



## DEVELOPING NEXT GENERATION PHOTOVOLTAICS

Abstract of Investment Opportunity

### Revolutionary technology for photovoltaic modules

**crystalsol** develops an entirely new type of flexible photovoltaic module with a significant cost advantage compared to all currently known photovoltaic technologies. The technology is the unique combination of decades of research for the Russian military and Philips semiconductor know-how from the 1960s. The key competitive advantages are

- Production of flexible, transparent and colored modules, tailor made in size and shape primarily for applications in building integrated photovoltaics (BIPV)
- Use of a unique semiconductor powder made of abundant and low cost materials, avoiding the need for silicon, indium, or tellurium
- Simple and high speed roll-to-roll production process without upscaling issues
- Supply of unsealed modules which can be packaged into building elements by customers thereby dramatically lowering total system cost

The technology leads to module cost reduction of 50-60% compared to current industry average. Considering the most aggressive projected price decline until 2013 this implies a future cost advantage of 20-30% achievable already at low scale production.

### High growth market

The market for photovoltaics has recently been growing at roughly 45% p.a. and will continue to grow on average about 20% p.a. at least until 2020. While the overall market is already growing tremendously the share of BIPV is expected to grow from 5% to about 30% in 2020.

### Strong intellectual property position

The key patent for the semiconductor powder production has been granted worldwide; several others are filed or in preparation. Extensive patent research has not identified any competing patents. A team of 16 development engineers is advancing the existing prototypes in two newly set up facilities in Austria and Estonia. A close cooperation with Tallinn University of Technology ensures continued access to IP generated through basic research.

### Unique combination of team skills

**crystalsol's** team combines scientific and business competence. Co-CEO's Thomas Badegruber and Wolfgang Ressler have startup experience and a strong background in management consulting. CTO Dieter Meissner and Head of Development Christoph Waldauf have many years of experience in photovoltaic research and development.

### Attractive business case

Current semi-automated production leads to monolithic prototype modules of 5x5 cm<sup>2</sup> in size. Top score cell efficiency is above 6 percent. The innovative production process reduces capital requirements and can more easily be scaled up and multiplied than all other photovoltaic technologies. Total capital requirement for product development is estimated at EUR 7 million until 2012. This includes a roll-to-roll pilot line with about 5 MW nameplate capacity. If a commercial production facility is realized in 2012, first revenues of annualized EUR 15-25 million are possible in 2013.

**crystalsol** is looking for an equity investment of EUR 5 million, which will be leveraged by up to EUR 2 million of public grants and cover the capital requirement for the next phase. Exit options after product development include trade sale, licensing, or joint venture.

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