# COGEM CPV - An innovative Ceramic Heatsprider within HCPV (High Concentration Photovoltaic) Technology

## Sprawozdania

Informacje na temat projektu

**Cogem CPVTM**

Identyfikator umowy o grant: 674311

Strona internetowa projektu

**DOI**
10.3030/674311

Projekt został zamknięty

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1 Czerwca 2015

**Data zakończenia**
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SOCIETAL CHALLENGES - Secure, clean and efficient energy

**Koszt całkowity**
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**Koordynowany przez**
SOLERGY ITALIA SRL CON UNICO SOCIO
Italy

## Periodic Reporting for period 2 - Cogem CPVTM (COGEM CPV - An innovative Ceramic Heatsprider within HCPV (High Concentration Photovoltaic) Technology)

**Okres sprawozdawczy:** 2016-06-01 do 2019-12-31

Podsumowanie kontekstu i ogólnych celów projektu

""“COGEM CPVTM” is a Solergy Italia srl project financed by the European Union’s Horizon 2020 research and innovation program under grant agreement No 674311.
The general objective of the project is to develop “COGEM CPV”, an innovative heatspreader to be integrated in the context of High Concentration Photovoltaic (HCPV) technology. By adopting and applying new materials, particularly ceramics, it is estimated that a reduction of 25% in energy generation costs and an improvement of 3% in performance can be achieved.
The heat spreader is a small system component of the overall Solergy HCPV system that however represents the heart of Solergy’s technology. The heat spreader system contains the solar cell and provides for the electric power production and heat recovery. The heat spreader is an upgradeable component that makes Solergy to be the unique PV player able to allow upgradeability of the system thus increasing electric energy output that normally decreases in time.
By using new components, materials, and technologies, the proposed innovative system reduces costs by eliminating certain parts and assembly process steps that currently contribute to the final cost of the manufactured heatspreader component.
The objective of Solergy is to introduce a new approach to HCPV by resolving current technological issues related to the heat spreader system and enabling HCPV to take its rightful place as the solar technology of choice for sunny regions. “COGEM CPV"" is an important contribution to the world’s first field upgradeable, 40+ year lifetime High Concentration Photovoltaic (HCPV) system.
The disruptive potential of “COGEM CPV” lies not only in its potential to greatly reduce the cost of solar electricity generation, but also in the ability to co-generate heat that can be applied for cooling, hot water, process heat, and higher efficiency desalination.
With the introduction of “COGEM CPVTM”, Solergy can tackle the challenges set out by the Work Programme and the resulting Energy and Climate targets for 2020 and beyond that aim to reduce greenhouse gas emissions, increase the share of renewable energies, improve energy efficiency and, ultimately, contribute to the establishment of an energy system that will deliver a competitive, secure, and sustainable energy supply."

## Prace wykonane od początku projektu do końca okresu sprawozdawczego oraz najważniejsze dotychczasowe rezultaty

1) Research activities for the development of a new innovative component have generated a new dual-use HS (500X and 1000X concentration factor), tested over project duration, that reduces unit power production costs up to 61% and improves performance up to 83,5% well above project goal;
2) IPR Management & Market research: IPR management activities have been successfully carried out and a patent has been filed. Extensive stakeholder and market analysis, enriching the exploitation and market deployment strategy have been carried out successfully. Based on direct interactions, meetings presentations, and extensive dialogues with over 100 diverse stakeholders spanning end customers, project developers and EPCs, utilities, panel manufacturers, oil & gas companies, and insurance and finance companies a well-targeted and concrete strategy for market deployment of project results has been defined. All project milestones and deliverables were completed successfully.
3) Dissemination activities and all deliverables have been completed, successfully achieving all project milestones. These included initial communication and dissemination plan, website

development with periodic updates and enhancements, social media presence and posts, e-newsletters, articles in both popular and peer-reviewed scientific journals, mentions and feature articles by independent press, periodic press releases, participation in fairs, exhibitions, conferences, and specialist workshops, preparation and dissemination of brochures, white papers, and branded communication pieces for broad dissemination, and preparation of highly tailored content for specially targeted dissemination. The Final Exploitation plan describes the strategy and methods by which Solergy intends to drive business outcomes based on the COGEM CPV technology that was developed during the project while the Final Dissemination Report summarizes and assesses the impact of the numerous dissemination activities described above.

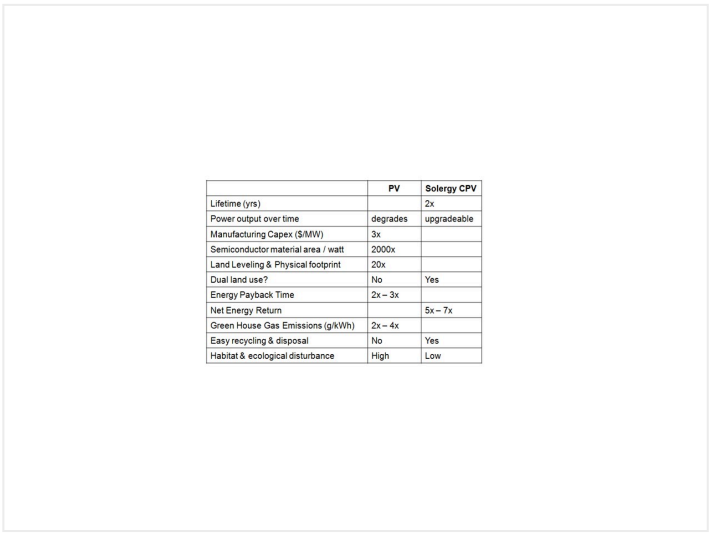
## Innowacyjność oraz oczekiwany potencjalny wpływ (w tym dotychczasowe znaczenie społeczno-gospodarcze i szersze implikacje społeczne projektu)

The International Energy Agency (IEA), in its report Energy Technology Perspectives, June 2016, noted that while progress is promising, global clean energy deployment is still behind what is required to limit global warming by 2°C by 2025 (2DS target). The report further noted that greater innovation is essential to meet ambitious climate goals.
Within this context, progress on solar energy deployment has been solid, adding another 110GW in 2019. By now there is no question that solar can scale and it must be a significant part of the energy mix to fulfill the 2DS target. But, how much will it cost to scale solar by 10x-20x to achieve the necessary capacity of multiple terawatts? Not only in terms of capex and investment, but also in terms of materials consumption, energy, disposal, land use, and environmental damage? The challenge and the opportunity now is to develop strategies to scale up solar adoption to terawatt production levels at low cost, but also in an environmentally sustainable way.
HCPV systems provide a highly scalable, low impact pathway to terawatts of solar energy in regions with high solar resource. They extract up to 1000 times more power per unit area of semiconductor material by using lens and/or mirrors to concentrate sunlight 500 – 1500 times onto tiny multijunction cells of dimension 1cm2 or less. In this way, expensive, hard to recycle semiconductor is replaced with cheaper materials such as glass and metal. Multijunction cells with efficiencies over 40% are already commercially available and are expected to reach 50% efficiency within the next 3 years.
With the above strategies we will extract more power from less land and consume smaller quantities of expensive and toxic semiconductor material. Now imagine that we could double the lifetime of a solar power plant to 40-50 years and actually boost its power output over time rather than watch it passively degrade to obsolescence. The savings in capex, resource and land consumption, and ultimately energy costs would be enormous. Natural gas or coal power plants are built to last 40 years or more, why should solar be less?

(see Figure 1)

The COGEM project plays an important role in the realization of low-cost, sustainable solar by supporting the development of the heat spreader – the upgradeable component which helps make the various benefits described above feasible. Already, technological breakthroughs in thermal

management under concentration, that minimize cell operating temperatures and thereby maximize conversion efficiency, have been realized. New, innovative designs that reduce component count and reduce cost of assembly are in advanced phases of realization. The sum of these efforts are expected to bring the heatspreader component in line with required cost and performance targets.
In conclusion, the activities within the COGEM project are driving the realization of 40 Year, Upgradeable Solar beyond the current state of the art and are making significant contributions towards the broader societal goals of accelerated solar adoption in a sustainable fashion.



| | PV | Solergy CPV |
|---|---|---|
| Lifetime (yrs) | | 2x |
| Power output over time | degrades | upgradeable |
| Manufacturing Capex ($/MW) | 3x | |
| Semiconductor material area / watt | 2000x | |
| Land Leveling & Physical footprint | 20x | |
| Dual land use? | No | Yes |
| Energy Payback Time | 2x – 3x | |
| Net Energy Return | | 5x – 7x |
| Green House Gas Emissions (g/kWh) | 2x – 4x | |
| Easy recycling & disposal | No | Yes |
| Habitat & ecological disturbance | High | Low |

Environmental impact

**Ostatnia aktualizacja:** 6 Kwietnia 2020

**Permalink:** https://cordis.europa.eu/project/id/674311/reporting/pl