




How can we use Solar Energy for our civilisation?

Tutorial with Experiments 
for visiting young students from China

Thomas Nordmann
TNC Consulting AG
Switzerland 

July 31th 2017
in cooperation with Gregory MacKinnon
Professor of Science & Technology Education
School of Education, Acadia University
Wolfville, Nova Scotia, Canada 

How can we use Solar Energy for our civilisation?

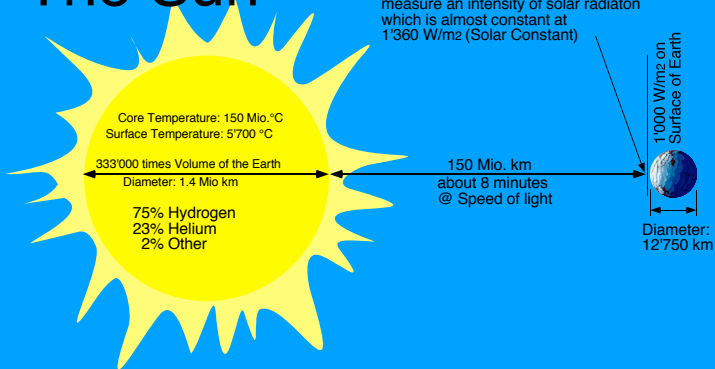


Agenda

- What is Solar Energy?
- How can we use Solar Photovoltaic?
- Where is Photovoltaic used today?
- How can we store Solar PV for the night?
- Who is the leader in Photovoltaic application?
- How can we build our first solar electric car?
- Test drive and first competition in Nova Scotia!
- Your question my answer?

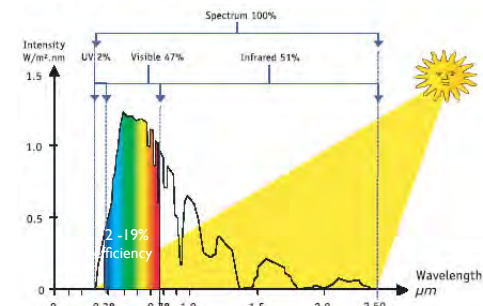


The Sun

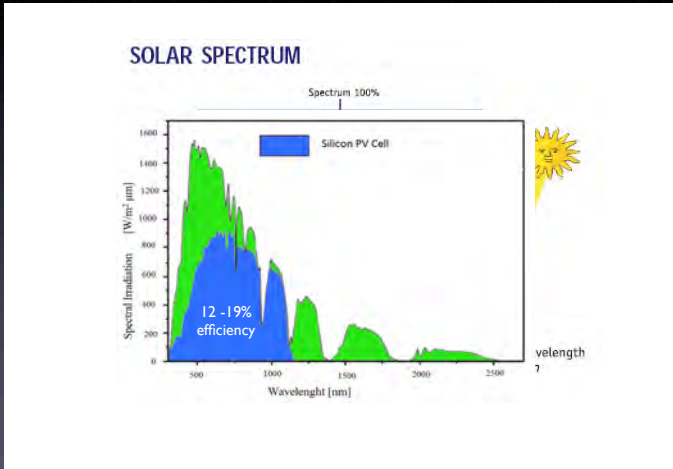


Solar Power on earth: Power 0 - 1'000 W/m²
Energy/Year: 600 - 1'200 kWh/m²

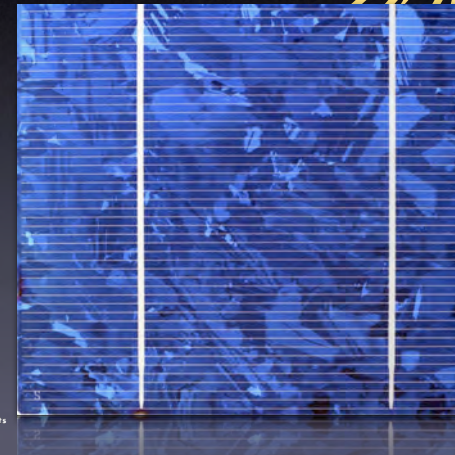
SOLAR SPECTRUM



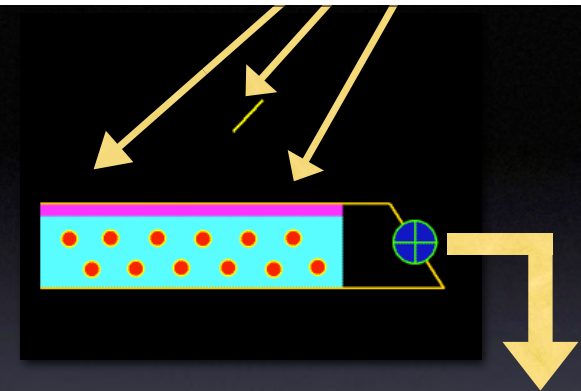
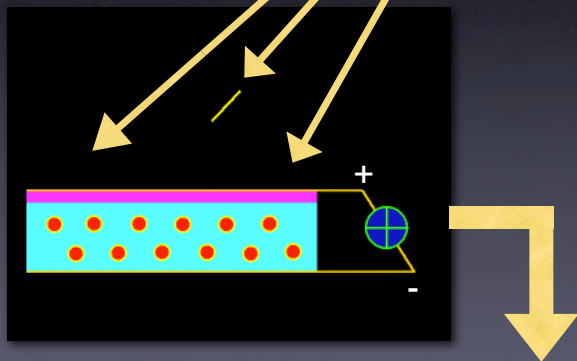
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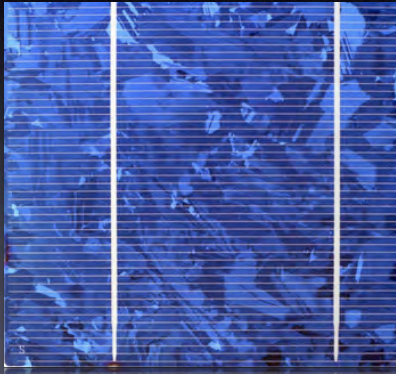
This is the photoelectric effect



This is the photoelectric effect

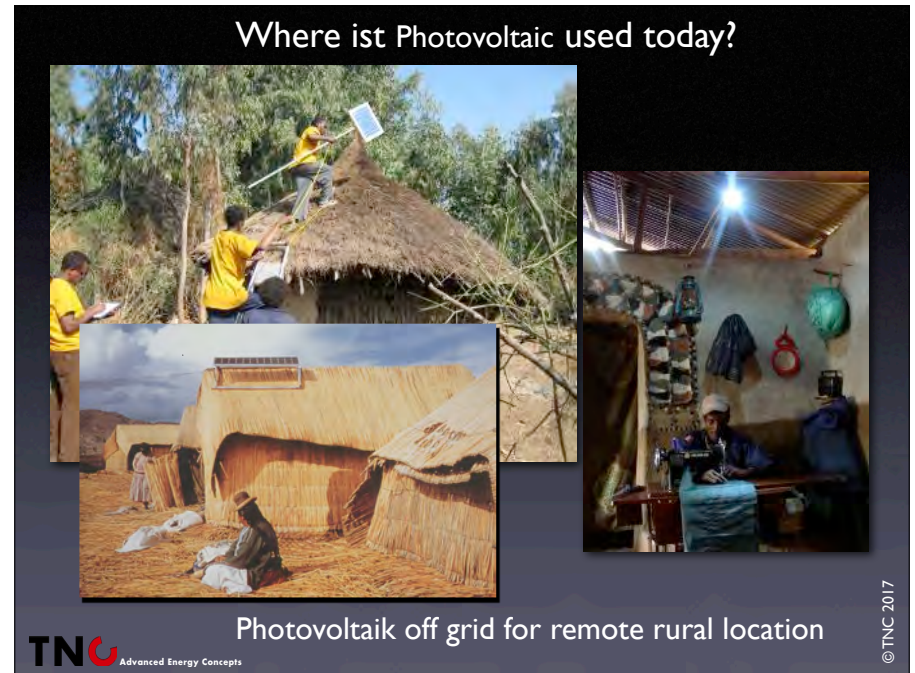
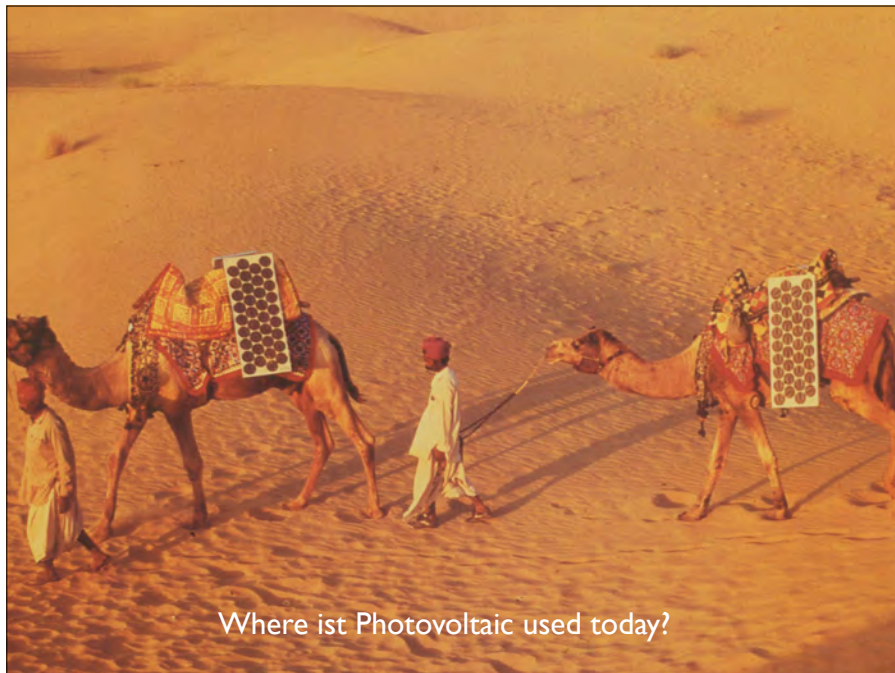


Solar Power on earth:
Power 0 - 1'000 W/m²
Energy/Year: 600 - 1'200 kWh/m²



The photoelectric effect
156 mm x 156 mm
d 0.2 mm
 $\eta = 12 \dots 19 \%$
 ≈ 10 gram of silizium
 $\approx 4 W_p$ power output
12 - 19% efficiency

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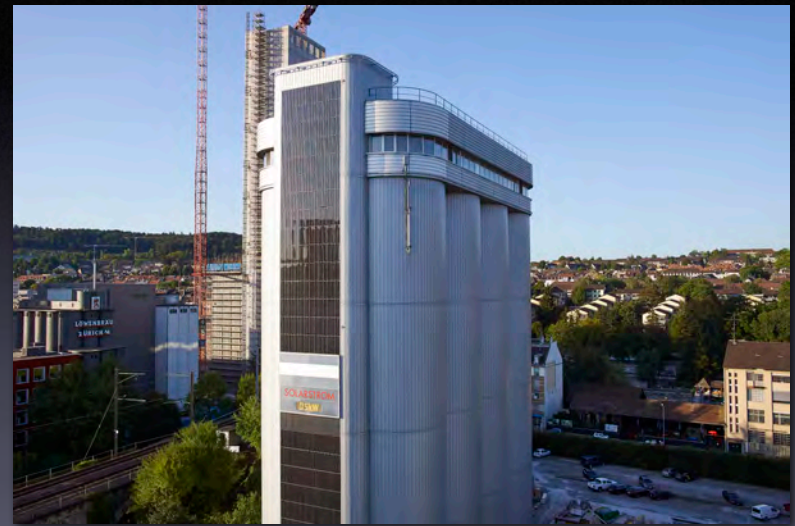


Where ist Photovoltaic used today?



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Where ist Photovoltaic used today?



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Where ist Photovoltaic used today?



Solar PV for a highway in Switzerland 1989



Where ist Photovoltaic used today?



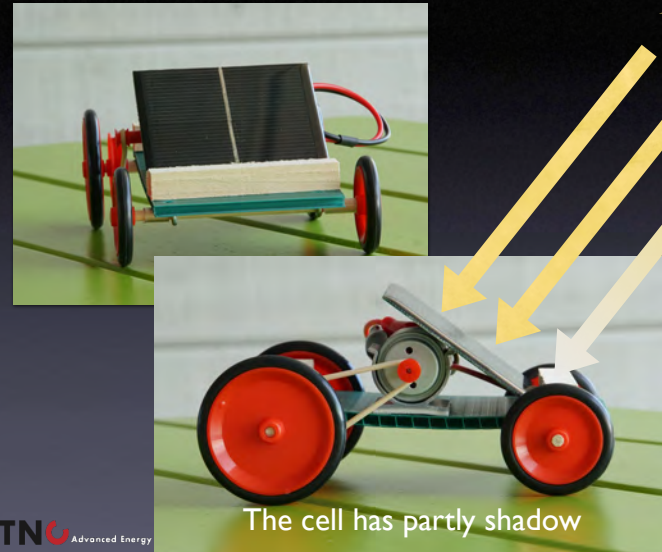
Who is the leader in Photovoltaik application?



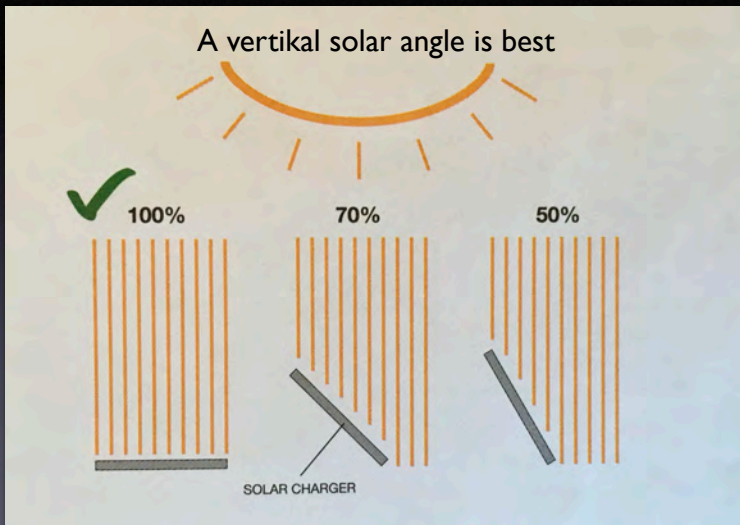
How can we build our first solar electric car?



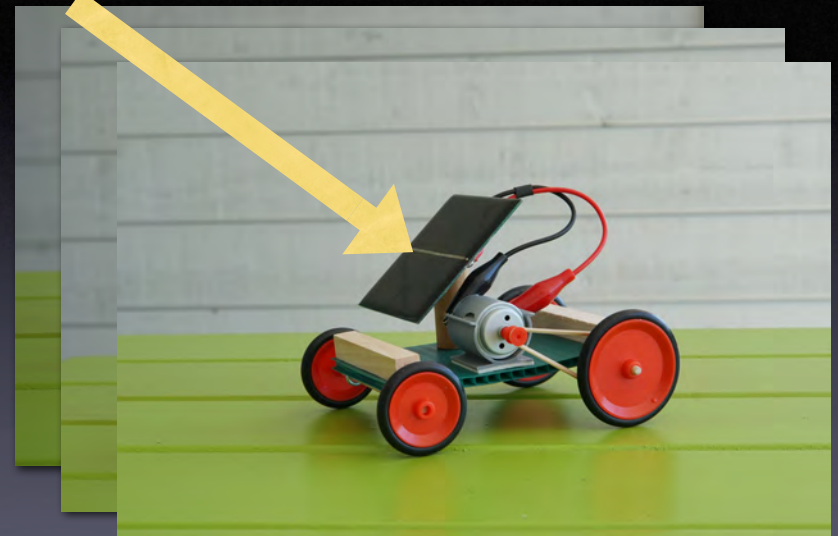
How can we improve our first solar car?



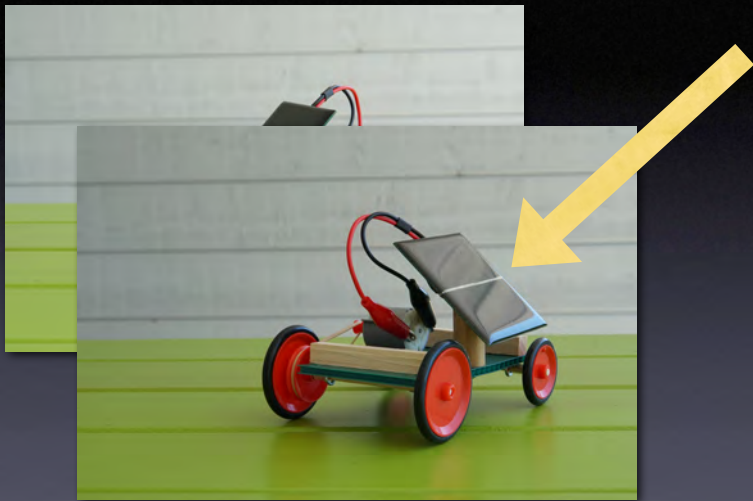
How can we improve our first solar car?



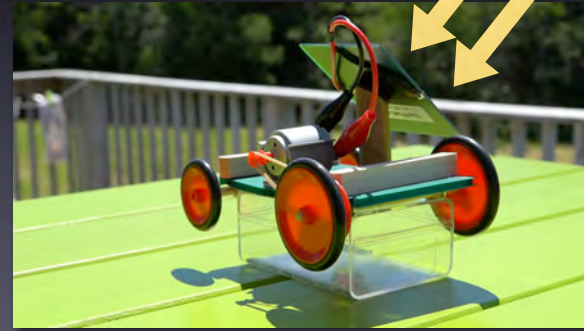
How can we improve our first solar car?



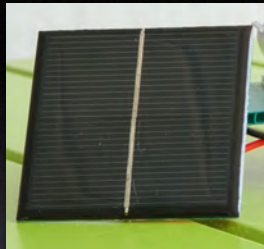
How can we improve our first solar car?



This is the photoelectric effect



From your first solar electric car to a PV charger?



This PV Cell has
1 Volt x 0.5 Amp
= 0.5 Watt of Power

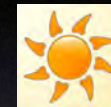


This PV Chargers has
4.5 Watt of Power



This PV charger has
4.5 watt of power

How to operate a PV charger?



The battery will be charged
in 6 hours with full sunlight



An iPhone will
be recharged
in 2 hours
with full sunlight



step 2



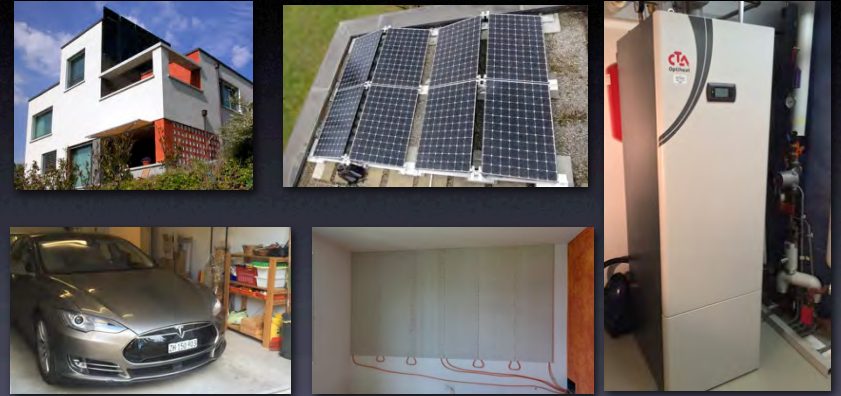
step 1

step a

My PV installation with 6'000 Watt of Power



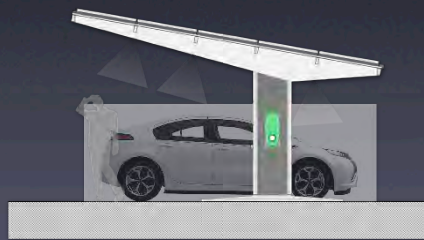
My PV for the heat-pump and electromobilit

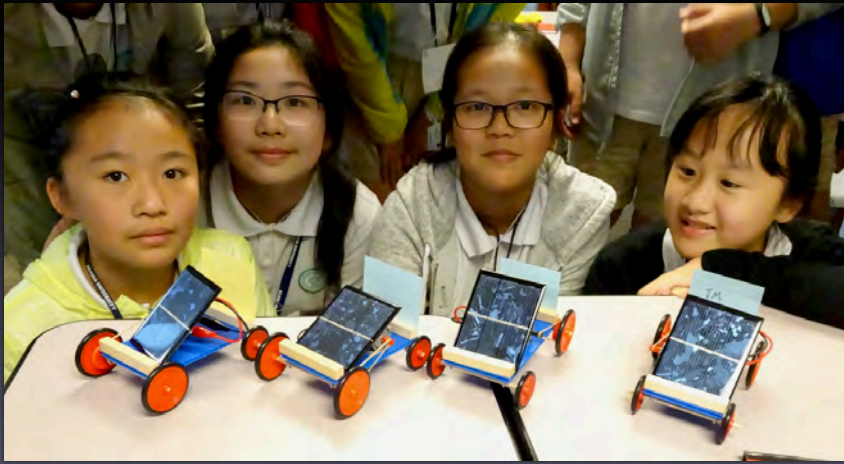


Power for electromobilit in my Smart Energy Home



- 22 kWh/100 km → 4'400 kWh/20'000 km
- Charge $\eta > 80\%$
- PV of 5 kWp is needed!





Thank you for your interest
in Solar Power