



## Tiny Light Engine for Large Scale LED Lighting

### Message from the Consortium

The two and a half years of the project have passed and the partners can look back at very active time with many ups and downs. All partners are committed to the project and the cooperation within the consortium is efficient and fruitful.

They have developed the work plan and designated many to-do's for the last few months. Everyone is energized and motivated to bring the project home on time while meeting all goals and objectives.

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##### Consortium

7 partners (4 countries)

Project number: **731466**

Project website: [www.ledlum-project.eu](http://www.ledlum-project.eu)

##### Project Coordinator

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Project start: **1<sup>st</sup> November, 2016**

Duration: **3,5 years**

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Total cost: **EUR 4,118.521,25**

EC contribution: **EUR 4,118.821,25**

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# Technical and Advisory Board Meeting in Cork

*From the 13<sup>th</sup> to the 15<sup>th</sup> of March, 2019, the LEDLUM partners met for a technical meeting and Advisory Board (AB) Meeting in Cork, Ireland, hosted by partner Tyn-dall.*



Partners reflected on the first two years of the project with a concentration on the last six months. They also identified several hot discussion topics and voted to select the most important ones.

The two hot topics chosen for discussion were, “System Architecture” and “Integration (Module/SiP/passives)”. The consortium split in two groups to work on these topics and afterwards presented and discussed their findings in the group as a whole. On the second day of the meeting, Advisory Board member Johannes Stahr joined the consortium.

After a short wrap-up of the first day, the consortium again split in two groups and focused on the integrated passives/SiP and the development track demo. The findings of the two groups were then presented and discussed with the whole group. After lunch, the consortium returned to their groups and worked on the research track demo and the

luminaire demo. Afterwards they came back together and discussed their findings.

With all the new input from these two days, the consortium decided to focus on the hot topics on the last day. “Dissemination & Exploitation” and “Magnetics” were selected. At the end of the second day, the Advisory Board members, who actively participated in the discussions, provided valuable feedback, which will help fulfill project goals.

After a short wrap-up of the second meeting day, participants continued interesting discussions in a less formal atmosphere during a common dinner. The last day was used to discuss the two hot topics, to align further work, and to collect the action points and define responsibilities. In summary, the meeting was an important step forward for LEDLUM, which stimulated future thinking while sharing the results of everyone’s work thus far.

# Technical and Advisory Board Meeting in Cork

The LEDLUM consortium has shown healthy progress in the project. They implemented the proposal to split development activities from research activities.

This is named Development-track (D-track) and Research-track (R-track) and the partners have focused to work in their particular track.



## Research- and Development-track

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### *D-track*

Works on the improvement of architecture – size, frequency, EMI and upgrading TRL level. Tridonic would like to have a production ready demonstrator in hand by the end of the project. Reduction of the length fitting in the small housing and thermal management have been the “environmental” topics. The optimization of magnetics, frequency, losses and the optimization of components to fit in 50cm<sup>3</sup> will be the next task.

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### *R-track*

The partners are doing the task, as it was intended. Find the right concepts to move technical targets. Single stage, two stage, three stage converts are in discussion to find the optimized concept for size reduction for the 50W converter. The initial target was 10cm<sup>3</sup> - which means 5kW / liter. The consortium will also focus on Driver on board (DOB) in the upcoming months. This will be implemented in the single stage converter but in the second priority of the R-track. All over the R-track stays on technology which is not so far away from the D-track.

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### *Cooperation*

Is better than satisfactory. Monthly conference calls and on-demand technical meetings are taking place. The work in R- and D- track brought improvements in this field and the team has grown together in the last year. All over, I see that Technikon manages the team well and all Partners are fully committed and engaged in the Project.

# Technical progress in the last few months

## ● *Driver system*

The consortium focused on improvements to the first full system demonstrator presented in the previous newsletter and preparing for the final system demonstrator. The following areas have been covered:

### *EMC*

#### *Surge Protection*

#### *Thermal design*

#### *PFC design*

Informal EMC-measurements with the demonstrator in a luminaire were done. Furthermore, various EMC filter topologies for the resonant converter were investigated and characterized for both radiated and conducted EMC.

Also, the effect of the AC wire placement with regard to the converter was investigated, and a filter with less influence on AC wire was derived. Additionally, 1kV surge protection (requirement for the CE marking) was investigated: selection and placement of a MOV was found.

An anti-surge resistor and the option to include a small TVS diode to protect the converter further was also investigated.

Thermal simulation was compared with reality and additional constructions (partial potting and assembling on heatsink respectively in luminaire) were executed.

Initial investigation for size reduction for the next PFC design was performed. Planar magnetics and higher frequencies were considered as possible solutions.

## ● *Silicon integrated capacitor technology*

Significant progress has been made toward the demonstration of a 1.2kV silicon integrated capacitor technology. Recent Vramp results shows that a VB<sub>break</sub> nearly 1.2kV could be achieved corresponding to a V<sub>use</sub> > 1kV for 10 years lifetime @ 100°C.

For that voltage, specific capacitance exceeding 0.5nF/mm<sup>2</sup> could be demonstrated. The technology is available as vertical caps (one terminal on each side) and demo chips for horizontal caps (2 terminals on top sides) are being manufactured. This capacitive technology will be used for the final LED-LUM demonstrator.