

2050: 10 billions people in the world

Energy demand (TEP)

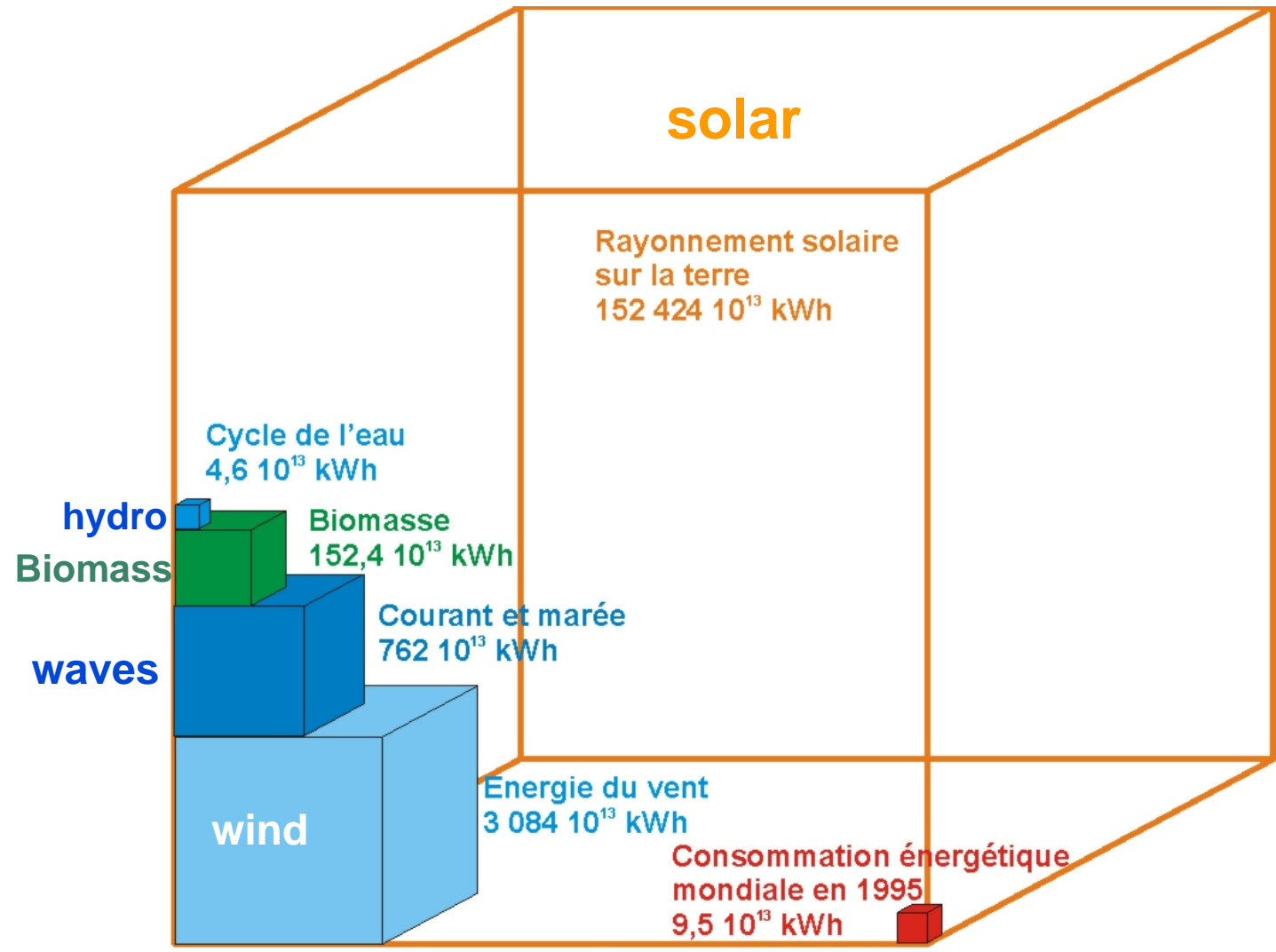
2002: 10,230 Mtoe/yr = **13.6 TW**

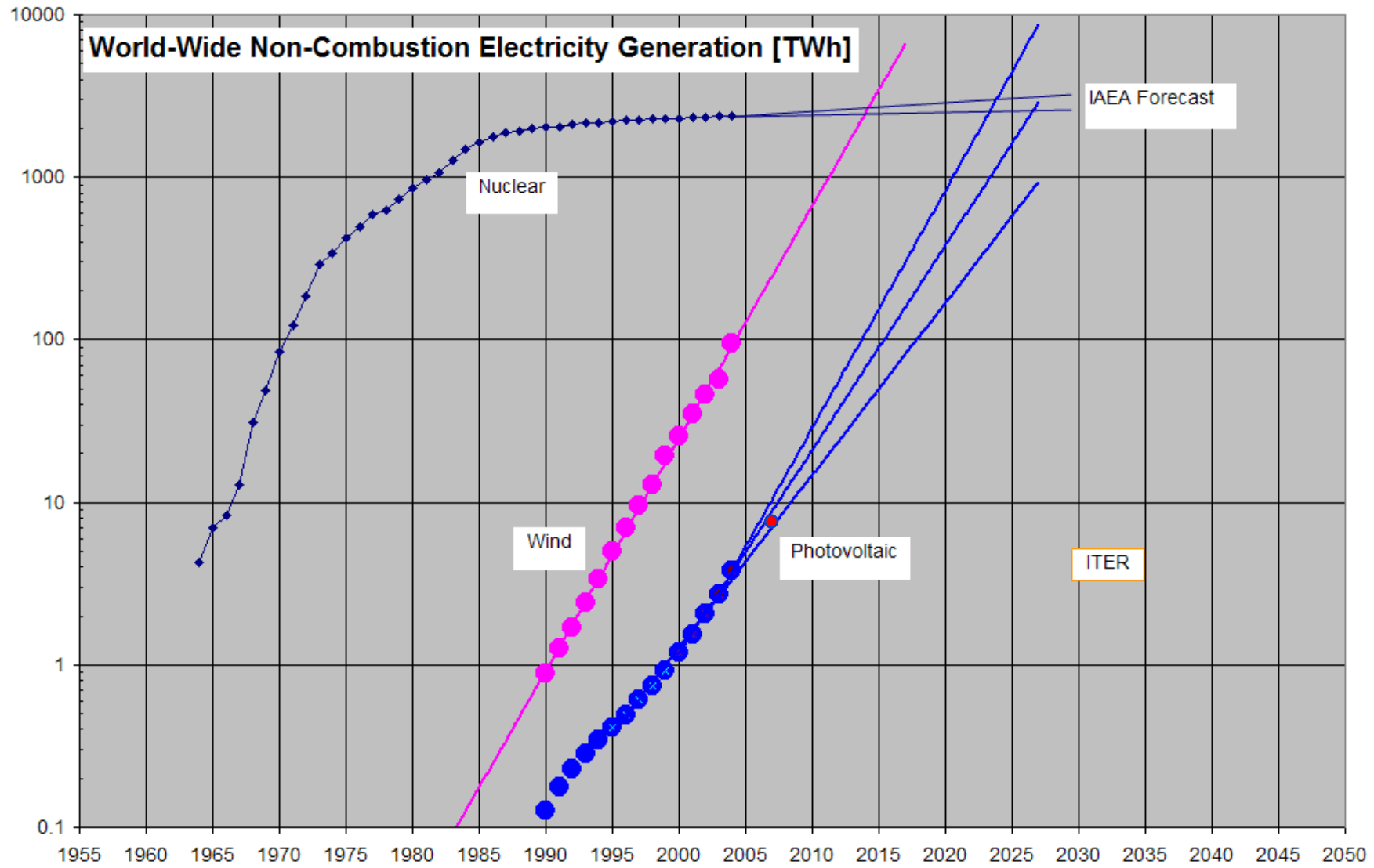
2050: > 25,000 Mtoe/yr = > **33.2 TW**

• Electricity 2002: → 1.8 TW, with 0.3 nuclear
2050 → **10 TW**

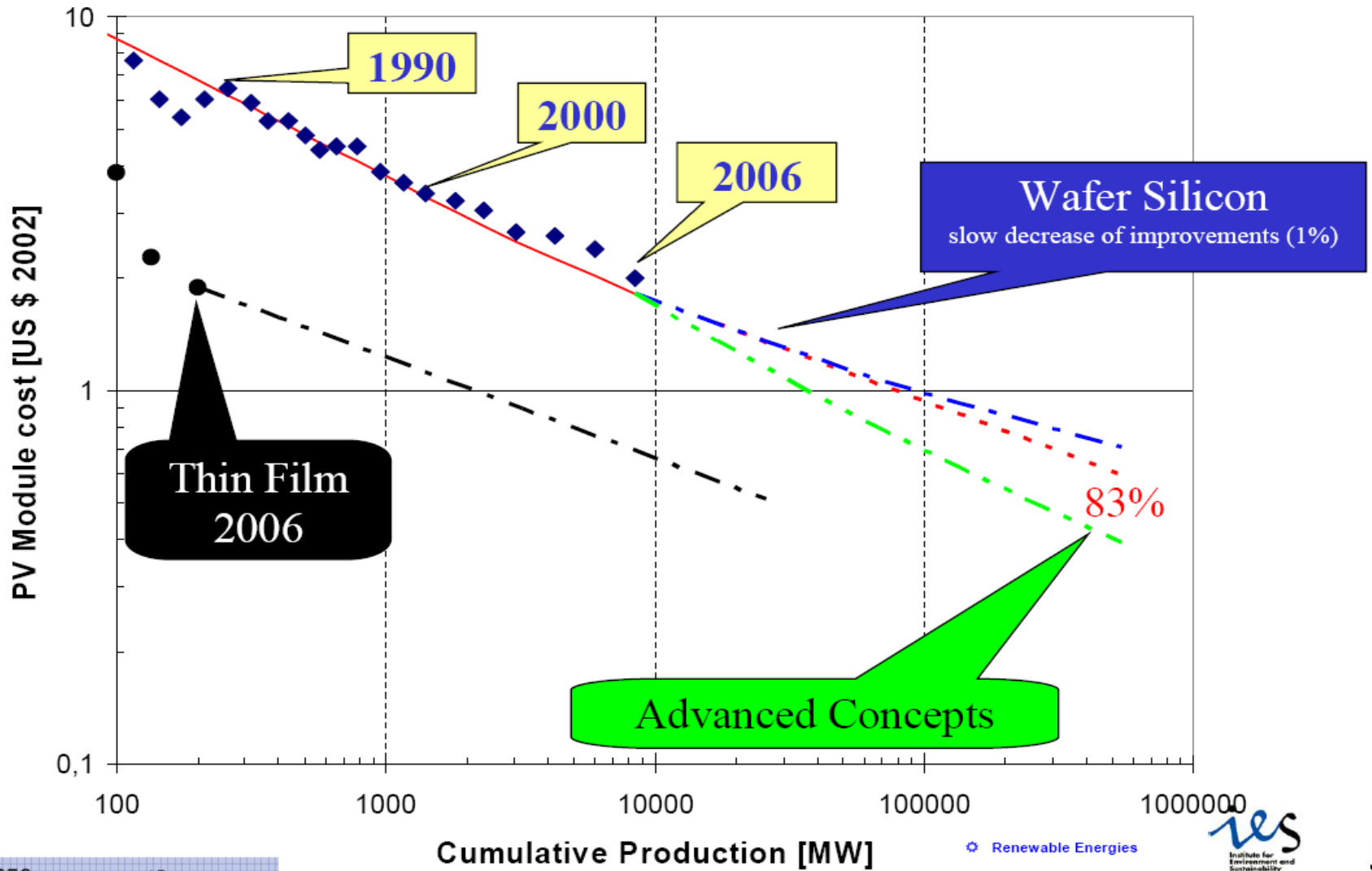
- **Oil:** 10x more plants : *limited source & cost??*
- **coal:** 5x more mines: *CO2 ??*
- **Nuclear:** 1 nuclear power plant/week: *U source, waste?*

World potential of RenEn

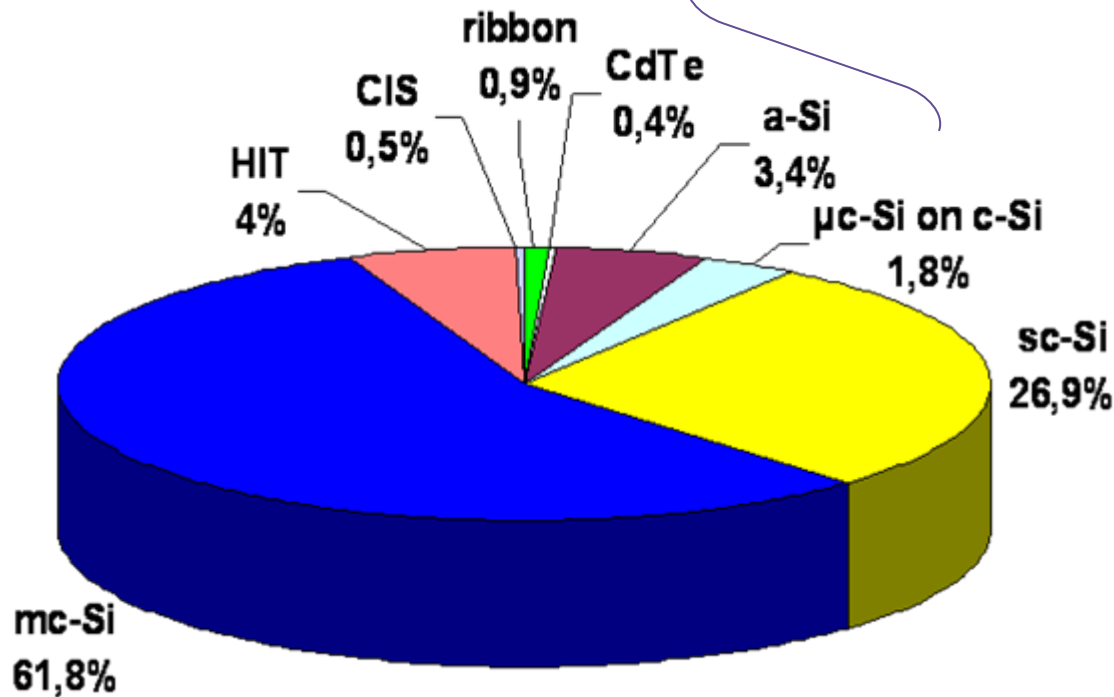




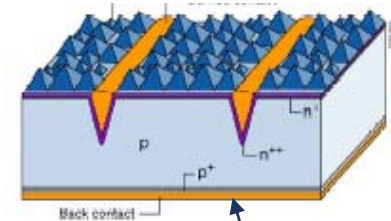
Learning curve for cost



~4%: thin films (1-5 μ m of Si, CIGS, CdTe) on glass



95 % crystalline wafers (200-300 μ m)

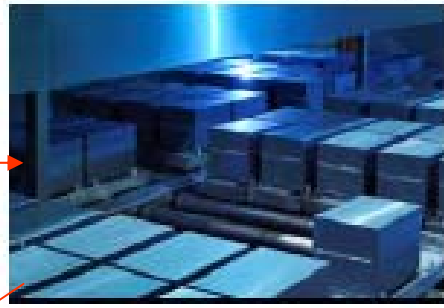


poly-Si



poly-Si in crucible

ingot



blocs

wafers

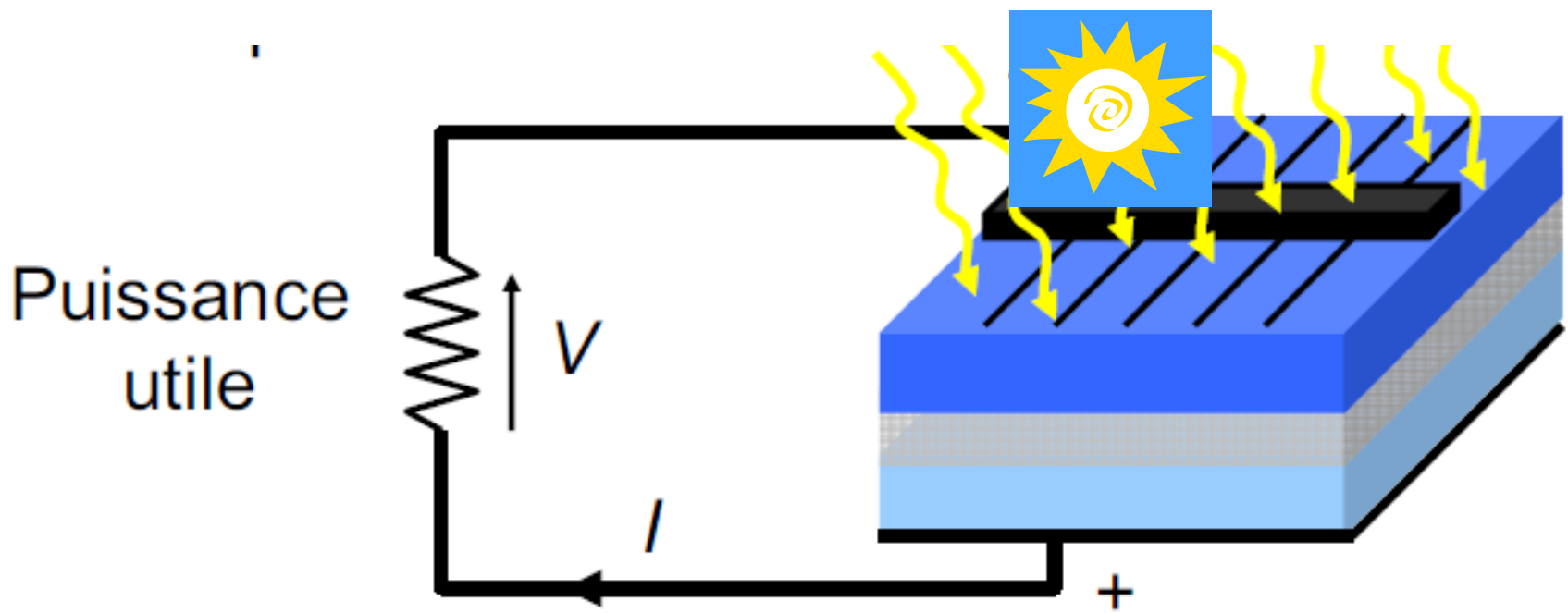


Cells: 16-18%

**Module:
14-16%**

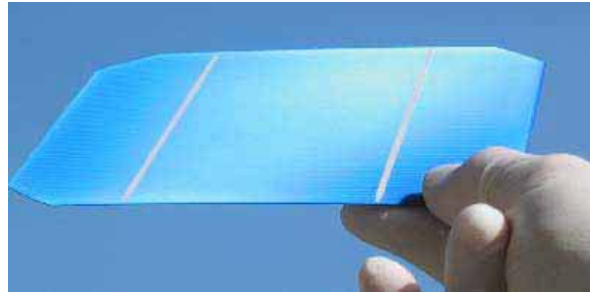


**Building
Integration**



Light Energy → Electrical Energy

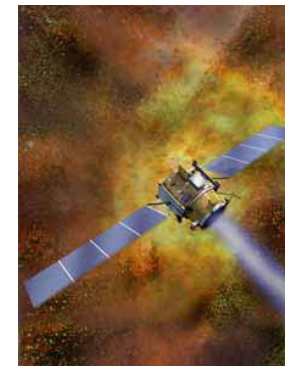
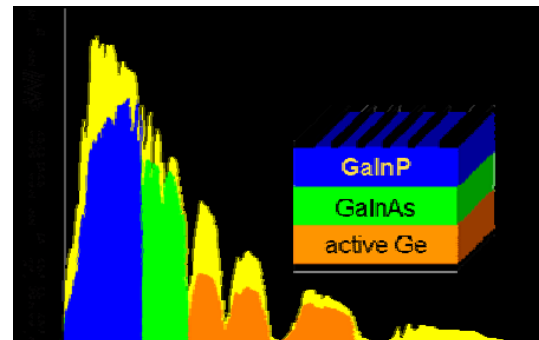
- **Crystalline silicon** → roofs, fields

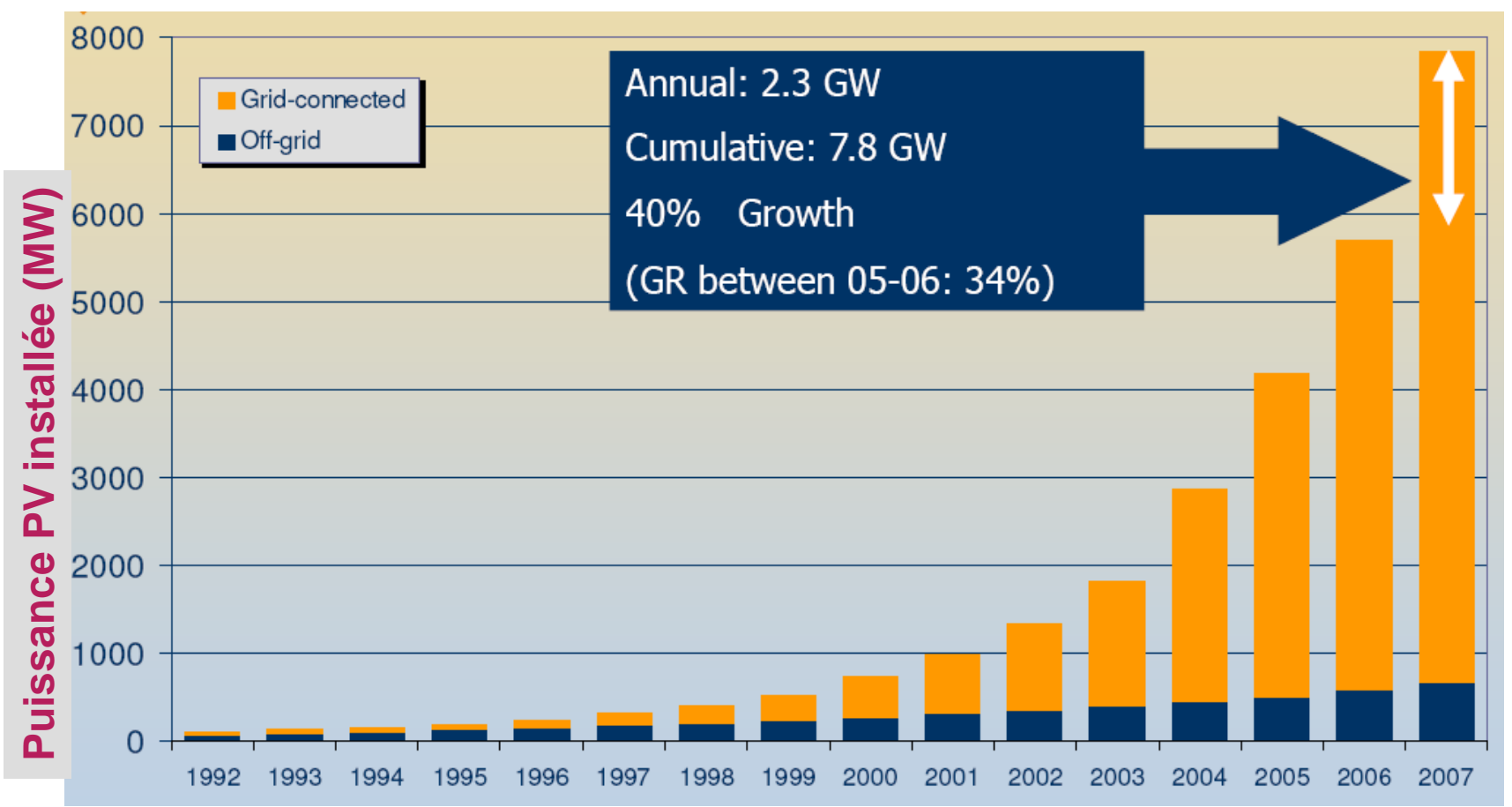


- **Thin Films** → Si, CdTe, CuInSe, polymere → façades, roofs, gadgets



- **GaInAs, GaInP** → spatial, concentration






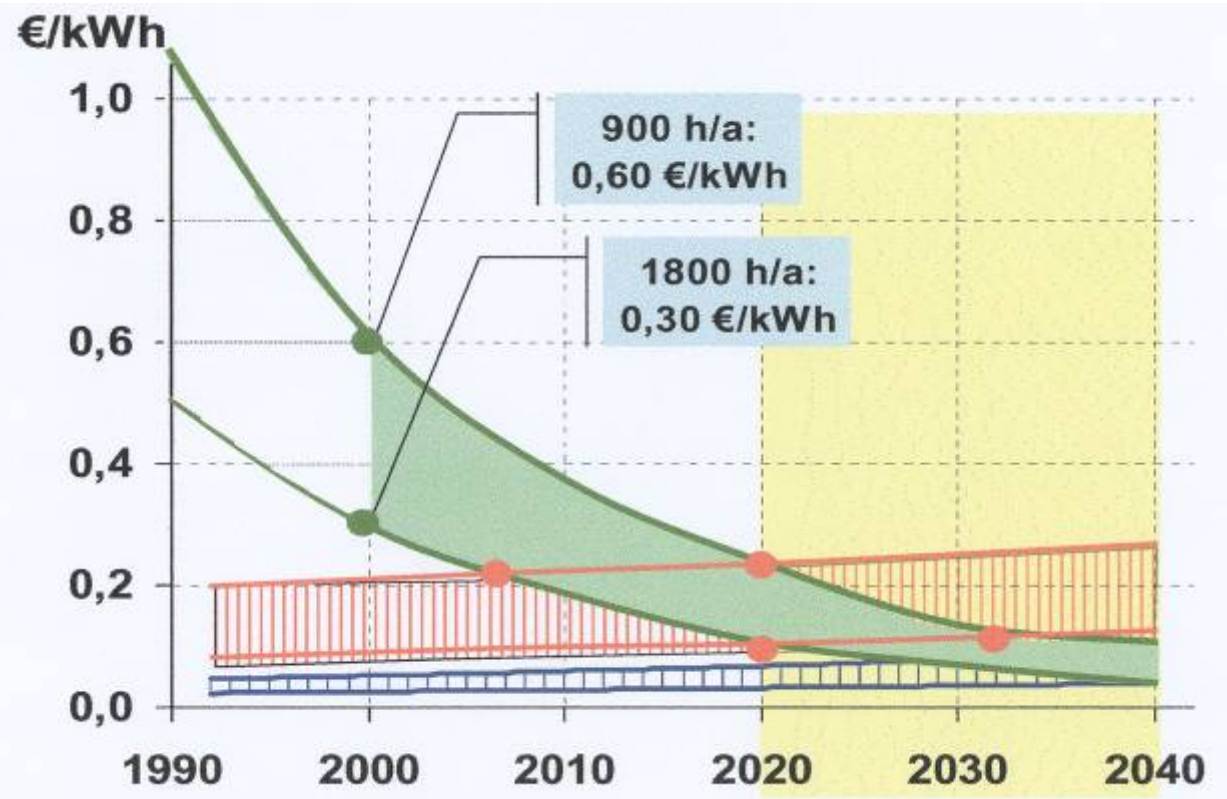


- ~ 8TWh PV in 2008 → 0.12% produced electricity
- ~ 100 000 jobs
- ~ 15 billions Euros
- ~ 25% growth → 12% electricity in 2030

Cost of **Electric PV kWh** compared to **grid electricity kWh** (peak et bulk)



-  Photovoltaics
-  Utility peak power
-  Bulk power

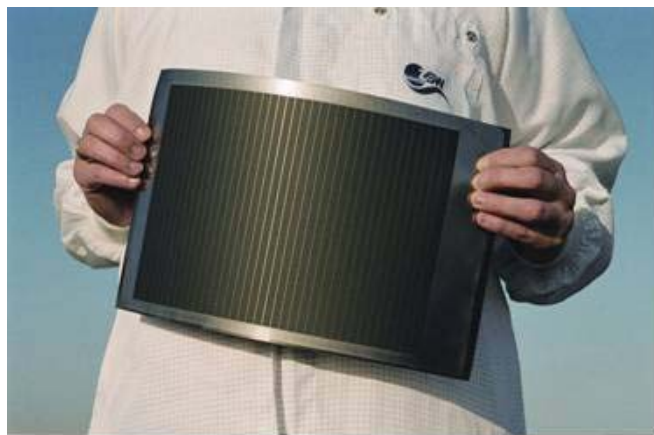




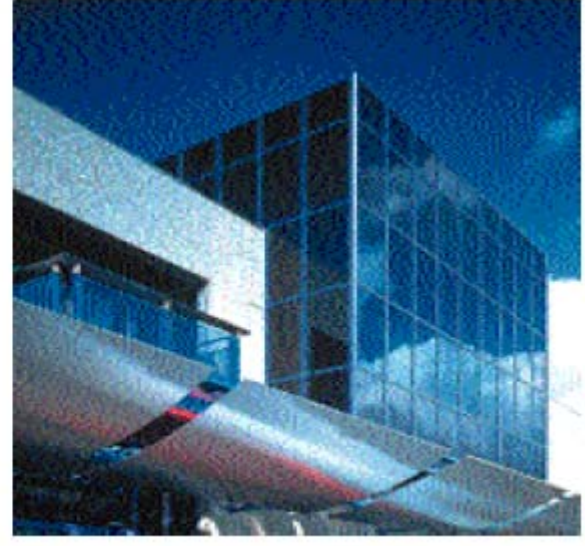
Chambery



Ulm

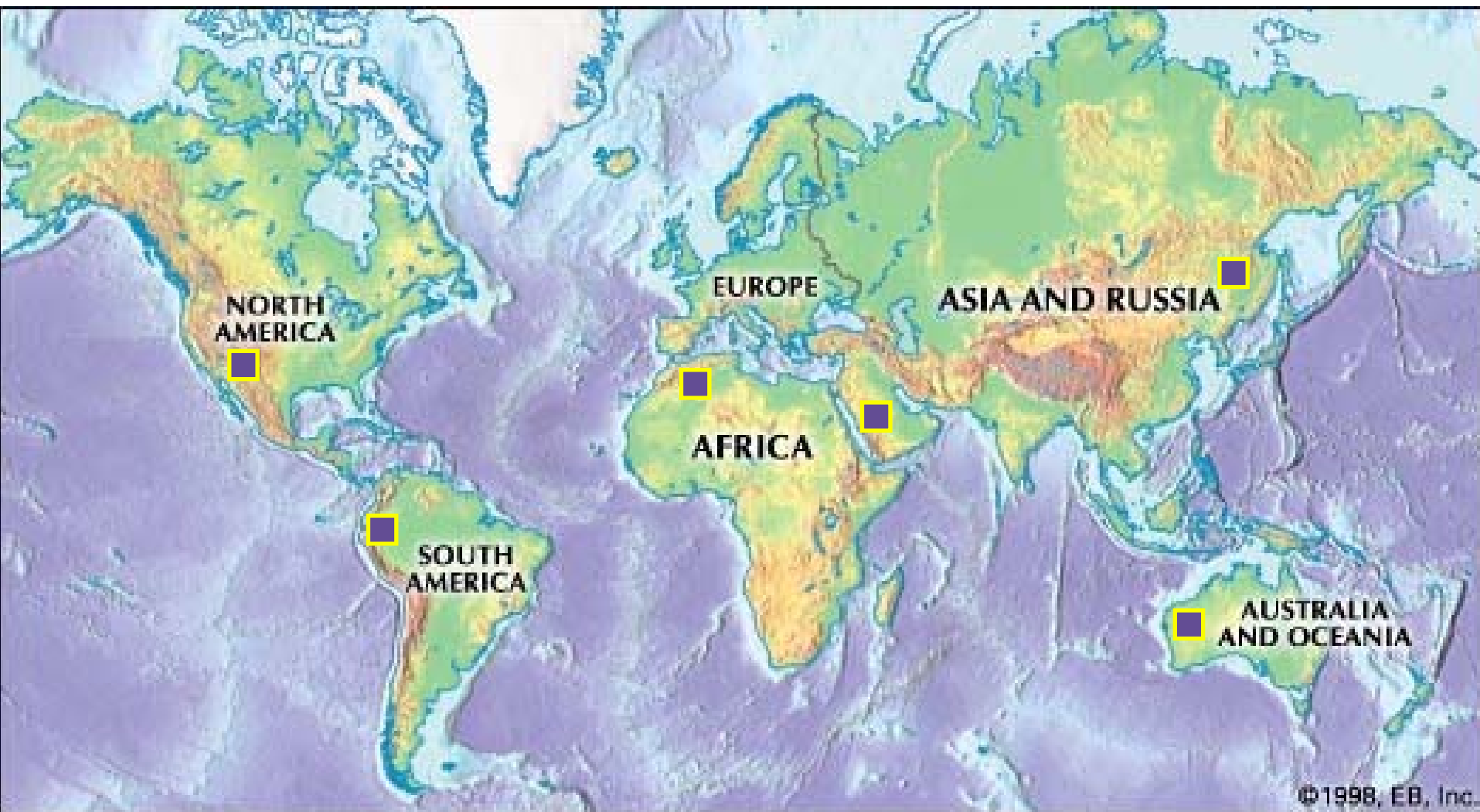


Berlin



Ohta City Land Development Corporation, Japan.

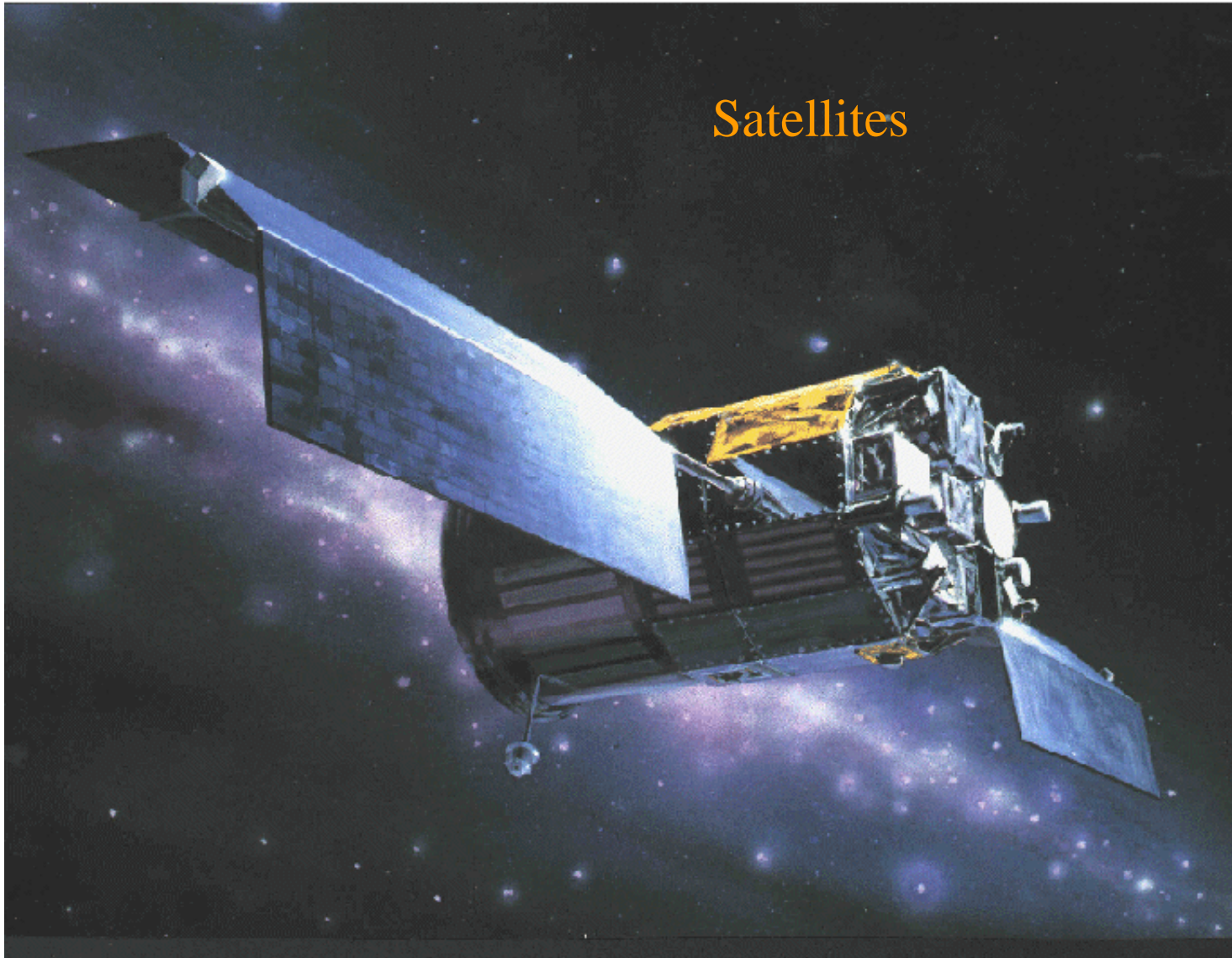




©1998, EB, Inc.

6 boxes (deserts) of 3.3 TW







**Aile volante NASA Helios : 80 m d'envergure
35 kW de cellules Si $\eta = 19\%$**