

Perspektiven der Solarentwicklung in Gebäuden

Christophe Ballif^{1,2},

*Laure-Emmanuelle Perret-Aebi¹, Patrick Heinstein¹, Jordi Escarré Palou¹,
Gianluca Cattaneo¹, Heng-Yu Li¹, Karin Söderström¹, G. Bugnon¹, A. Faes¹, P. Duvoisin¹.*

¹CSEM, ¹ PV-center, Jaquet-Droz 1, 2002 Neuchâtel, Switzerland

² PV-lab, IMT, EPFL, 2000 Neuchâtel, Switzerland

//// active
interfaces



Photovoltaic Research in Neuchâtel Switzerland

A competence center with 80 researchers



- Basic research
- Advanced devices



- Applied research
- From lab to industry



EPFL- PVLAB

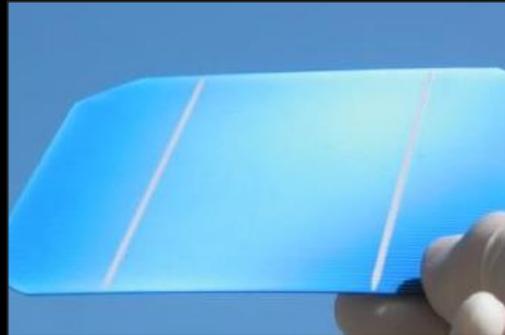
CSEM PV-center (since 2013)

Photovoltaic Research at EPFL and CSEM

A competence center



Optic, multiples
jonctions



High efficiency c-Si
cells



Lamination &
reliability



Special products



Systems & storage



BIPV

:: csem



POWERPURE

Ultra-low cost solar electricity

2020 >20%, < 0.4€/Wp, > 30 years
2026 >23% <0.3€/Wp, > 40 years
high energy yield

ELEGANCE

Changing the cities and the way
people relate to solar and energy

All shapes, all colors, affordable PV
construction material

CONNECTED

20% indoor
autonomous

High performance
ubiquitous energy
scavenger

EXPLORE

Specialty power
applications

In the air, on water,
on the road

SMART

A more intelligent
energy supply and
management

Algorithms and
electronics/IT
services



600 m2, PV module manufacturing, testing, accelerated aging, joined program with SUPSI

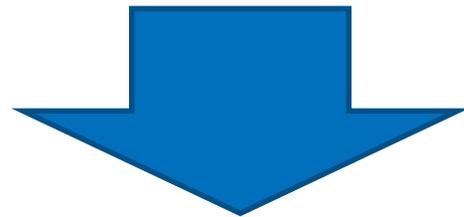
Polymer compounding for high reliability: platform for PV packaging materials



- Packaging foil of 0.1 to 2.5 mm thick and width of 20 cm
- Compounder / pelletizer (capacity: 4 Kg/h)
- Flat cast film extrusion / chill roll (capacity: 10kg/h)

Power pure

- Standard cells → PERC solar cells
- Advanced «high efficiency technologies»
such as Heterojunction or passivated contacts cells

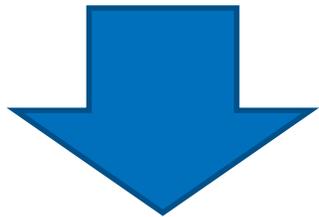


Impact for BIPV

- Better temperature coefficient (thanks to higher voltage) from -0.45%/°C down to -0.22%/°C
- Better optics and higher efficiency → less heating → better energy yield and reduced thermal stress

Power pure

- Improved metalisation (reduced Ag costs)
Multi-busbars, multi-wire, MWT,



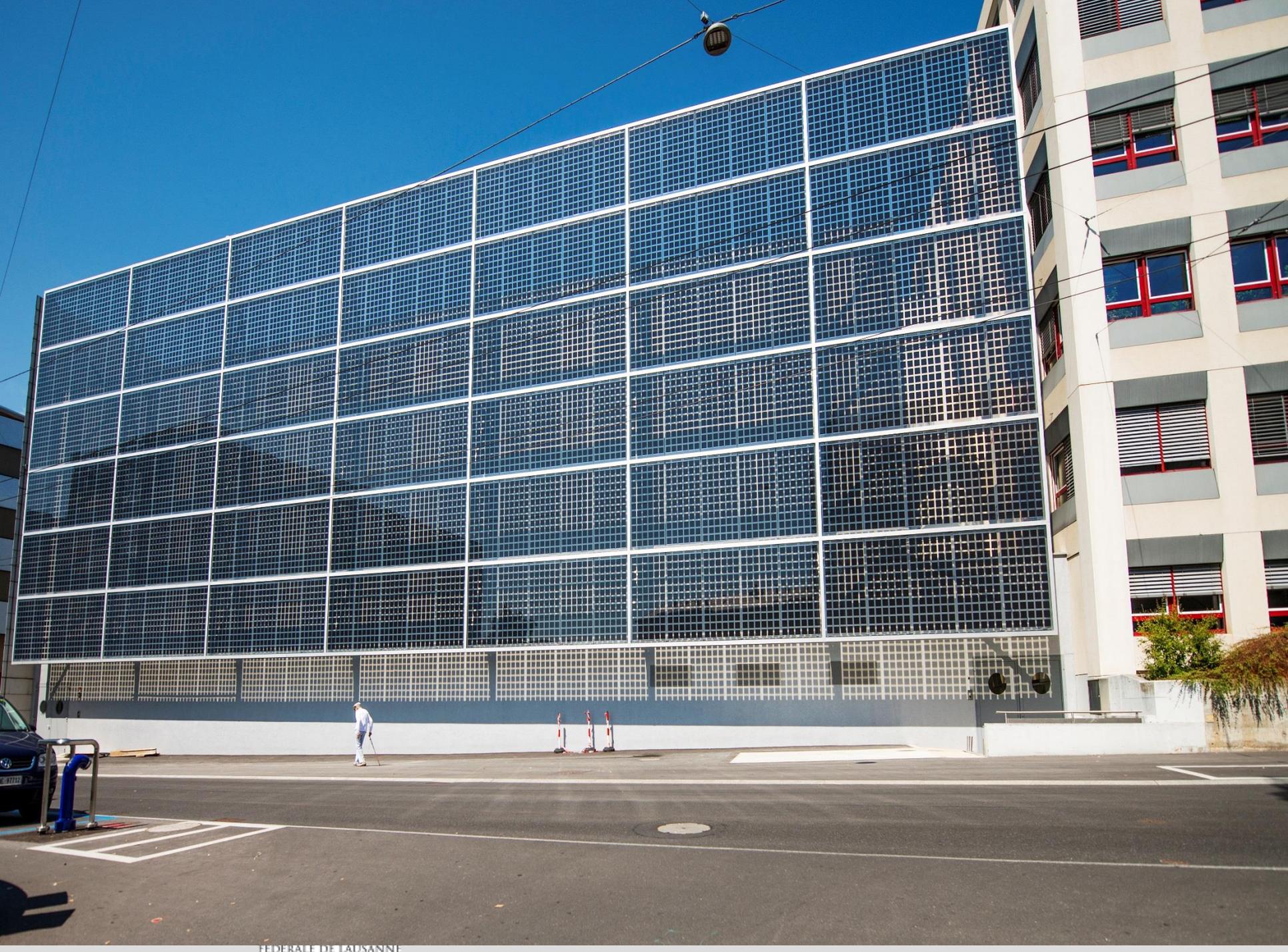
Impact for BIPV

- Improved aesthetics for free



Bifacial Solar screen: light reflected from back hits the back of the cells







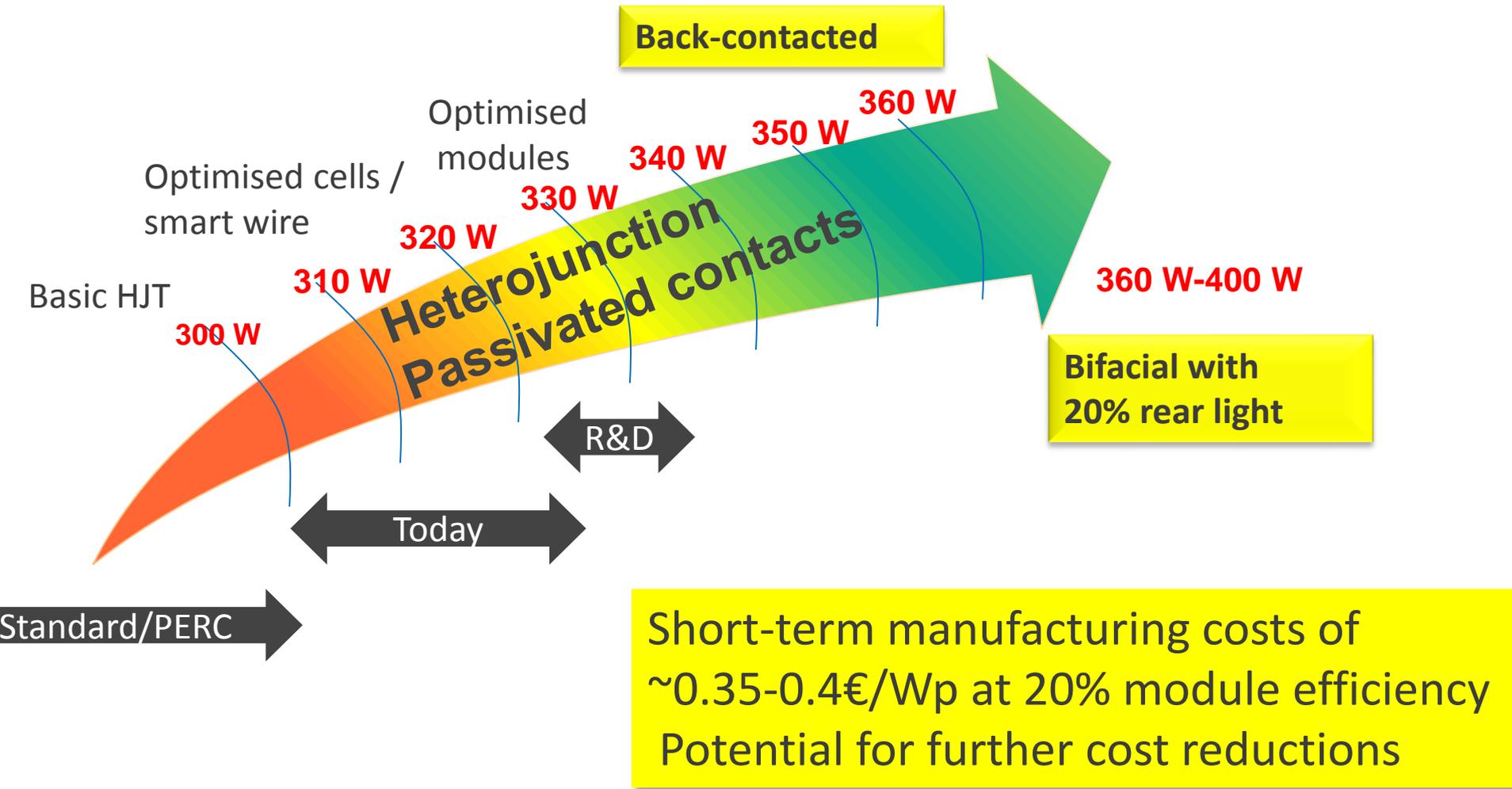


Latest news

And the Winner is... Meyer Burger for the Solar Visualised in Europe Award!

By James Watson, CEO of SolarPower Europe

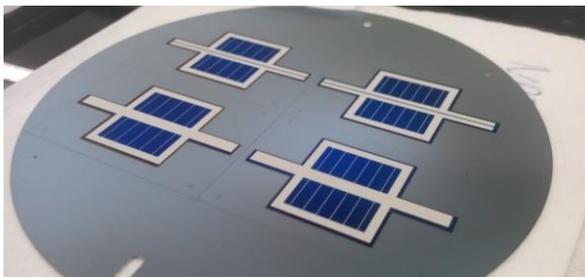
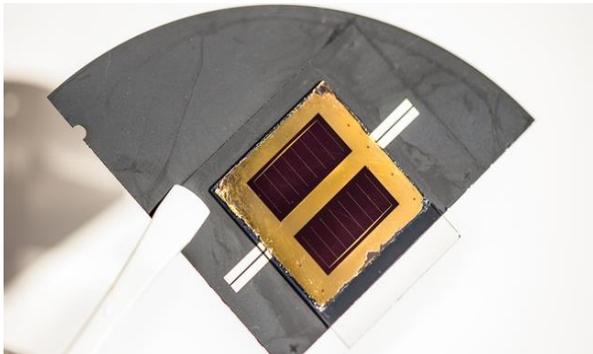
Future of c-Si SHJ modules, 60 cells, 6''



Cellules record du monde à «plusieurs jonctions» avec Silicium

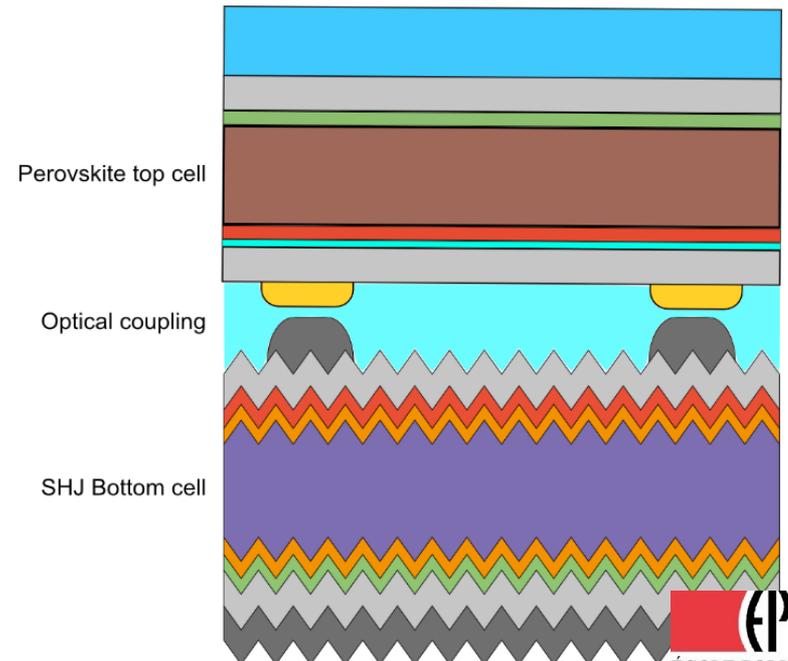
Custom designed small HJT cells
4 terminals III-V /c-Si tandem,

30.6 % Certified



«low cost» Perovskites on
Silicon, 4 terminal
measurements

25.6% in house



ELEGANCE

Multiple Swiss Solutions

- Meyer Burger (including module production)
- Megasol (including some module production)
- Schweizer
- Eternit
-
- Panotron
- SwissInso
- Designergy
- Userhuus...
- Solaxess
- G2E
- Flisom...



Integrated «Megaslates»



Swiss Solar Award 2015 «renovation category»

Over 10'000
systems installed



FIRST SMART-WIRE SHJ in roof «BIBV» megaslate configuration



Reference
section

HIT section

Terra-cotta PV

An example of transformative approach



Thin-film silicon terra-cotta

Mat or shiny finish

Sizes: full size (1100 x 1400) and small size available



ÜSERHUUS

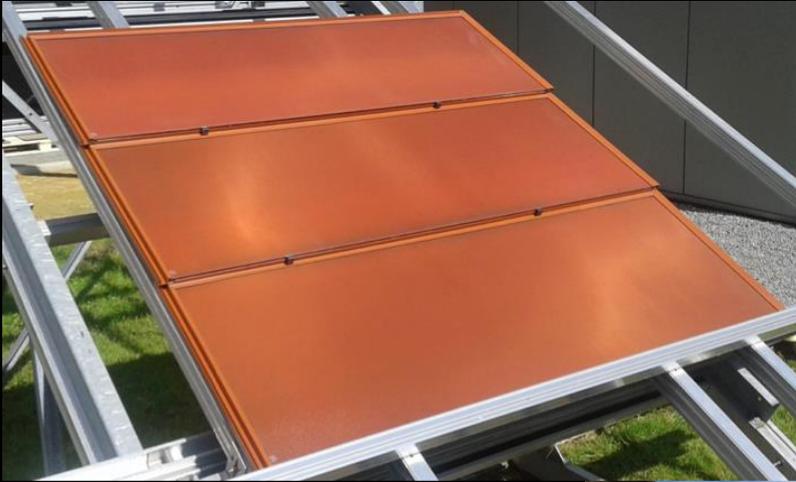
Photovoltaic in buildings

Demonstration project in Switzerland



**Thin film orange: ultra-low
potential productions cost at**

Change of strategy: crystalline c-si based terra-cotta module 115 w/m² together with Issol SA



Simulation, project under realisation



White photovoltaic modules

A new building material

- Better aesthetics
- Easiest integration
- Building façade are becoming active
- Possible over 10% efficiency

➤ A new building material

SOLAXESS
white solar technology

1st generation
product with

ISSOL

∴ csem



Intensive Field testing Copyright CSEM 2016





Spatial patterns of solar photovoltaic system adoption: The influence of neighbors and the built environment[‡]

Marcello Graziano* and Kenneth Gillingham**·†

*Department of Geography, University of Connecticut, 215 Glenbrook Road, Storrs, CT 06269, USA

**Yale School of Forestry & Environmental Studies, Yale University, 195 Prospect St, New Haven, CT 06511, USA

†Corresponding author: Kenneth Gillingham, School of Forestry & Environmental Studies, Department of Economics, School of Management, 195 Prospect Street, New Haven, CT 06511.

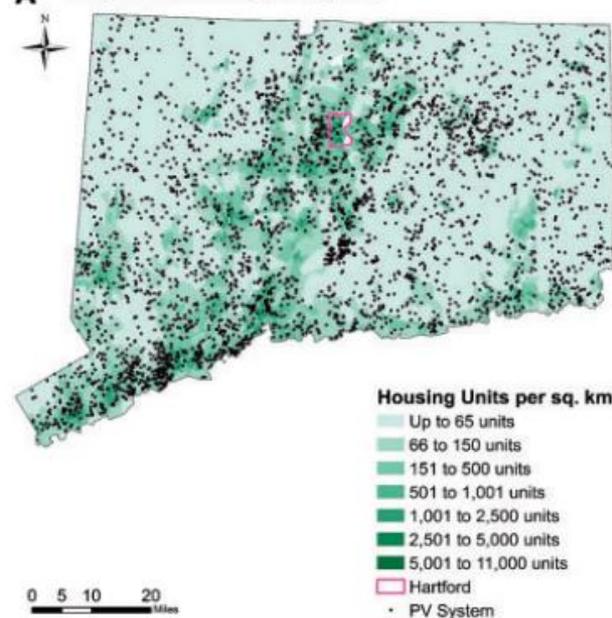
email <kenneth.gillingham@yale.edu>

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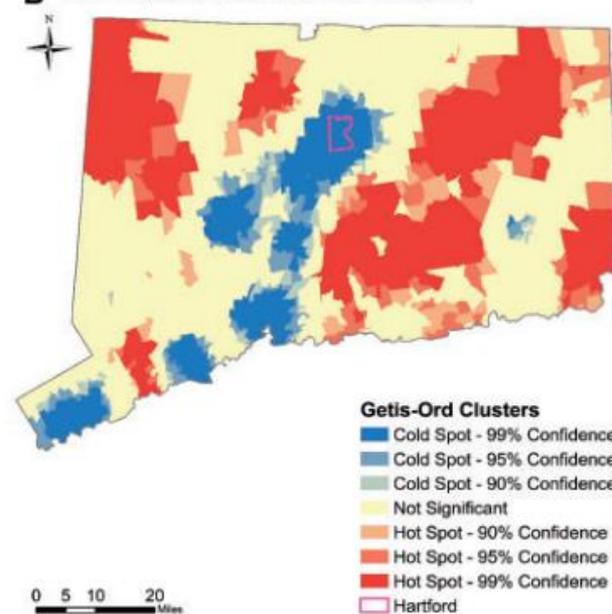
Influence your neighbors ...

“Example isn't another way to teach, it is the only way to teach”, A. Einstein

A PV Systems and Housing Density (2013)



B Block Group Level Optimized Getis-Ord Results (2013)



Connect



EXPLORE





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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

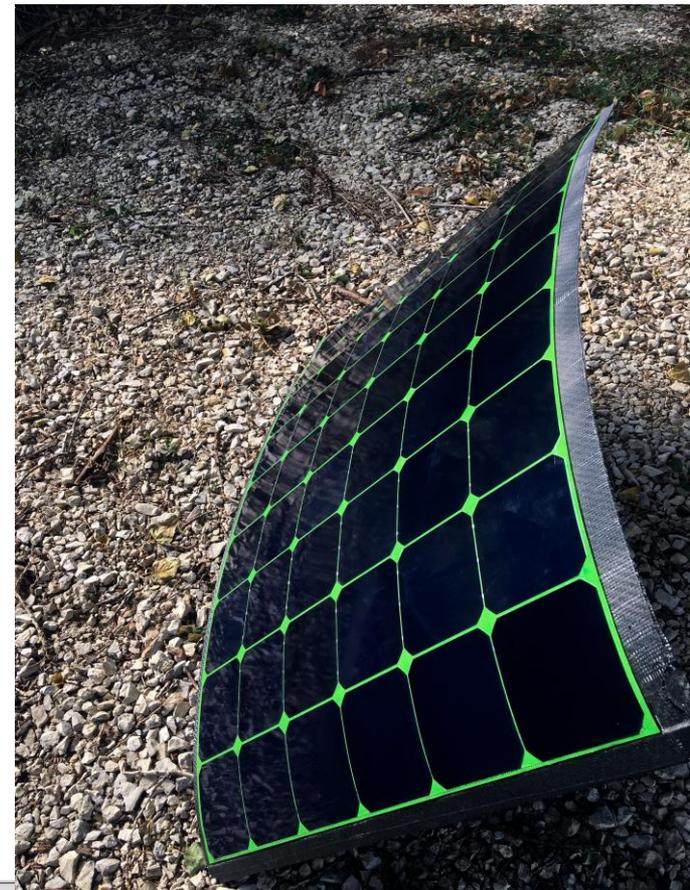
Solar Stratos... at the edge of space



PV Modules Fabrication: Customized PV products



- Development of high-efficient integrated, light and robust PV element for solar plane and boat :
 - 700 g/m² modules 21%, passing 200 cycles from -70°C – 85°C and 1000h in DH (85°C/85% RH)



Make people love solar for different reasons

Get people to see
more beautiful
examples, everywhere

Get people to
wear solar

Produce with local content,
have people involved in
companies

Will bring people, society and
politics

- to invest in Solar

- To vote for Solar

- To support energy transition

(Re) industrialise

Local modules, local cells

XGWp

European Gigawatt Fab

To pay more for solar and BIPV

Still a simulation



Still a simulation



Still a simulation



Small actions



Thank you !

**You may never know what results
come of your actions, but if you do
nothing, there will be no
results.” Mahatma Gandhi**

L.E. Perret-Aebi, P.J. Alet, J. Escarré, P. Heinstejn, G. Cattaneo, K. Söderström, G. Bugnon, V. Chapuis, E. Annigoni et al. CSEM
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Ph. Löper, F. J. Haug, N. Wyrsh, A. Hessler,
Q. Jeangros G. Nogay, J. Stueckelberg, P. Wyss et al... at EPFL
C. Bucher, J. Fonjallaz, R. Tschärner, and
technical team at EPFL and CSEM
B. Strahm, D. Lachenal, P. Papet, D. Baetzne
et al., MEYER BURGER RESEARCH,
Neuchatel
T. Söderström, Y. Yao, J. Zhao , E. Vetter, S. Leu et al. MEYER BURGER, CH-DE
O. Shojei, F. Jeanneret, et al. Indeotec SA, L. Sinnico et al. Oerlikon/TEL solar
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