

U-Light -

Ultra lightweight PV modules and their applications in innovative PV systems achieving lowest levelized cost of electricity (LCOE)

ISC Konstanz (Coordinator) - Germany



Isovoltaic – Austria



PCCL - Austria



ZHAW - Switzerland



Objectives

- Light weight PV systems may enable new applications
- Reduced weight may result in lower module and/or system cost
 - Less material consumption
 - Lower-cost mounting solutions, lower transport cost,...
 - Cheaper material?
- Basic structure of c-Si PV modules unchanged for decades
 - Innovative approaches with regard to module materials, design
- Novel cell technologies which also affect the module concept
 - Highly efficient cell concepts & integrated bypass diode
- Module materials which enable increased efficiencies
- Reduced levelized of cost of energy (LCOE)

Main approaches: Weight / Materials / Cell & Module Design

- Standard module: Stability based on thick glass and/or aluminium frame
 - Glass and frame have considerable weight ; lower weight \Rightarrow reduced stability
 - Approach: Novel module design and/or use of alternative materials
- Also other materials still have potential for reduced weight/material consumption
 - Encapsulant & Backsheet (also new standard)
- Lower module weight may result in lower BOS cost and enable new applications
 - Mounting solutions adapted to novel module design concepts
- Backsheets with improved reflectance ; encapsulants with improved clarity
- Bifacial & highly efficient cells
 - Increased yield at module and system level
- Omit/integrate bypass-diodes
 - Integrated shunting path to prevent hot spots (reduce cost and failure susceptibility)

Individual work packages related to:

Material

Glass

GRP

Encapsulant,
backsheet

Module

CTM

Bifacial,
monofacial

Light weight,
alternative
design

Cell

Intrinsic
bypass diode

Bifacial Bison

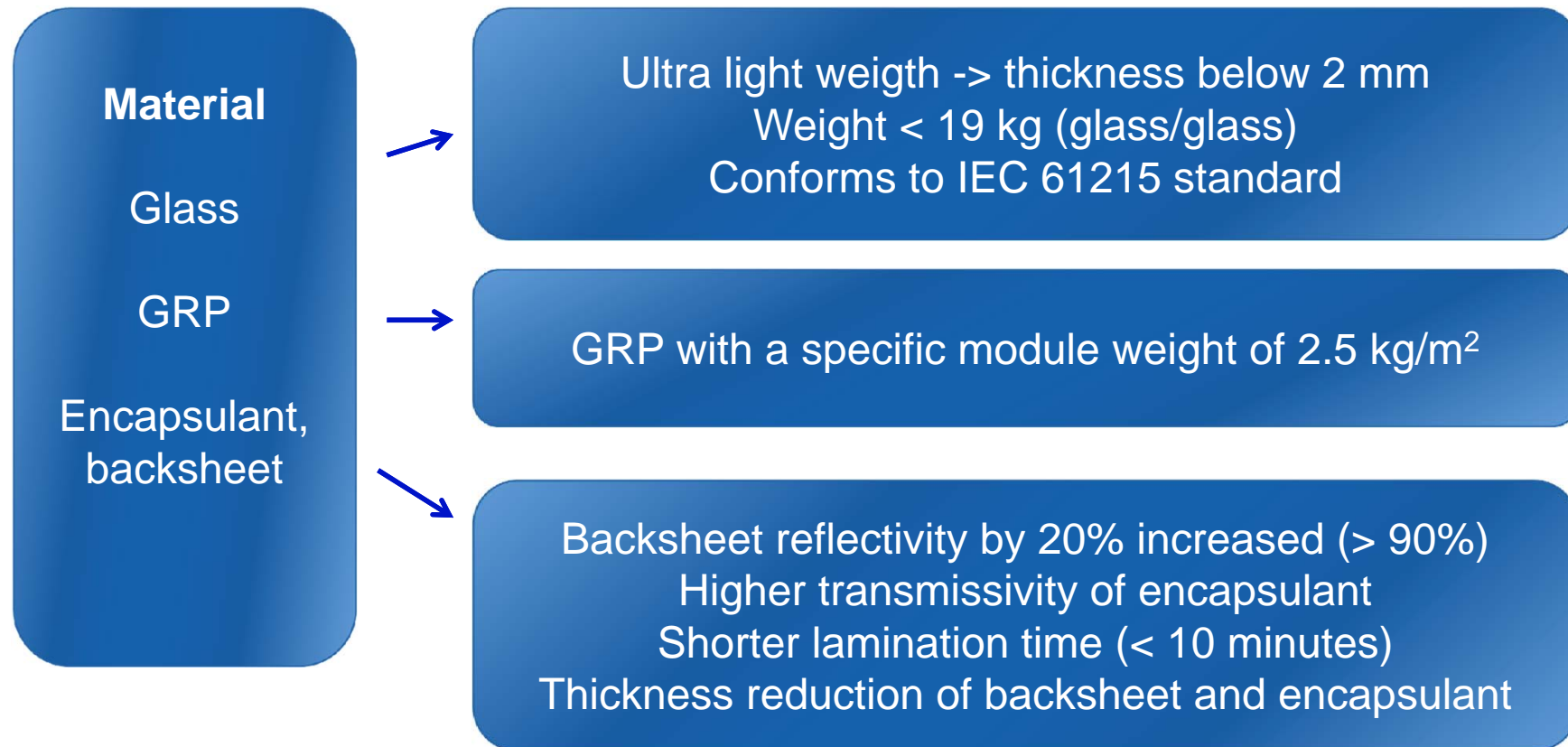
IBC Zebra

System

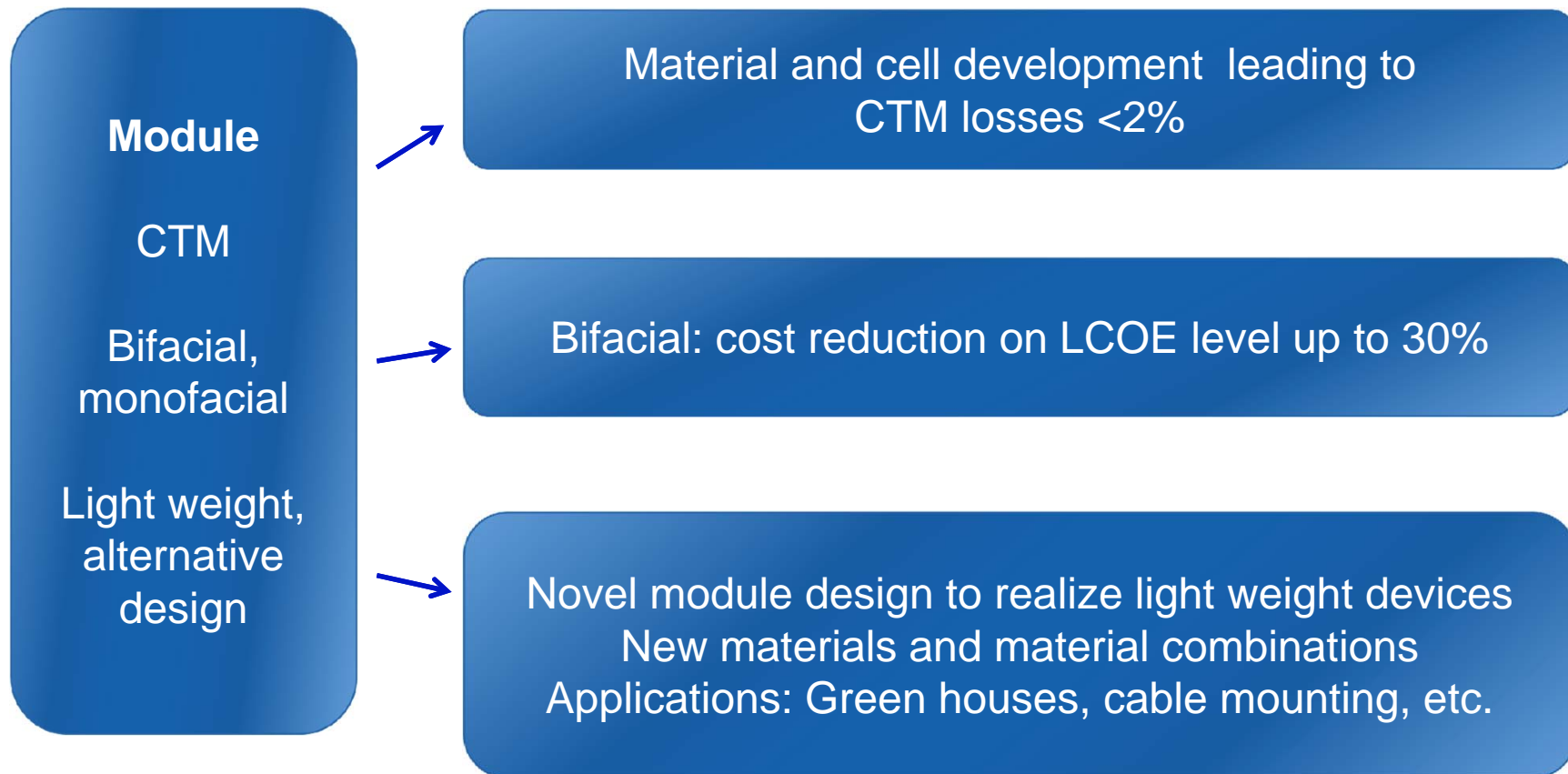
LCOE
(levelized
cost of
energy)

Module reliability, performance and cost effectiveness

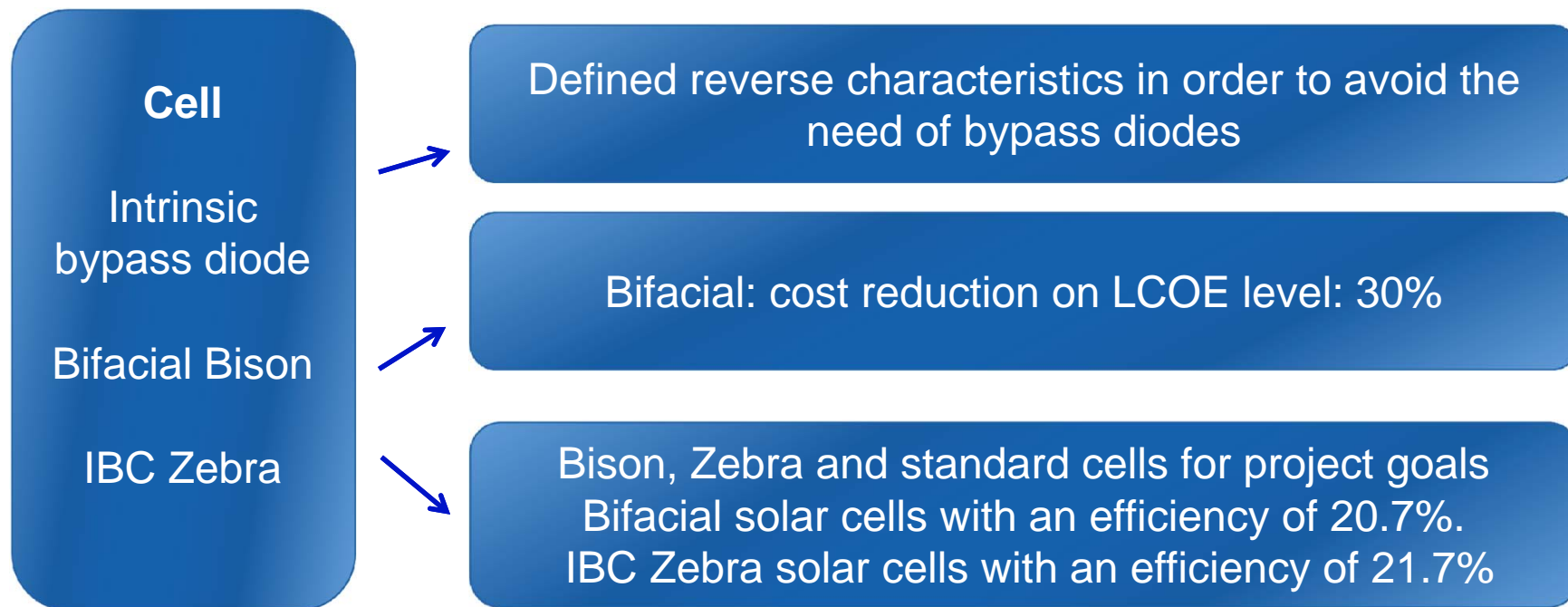
Individual work packages related to:



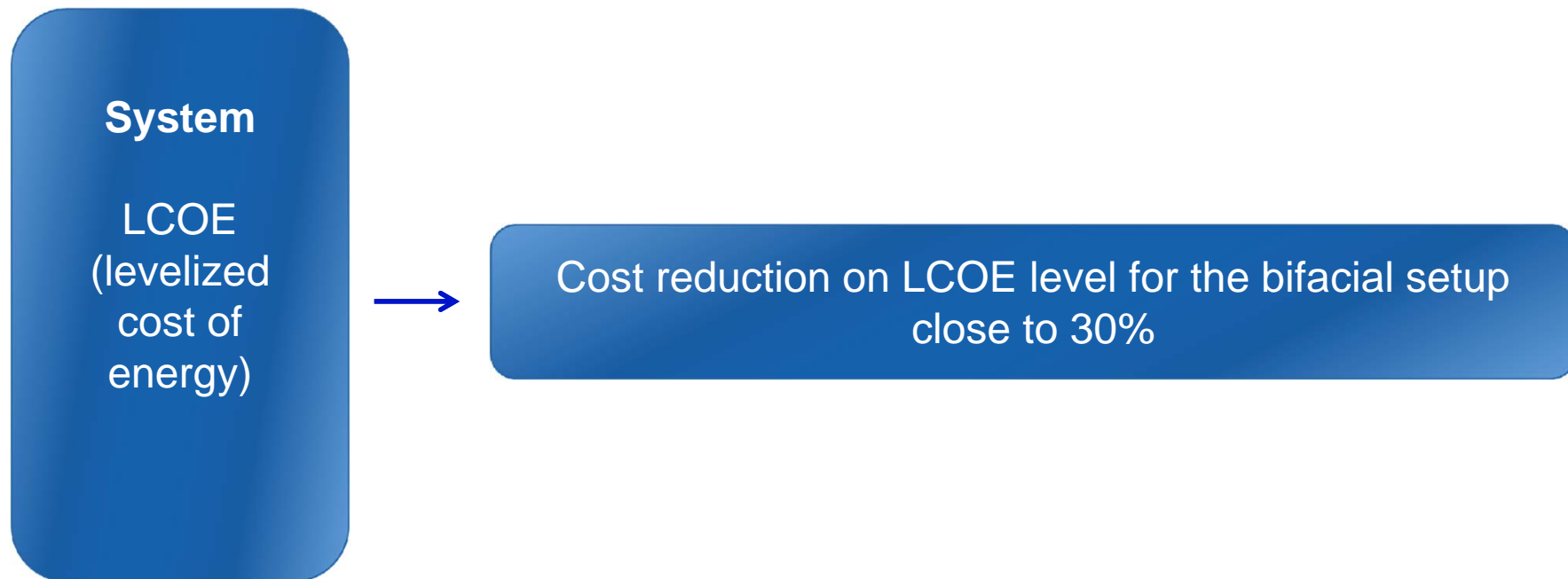
Individual work packages related to:



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Scientific, technical and commercial challenges

- Technical goals in general (weight, reflectivity, transmission,...)
- Very thin ($\ll 2$ mm) suitable glass is no standard product. Properties have to be tested. Stability, hail test,... availability!
- Alternative materials and their combination in laminates have to fulfill the requirements on durability and stability (IEC standards)
- Throughout revision of the module design for alternative module concepts
- Suitable production processes have to be found (e.g. lamination of GRP / c-Si)
- The (price) competitiveness has to be shown
- Challenges concerning the material development, e.g. pigment particles in the sub micrometer-range with very high refractive index,...

Experience with and suggestions for SOLAR-ERA.NET joint calls

- For all partners it is the first SOLAR-ERA.NET project
- The project only started -> feedback up to now only to the application phase
- Feedback of the partners can be summarized as follows:
 - All partners are extremely happy to have the opportunity to work within the frame of this international project
 - Dependency of the overall project granting on several national deciding entities is not ideal