEN ROAD SURFACES AND LIGHTING FOR THE RIGHT LIGHT

Road projects are rarely designed by combining the reflective characteristics of the road surface with those of the lighting that will illuminate it. Yet it is the luminance, that's to say, the light perceived by the driver, that should determine the successful dimensioning of the lighting installation.

Lumiroute® relies on this fact to offer a project involving these two themes in order to optimise the performance of the installations, with the aim of achieving significant energy savings. The evaluation of Lumiroute®, scheduled over a period of 3 years, started in 2014 on an experimental site in Limoges.

INNOVATIONS

▶ The principle of the Lumiroute® process is based on optimising the management of urban assets by combining two trades:

- the road, by mastering its ability to reflect light,
- the lighting, by taking into consideration the optical properties of road surfaces to dimension the installations.

▶ The Innovation allows an optimised concept to be proposed whereby the road surface and the lighting equipment are inseparable in order to provide a controlled luminance. The electrical power installed is also directly dependent on the optics of the street lamps associated with the properties of the road surface's reflection.

▶ The surface covering was formulated in the laboratory in order to optimise photometric properties. It can either be a light covering by combining synthetic binder and specific pigments, or a traditional covering made of light aggregates whose colour is left apparent by hydroblasting (high pressure water projection).

▶ Thanks to an innovative technology in the light intensity management system provided by LED street lamps, "Lumiroute®", addresses the power and light distribution depending on developments in the time of photometric properties of the road surface. The goal is to the "right Light".

STAKEHOLDERS

▶ Winner in 2011 of the call for projects for "Road Innovation" launched annually by the Ministère de l'Environnement, de l'Energie et de la Mer (MEEM), the Lumiroute® system is subject to a procedure defining the framework for an experiment that includes broad support of CEREMA (Centre d'Etudes et d'expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement) and ADEME (Agence d l'Environnement et de la Maîtrise de l'Energie), together with the designers for the Lumiroute® process experiment on a real site.

▶ The Communauté d'agglomération Limoges Métropole is a project partner strongly committed to sustainable development.

▶ A steering committee is made up of the different stakeholders, both public and private, working in partnership on this project: Limoges Métropole, the project client; Cerema, commissioned by the Comité d'Innovation Routes et Rues (CIRR); Malet, specialised in road construction, the lighting specialists Thorn; Spie Batignolles Energie, experts in lighting and electrification, and ADEME.

KEY DATA

- → **Reduction in the amount of lighting equipment** (street lamps and cables)
- → **Individual and intelligent management of lighting power**
- → **Less glare**
- → **Reduction in light pollution**
- → **A profitable investment** for a town whose public lighting expenses represent 10% of its operating budget

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IMPLEMENTATION

▶ For the first experiment of the Lumiroute® process at a national level, Limoges Métropole was able to invoke Article 75 of the Procurement Code and establish a works contract following a tendering procedure limited to the winners of the call for projects.

▶ The requirements for the site selection were the existence of a new lighting project for a sufficiently long and straight section of road, designed for heavy traffic.

▶ The experimental site is made-up of two control sections with traditional solutions (discharge lighting) and two Lumiroute® sections with the combination of surface coverings + adapted lighting (LED).

▶ The site, commissioned in the last quarter of 2013, is regularly monitored with photometric property readings every six months, together with the main characteristics of the asphalt and lighting. The evaluation covers the entire installation and then for each component (street lamps and the ground), considered individually, (energy, photometric and acoustic evaluations). The environmental lighting assessment that focuses on the spread of light emanating from the lamps, allows the light pollution to be measured.

▶ After three years of experimentation, a report presenting all the results will be produced by the Monitoring Committee led by CEREMA to validate the innovative solutions used.

> *The objectives have been met and even exceeded.*
>
> **Gérard VANDENBROUCKE,**
> president of the Communauté d'agglomération Limoges Métropole

RESULTS

/// The four sections show an adherence conforming to the standard noise levels and which have not evolved significantly.

/// Based on the photometric surveys carried out over different periods, an over-dimensioning of the light level was observed on all sections. The flexibility of Lumiroute® facilities allowed the steering committee to take the decision to gradually lower the power of the LEDs.

/// So, after two years, this reduction of 38% of the installed capacity on the Lumiroute® sections has allowed an energy saving of around 60 to 70%. The Lumiroute® sections are 3 times less energy-consuming than control study sections.

/// There is also better control of lost light flow (non-useful light reflected back into the sky) for Lumiroute® sections which therefore causes less light pollution.

THE FINANCIAL SCALE OF THE OPERATION

/// A real additional cost of the solution Lumiroute®

The extra cost of a solution such as Lumiroute® compared to a traditional solution, is estimated to be around 40 to 60%.

/// Offset by energy savings

Energy savings are estimated to be in the order of 60 to 70% → **Profitability after 5 years.**

KEY DATA

- → **Total cost of the experimental project: €450k**
- → **ADEME Grant: €30k**
- → **Monitoring services are undertaken by CEREMA**

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