Tiny Light Engine for Large Scale LED Lighting

LEDLUM

MISSION

- Develop a **highly integrated cost competitive light engine technology platform** for Solid State Lighting connected to the electrical power grid.
- Develop an **integrated system level solution** for realising a highly miniaturised, efficient light engine.
- **Strengthen Europe's lighting business** with advanced technology and is expected to **create** around 1,000 **new highly educated jobs**.

OBJECTIVES

- 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%
- **Increase** of expected **lifetime** from 5 to 10 years.

EXPECTED INNOVATIONS

- **New soft magnetic thin film inductors** to increase magnetic on silicon energy efficiencies.
- **Increase the capacitance of ultra high density PICS trench capacitors** for HV applications under stable temperature and voltage linearity and state-of-the-art parasitic inductance and resistance.
- **Use the most competitive power semiconductors** in terms of energy efficiency and combine with drive and control circuitry for operation in the VHF range.
- **Use silicon wafers with embedded capacitors** as mechanical and electrical base for other electrical components, especially as magnetic-on-silicon based inductors and power transistors to achieve unprecedented power densities.
- **Combine the above magnetic**, capacitors and power semiconductors in a granular approach with novel ripple port circuit topologies to form a grid -tied AC-DC converter without electrolytic capacitors.

TECHNICAL APPROACH

The LEDLUM project is planned to run for 36 months. It is organized into eight work packages with significant dependencies and expected synergies between them which are described shortly in the following.

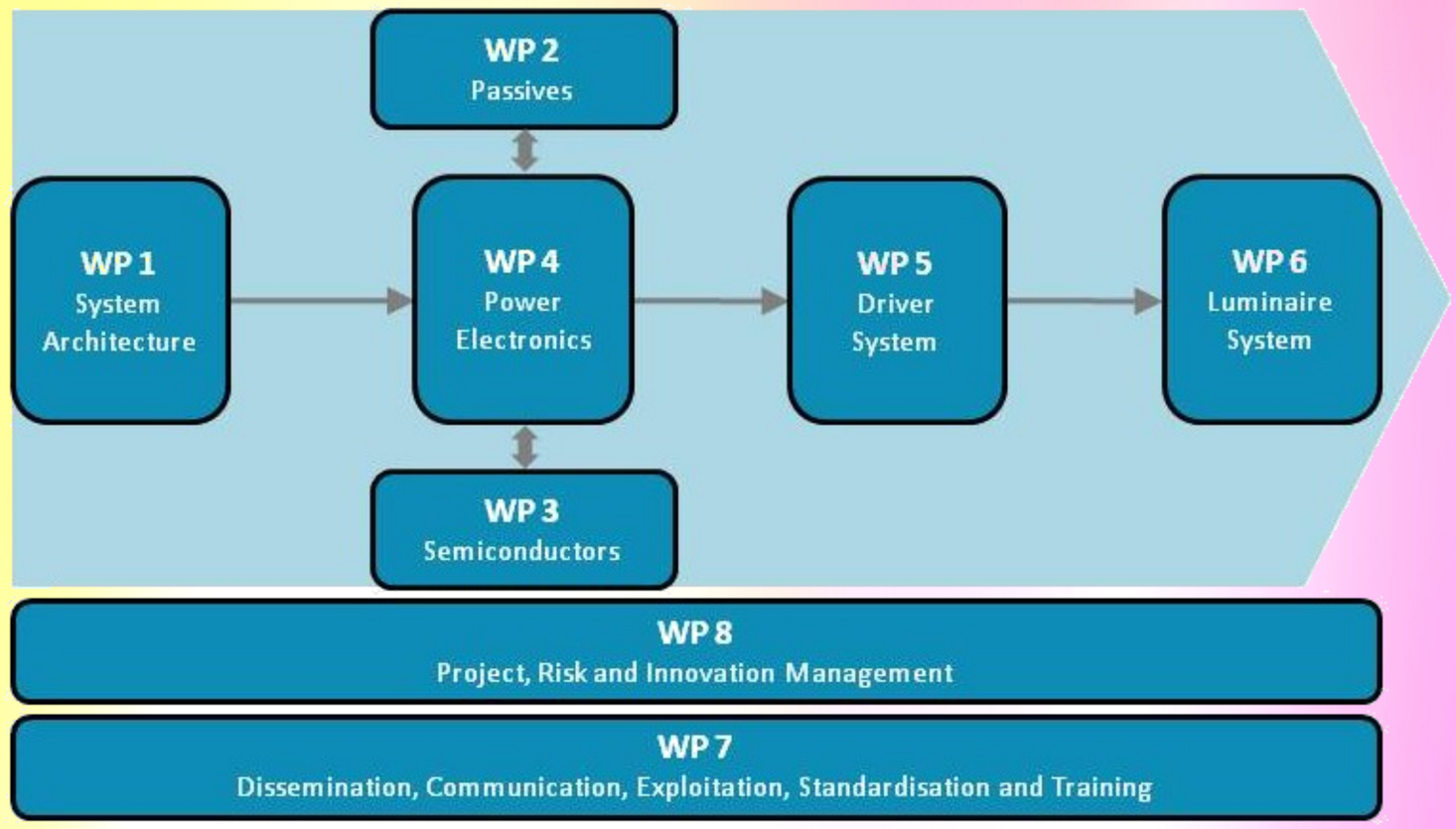
WP1 System Architecture defines the overall architecture of the LED driver systems.

WP2 Passives deals with integrated passive components and the development of a novel magnetic material and the optimisation of a laminated magnetic core structure/process, as well as magnetic research.

WP3 Semiconductors focuses on the power semiconductors and integrated circuits of LEDLUM's electrical engine and the optimum solution for the power devices and ICs is aimed to be realized.

WP4 power Electronics 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. Also the overall control and interface for the LED driver is a major aim of this WP. Moreover, all individual blocks will be assembled into a single and complete LED driver, which can be tested on a system level.



LEDLUM work package structure

WP6 Luminaire System uses the developed LED driver in order to build complete LED light fitting systems.

WP7 Dissemination, Communication, Exploitation, Standardization and Training ensures the communication and dissemination of results achieved to the outside parties as well as to participating entities.

WP8Project, Risk, and Innovation Management interacts with all other WPs in order to ensure a successful project lifetime with respect to risk and innovation management.

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Project Partners:

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PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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