SESSION Effects

INFODAY AND BROKERAGE EVENT
12 APRIL 2018
PREPARATORY ACTION ON DEFENCE RESEARCH

Call Text presentation RA Topic Call PADR-EF-02-2018

Towards a European high power laser effector
Towards a European high power laser effector

Operational advantages:

- Engage rapidly and precisely **agile targets**;
- **Low operational cost** per short;
- Reduced risk of collateral damage;
- C-UAS;
- C-RAM;
- C-Missiles.

Existing limitations:

- Sensitivity to **absorption and scattering**;
- Decreased beam quality under **adverse atmospheric conditions**.
PADR-EF-02-2018 - Challenge (2/3)
Towards a European high power laser effector

Expected requirements:

- Laser **output power** as high as possible;
- Maintain a **high beam quality**;
- Focus and lock the laser beam to a **small spot size** on the target;
- **Compact design**;
- **Integration in mobile platforms** (ships, trucks or helicopters);
- > **100kW**
PADR-EF-02-2018 - Challenge (3/3)

Towards a European high power laser effector

Current activities in Europe:

• Single high power laser do not go beyond 30 kW;
• Architectures that combine incoherent beams on the target;
• Risk of fully dependency on non-EU suppliers;
• Potential end-user restrictions (e.g. ITAR).
PADR-EF-02-2018 – Scope (1/6)

Towards a European high power laser effector

• Output power well beyond 100 kW;
• Operate in a continuous mode and high duty cycle;
• Output wavelength, beam quality and optical systems able to cope with:
  - variable atmospheric conditions;
  - ranges for the specific scenarios;
  - environmental safety constraints (urban areas);
• Graduated responses by varying output power, at the level of the source, without beam quality degradation.
PADR-EF-02-2018 – Scope (2/6)
Towards a European high power laser effector

• **Integration** in current and future compact laser systems;

• **Mounted on mobile (sea, land or air) platforms:**
  - reduced energy consumption;
  - lower cooling requirements;

• **Lower weight** while keeping a sufficiently rugged design;

• **Wall plug vs. optical efficiency** of the laser effector must be clearly estimated;

• **Optimised duty cycle** for each type of platform;

• Damage and lifetime **predictions** of components (simulations and modelling).
PADR-EF-02-2018 – Scope (3/6)

Towards a European high power laser effector

R&D assessment

Criticality mapping

R&T activities

Measurement aspects

Legal and safety regulations

Requirements for a complete laser system and its integration with platform

Cost breakdown for the development

Outline of the roadmap

Criticality mapping

Map materials, components and technologies (including skills) need priority support

End-user restrictions imposed by non-EU countries

Based on selected scenarios (R&D assessment), investigate at least:

• Single-beam high power laser technology
• Laser architectures capable to deliver graduated responses (novel beam combining technologies)
• Wavefront management of the laser beam (including innovative adaptive optics)
• Focusing and tracking the laser beam on the target

R&T activities

Select one or more materials, components, laser design or technologies R&T activities that can be taken up in the early stages of development phase

At least one demonstrator to address a specific technology gap and/or prove the potential of the technology for future power increase (scalable laser power capability)

Involving European end-users

Key performance indicators (KPI)

EDA, NATO and EU Programmes

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Towards a European high power laser effector

R&D assessment

Technology roadmap

Joint EU development programme (TRL 8 by 2027)

Typical scenarios:
- C-RAM
- C-Missiles
- C-rapid, small boats
- C-M/UAS

Measurement aspects

Legal and safety regulations

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EDA, NATO and EU Programmes

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**R&D assessment**
- Technology roadmap
- Joint EU development programme (TRL 8 by 2027)
- Typical scenarios:
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  - C-Missiles
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- Measurement aspects
- Legal and safety regulations
- Requirements for a complete laser system and its integration WS/platform
- Cost breakdown for the development
- Outline of the roadmap

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**R&T activities**
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R&D assessment

- Technology roadmap
- Joint EU development programme (TRL 8 by 2027)
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- The implementation of this topic is intended to target TRL 5.
- EU contribution: EUR 4 000 000 to 5 400 000.
- No more than one action will be funded.
- Deadline for applications: 28/06/2018
PADR-EF-02-2018 – Expected impact
Towards a European high power laser effector

- Convincing the **potential of EU-funded research** in support of EU critical defence technologies (high power laser effectors);
- Establish a **R&D assessment** towards an EU High Power Laser Effector by 2027;
- Ensure a **secure and autonomous availability** of high power laser effectors to military end-users by 2027;
- **Strengthening European industry** on its global position, through innovative technologies along a new European manufacturing value chain.

**Type of Action:** Research Action (RA)
PREPARATORY ACTION ON DEFENCE RESEARCH

Questions and Answers

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PADR-EF-02-2018

Towards a European high power laser effector

Background information subject to end-user restrictions:

• The call aim is to fund research projects that will generate substantial availability to military end users

• End-user restrictions on background could severely reduce the impact of the proposal on this point

• The description on the agreement on background (section 3.5 of the technical annex of the proposal template) should carefully cover such restrictions

• To propose development of alternatives that could lift such restrictions as part of the project.