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Topics

1. Insolight: a brief introduction
2. THEIA as a solution for agrivoltaics
3. Use cases: Greenhouses, Open Fields, Vegetalized rooftops

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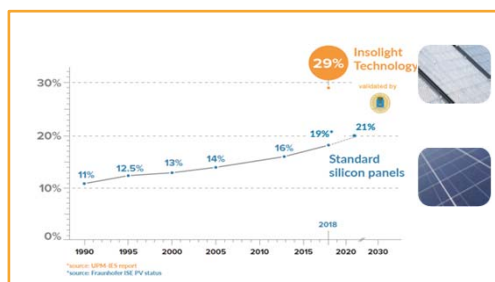
Insolight is a start-up founded to drastically boost solar module efficiency and make solar electricity more competitive

- Founded in **September 2015**
- Based at the Swiss Institute of Technology Lausanne, Switzerland (**EPFL**)
- 13 people, 15 industrial partners for setting up manufacturing

EPFL



Track-record: Insolight's flat solar panels break the efficiency ceiling of conventional PV, producing up to 50% more energy



International media have covered us...



10 Mio € for pilot assembly line



Insolight is driven by a passionate and highly qualified team, and a very experienced board

Insolight Leadership



Laurent Coulot
CEO

- Industrial experiences at (Melexis, Logitech, Rolex)
- MSc. Micro & Nano systems



David Schuppisser
CBO

- 3y consulting experience (McKinsey & Co)
- MSc. Physics & Technology management



Mathieu Ackermann
CTO

- Industrial experience (Melexis)
- MSc. Micro & Nano systems



Florian Gerlich
COO

- Industrial experience (Veolia water systems)
- MSc. Robotics & Space Technologies

Insolight Board and advisors



Rainer Isenrich
Board member
CEO Edisun Power Europe



Alan Rosling
Board member
Ex Managing Director of Tata Sons Founder of Kiran Energy



Daniel Brandenburger
Advisor
Coach Innosuisse; 20+ years of industrial experience in China



Kaiyu Yang
Advisor
Ex Managing Director of Shougang Concord Century



Marie Ivorra
Advisor
Ex CEO of RUAG Aerospace

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The combination of agriculture and solar electricity production (*agrivoltaics*) has a huge potential

Agrivoltaics hold strong promises...



Avoid land use competition between agriculture and solar energy



Install higher capacity than distributed on rooftops **while deployment costs are lower**



Reduce CO₂ footprint of agricultural processes and **comply with environmental norms**

... and has a huge market potential

In the **EU** only:

- > **2 bn m²** of greenhouses
- **50%** of land is **agricultural**
- **Strong trend to vegetalize cities** (rooftops and urban farming)

// Land use is not a zero-sum- game of competition between renewable energy and agricultural food production
Nature Sustainability, July 2019

// World's energy needs can be powered by farmland-based solar
Smart Energy International, August 2019

// India prepares to embrace agrivoltaics
PV magazine, September 2019

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Current agrivoltaic technologies are based on conventional solar modules that are not optimized for crop production

Competition between Agriculture and PV

- **Strong shading** of modules vs plant photosynthesis
- **limited electricity** production per m²

Greenhouses



Fields



Vegetalized rooftops



Need for a solution to optimize both agricultural and solar energy production

// We need a **new generation of PV** that lets through part of the light favorable for plant photosynthesis

François Viot,
Farmer, France

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Insolight has recently developed a high-efficiency translucent module for the agrivoltaic market - THEIA



Up to 30% efficiency, 4-5x more efficient than other translucent solar modules



Smart translucency with direct light regulation yielding **up to 75%** of light transmission



Strong economic benefits: cost of electricity, land yield, OPEX reductions



As easy to mount as conventional solar panels

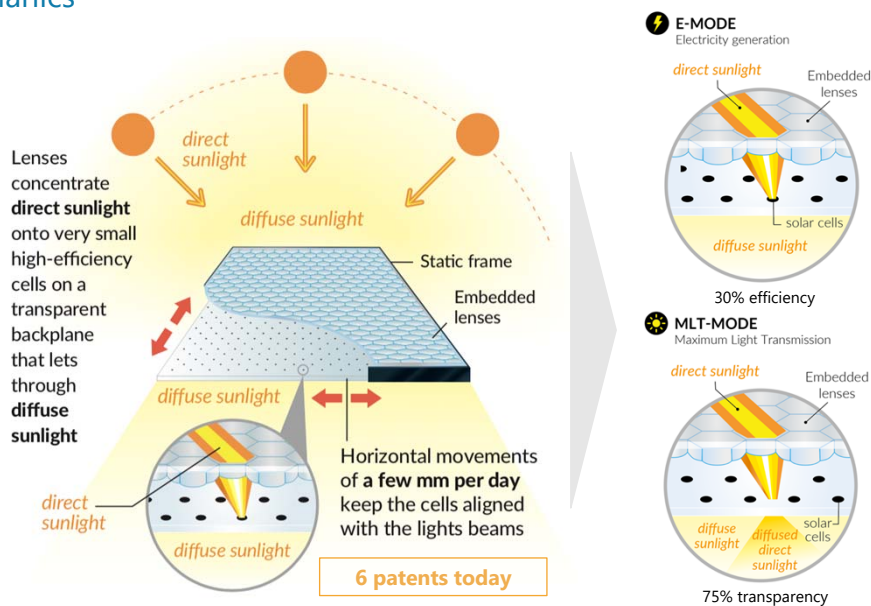


25 years reliability in the field

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The technology is based on a combination of optics, high-efficiency solar cells and micromechanics



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The module's high-efficiency coupled to translucency and light intensity control provides a clear competitive advantage

Technologies		Effective efficiency on crop % light to electricity ²	Lifetime years	Translucency of the module	Light Intensity control	Market penetration ¹
Opaque c-Si module		~8% ¹	25	✗	✗	
Spaced c-Si module		~8% ¹	25	✓ 25-35%	✗	
Elevated module with tracking		~10% ¹	25	✗	✓	
Upcoming translucent module		< 8%	< 10	✓	✗	
insolight THEIA		Up to 30%	25	✓	✓	

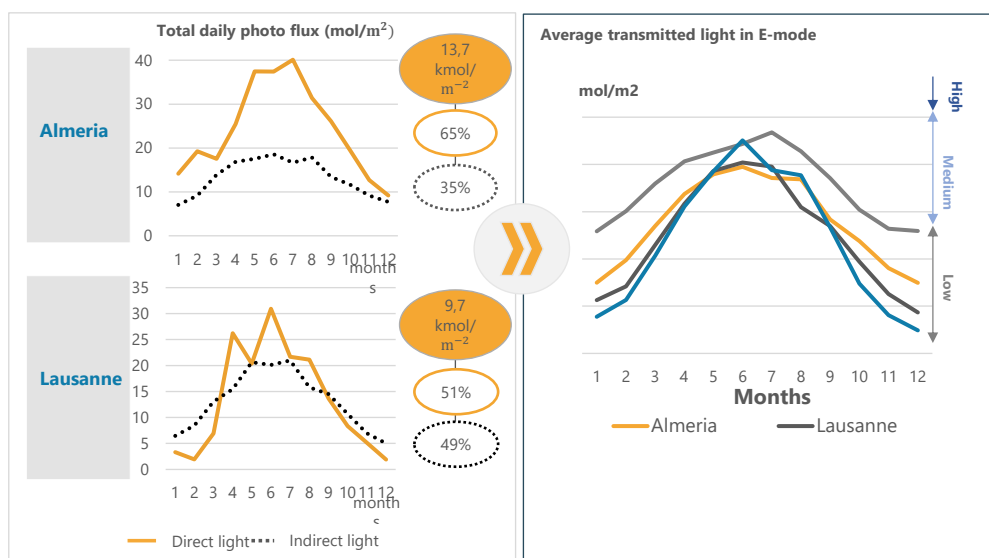
At installation level, THEIAs are less sensitive to partial shading than c-Si modules, enabling high Ground Cover Ratios

1 Insolight estimates 2 accounting for Ground Coverage Ratio

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The amount light transmitted through THEIA is highly variable according to locations



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The right crop needs to be selected for the right location, growth season and electricity production targets

Lighting environment for crop if no other light source than light transmitted through THEIA module



Orchid	Light sufficiency for the given crop							
Month	Almeria	Lausanne	AbuDhabi	Wageningen	Aix en Provence	Bordeaux	Tel Aviv	Hafslund
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								



Zucchini	Light sufficiency for the given crop							
Month	Almeria	Lausanne	AbuDhabi	Wageningen	Aix en Provence	Bordeaux	Tel Aviv	Hafslund
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

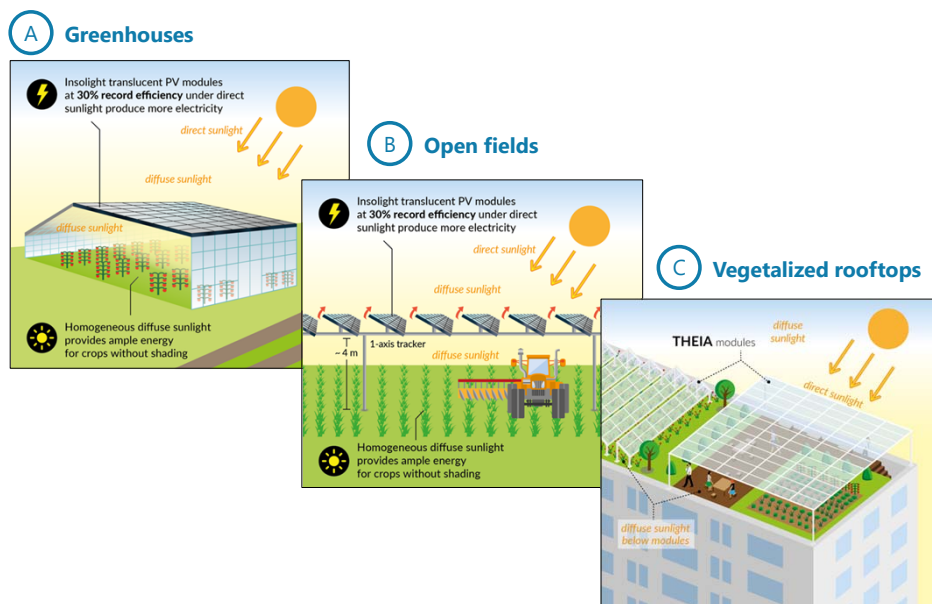
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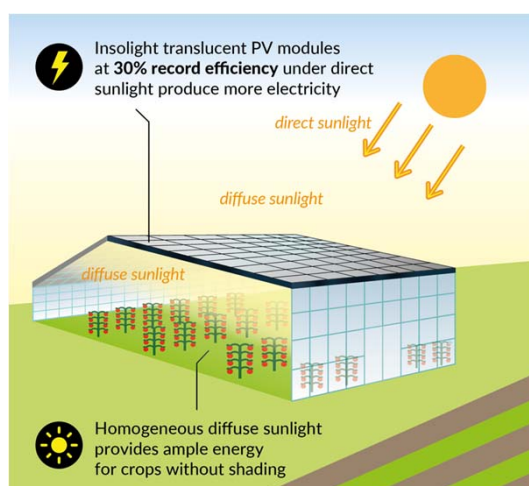
THEIA modules can be installed in 3 main use-cases



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A On greenhouses, a controlled diffuse light environment allows farmers to improve their plant yield while reducing their OPEX and carbon footprint



Grow plants more effectively with an optimized lighting environment (direct light can hurt plants)¹

Reduce greenhouse OPEX

- Lower electricity bill than thanks to highest efficiency
- Increased thermal insulation requiring less temperature control

Replace costly existing practices



X Chalk-based painting



X Mechanical screens

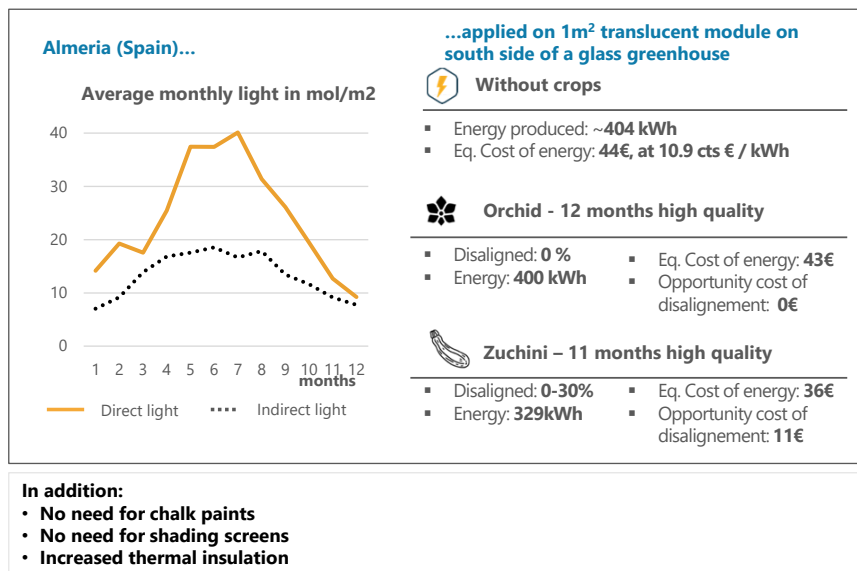
Compliance with environmental norms for reduction of CO₂ footprint

¹ Experts report 3-5% yield increase in similar setups separating direct and diffuse light ² Levelized Cost Of Electricity

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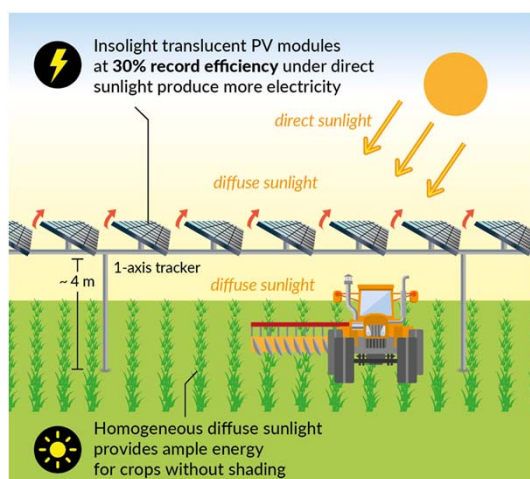
A Case Study – Orchids and Zucchini in Almeria



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B On open fields, THEIA maximises electricity production and agricultural production together



Grow crops (more) effectively

- Optimized lighting environment
 - Increased temperature control (frost) and hail protection
 - Reduced evaporation
- => Higher agri returns for farmer

Highest density of solar electricity on crops vs current agrivoltaics

- Up to 60% more electricity at module level¹
 - Minimal spacing of modules on mounting racks
- => Higher ROI + lower CO₂ footprint

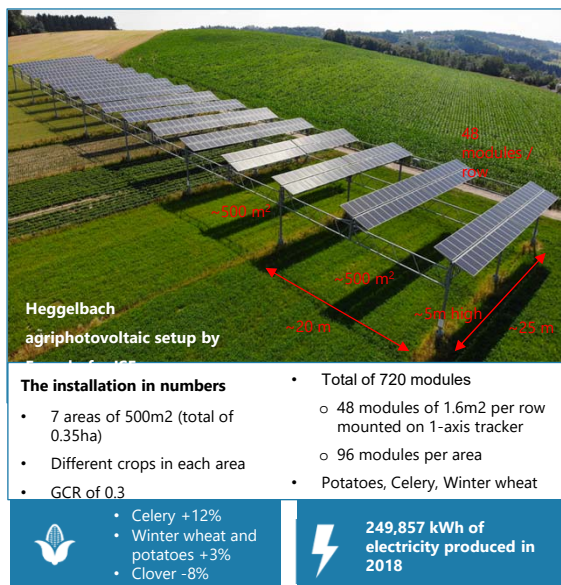
Best use of scarce land often with strong sensitivities

1 Compared to C-Si on single axis tracker

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Ⓑ Case study: Open-field – THEIA promises to improve on current best-in-class agrophotovoltaic setups



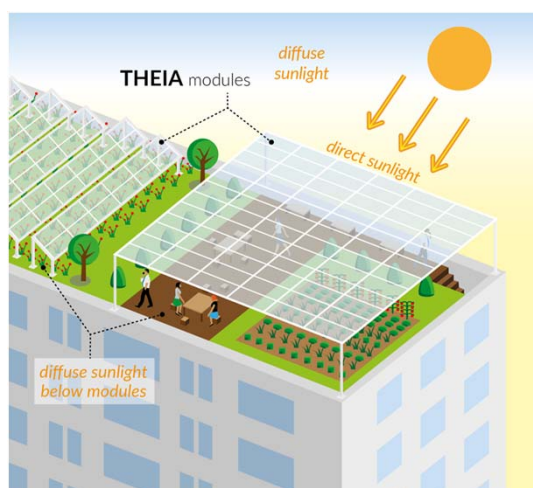
A similar setup with THEIA could:

- **Guarantee maximal crop yield** through optimized lighting environment
- **Increase generated electricity** by >30%-50% (higher GCR)

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Ⓒ On urban rooftops, THEIA avoids the competition between vegetalizing cities and distributed electricity generation



Avoid the competition between vegetalized cities and distributed electricity generation

Reduce electricity bill of buildings / factories

Improve rooftop environment for plant growth

- Homogenous diffuse lighting environment
- Protection from weather (temperature, storms, hail, ...)
- Reduced evaporation

Compliance with environmental norms for reduction of CO₂ footprint

1 Benchmarked to spaced C-Si modules, DSSC modules and OPV

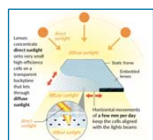
2 Compared to C-Si on single axis tracker

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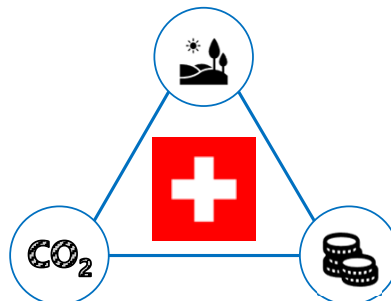
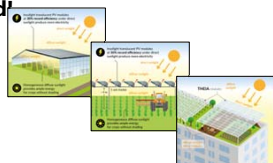
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The Swiss PV community can help!

We're bringing to market a radically new tech...



... with the potential to trans-form how we use land!



How?

- Setup joint pilots
- Place first "pre-series" orders
- Collaborate with us for large scale

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Thanks for your attention

Please contact us: david.schuppisser@insolight.ch
www.insolight.ch

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eit Climate-KIC

Schweizerische Eidgenossenschaft
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Innovations - Swiss Innovation Agency

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