LEDLUM - TINY LIGHT ENGINE FOR LARGE SCALE LED LIGHTING

Newsletter
March 2017—Issue 1

LEDLUM

Main Project Information

LEDLUM develops a highly integrated cost competitive light engine technology platform for Solid State Lighting (SSL) connected directly to the electrical power grid. It proposes to develop an integrated system level solution for realising a highly miniaturised, efficient light engine.
LEDLUM is committed to make a major innovation step in overall solid-state lighting engines by :

- **90% size and weight reduction** of the power electronics part in the LED driver,
- **reduction of material cost** by a factor of 2,
- **reduction of energy losses** by 45%, and
- **increase** of the expected **lifetime** from 5 to 10 years.

The methods include integrated magnetics, deep-trench silicon level capacitor design, integrated circuit level power electronics and mechanical design for optics and end customer ready demonstrators.

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Message from the Coordinator

The intention of this newsletter is to open a new communication channel in order to provide news on the project progress and to discuss ongoing topics relevant to LEDLUM for internal and external project partners, stakeholders and all other interested bodies.
For more detailed information about and around the project we warmly invite you to have a look on our **project website**, which is constantly kept up-to-date with the latest project related news: www.ledlum-project.eu. The project has successfully started with the kick-off meeting in November 2016 and since then the project has been in its initial stages of formation. The overall **system architecture** and the **requirements** of LEDLUM and of its management services is being discussed and defined and the first steps towards the design of prototype-modules have been taken.
LEDLUM **covers the whole supply chain** starting from passive and semiconductor components of power electronics systems, light engines to complete luminaires. Thereby a European eco-system that supports highly optimized LED systems is established. The drastic size reduction enabled by the innovative technology platform in LEDLUM is a direct response to the "breakthrough in miniaturization of SSL light engines and systems" contained in the Research and Innovation Action of the ICT29 call. This leads to a strengthening in Europe's lighting business and will probably **create around 1.000 new highly sophisticated jobs**. LEDLUM with its disruptive technological approach will therefore **strengthen the market position** in the field of LED drivers and LED based luminaires for the next decade.
The LEDLUM consortium consists of **7 partners from 4 different countries** (Austria, Denmark, France and Ireland) who will support the project success with their know-how and expertise.

Concept

LEDLUM will make major **improvements** to the **volume**, the **weight**, the **lifetime** and the **size** of the **driver** (electrical engine) of light emitting diodes (LED), that are used in the majority of Solid State Lighting (SSL) systems. These improvements will be made while keeping the power rating of the driver. To achieve this, the operating frequency of the driver will be increased by approximately a factor of 1,000.

Key Data:

Start Date:	1st November 2016
End Date:	31st October 2019
Project Reference:	731466
Project Funding:	€ 4.118.521

Consortium:	7 partners (4 countries)
Project Coordinator:	Dr. Klaus-Michael Koch coordination@ledlum-project.eu
Technical Leader:	Dr. Mickey Madsen mickey@nopoc.com
Project Website:	www.ledlum-project.eu

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Work Package Overview

The LEDLUM project is planned to run for 36 months. It is organized into eight work packages (WP) with significant dependencies and expected synergies between them which are described shortly in the following. **WP1 "System Architecture"** will define the overall architecture of the LED driver systems, the system components and interfaces and the system requirements. **WP2 "Passives"** deals with integrated passive components for use in the LEDLUM's electrical engine. **WP3 "Semiconductors"** focuses on the power semiconductors and integrated circuits of LEDLUM's electrical engine. **WP4 "Power Electronics"** contains the research and development of the AC-DC and DC-DC converter as well as the fabrication of the sub-components for the demonstrators. The goal of this WP lies on the improvement of the major market drivers in respect of size, volume, cost and lifetime. **WP5 "Driver System"** targets the assembly of the AC-DC and DC-DC converter together with the controls and power management to obtain a complete driver system. **WP6 "Luminaire System"** uses the developed LED driver in order to build complete LED light fitting systems. Two LED light fitting systems will be designed as part of this WP. **WP7 "Dissemination, Communication, Exploitation, Standardisation and Training"** obtains inputs from all other WPs and ensures the communication and dissemination of results achieved within the individual WPs to the outside parties as well as to participating entities. Finally, **WP8 "Project, Risk, and Innovation Management"** interacts with all other WPs in order to ensure a successful project lifetime with respect to risk and innovation management. WP8 coordinates and ensures that the tasks are in line with the project work plan in order to reach the common goal of LEDLUM.

Past and Ongoing Activities

After the successful project kick-off each partner has enthusiastically looked into their tasks within the particular Work Packages (WPs) and started progress towards the objectives. The first deliverables have been submitted and quite some work has been performed during the last 6 months.

Within WP1 work on an initial feasibility assessment started and a questionnaire was developed in order to collect information regarding possible future products or services emerging from LEDLUM. Besides that, Task 1.2 "System architecture during specification phase" was completed. Furthermore, a draft block diagram showing the individual modules was established and System Architecture and Requirements (SAnR) v02 was released and reviewed.

In WP2 a preliminary study of the ecosystem of suppliers for high dielectric strength materials has been carried out and a supplier offering best strength performance has been selected. Moreover, the optimization of 3D structures to adapt to the dielectric thicknesses that are projected for the LEDLUM application was initiated. Additionnally, a state of the art review for sputtered soft magnetic materials has identified CZTB as a promising first candidate material. Consequently it is the likely choice of material for fabricating the generation 1 magnetic devices. Further, a first silicon run on planar (2D) structure has been launched and is currently under process to evaluate the material performance. Some partners also started working at WP3 already.

Within WP4 the interface discussion was started during a face-to-face meeting between some of the partners. The main specification in this interface was found to be the bus voltage between the AC-DC and the DC-DC block and the ripple allowed on this.The synthesis and implementation of DC-DC stages, with a focus on bus voltages and the influence on the DC-DC efficiency,have been initiated.

In WP5 the selection of LowVoltagePowerSupply-circuits (LVPS_lo & LVPS_hi) started, whereas the LVPS_hi circuit is still in selection-process. Besides that, a first draft of the DALI-interface with basic requirements was designed.

There is no considerable progress to report in WP6, as this WP will only start in September 2017.

Within WP7 a project website and an information platform have been set up. Also the design of a project logo and project leaflet has taken place and a Twitter account for LEDLUM was created, in order to reach followers of general public with short notices on the project progress. Results from WP8 showed that the collaboration among the partners is well functioning. The project managment team performed work such as reporting to the EC, distributing the pre-financing, designing templates, and handling day-to-day requests with partners and external bodies.

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