



Österreich-Standort einer innovativen Photovoltaik- Industrie

PV France 2009 **An economic sector under development**

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PV France : present status

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PV France : present status

☐ Installed PV power



Moyennes annuelles de l'énergie reçue sur une surface orientée au sud et inclinée d'un angle égal à la latitude (en kWh/m²/jour)
 (D'après l'Atlas européen du rayonnement solaire - Commission des Communautés Européennes)

**PV installed in 2008:
 ~105 MW**

~75 MW : mainland

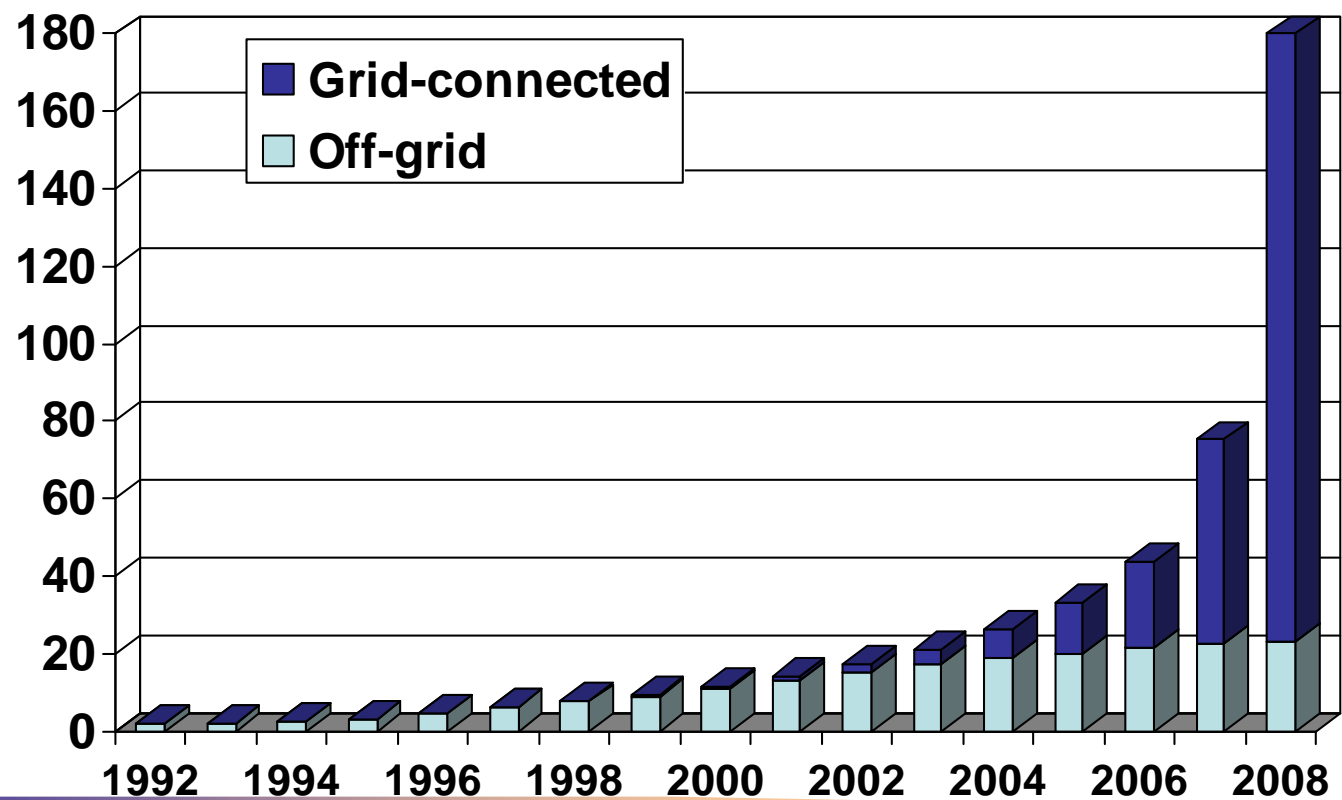
~30 MW : overseas

**Cumulative PV installed
 by end 2008: ~ 180 MW**

PV France : present status

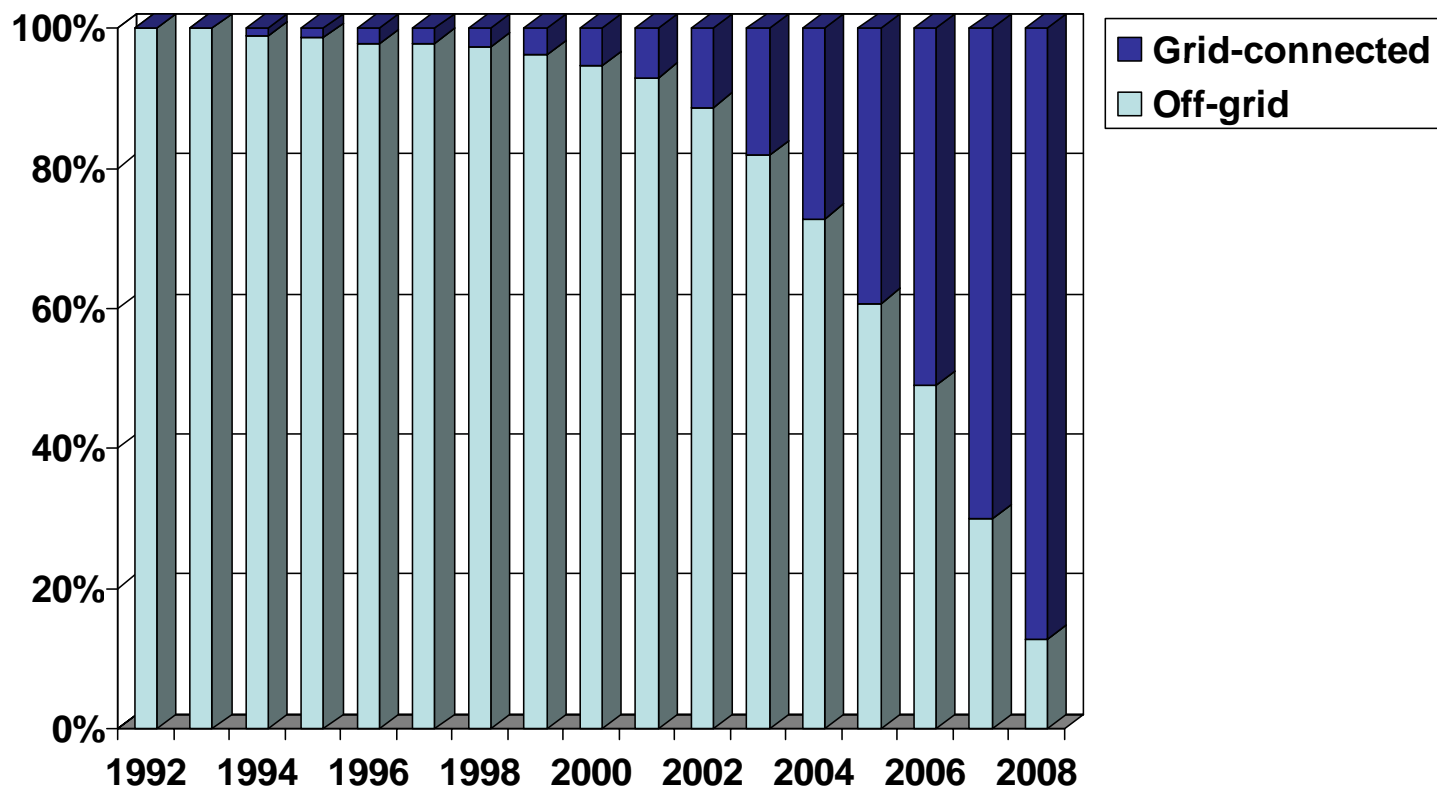
□ Cumulative installed PV power

MW



PV France : present status

□ Cumulative installed PV power: evolution of applications



PV France : present status

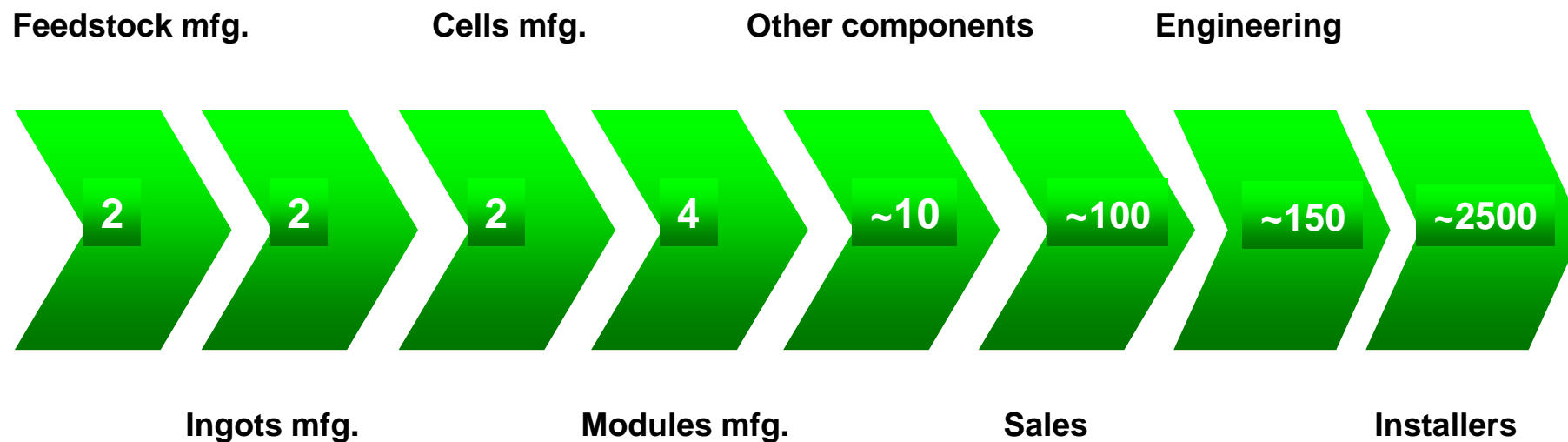
□ Market : 4 main applications

- ✓ Individual systems for homes (~2-3 kW)
- ✓ Roofing systems of collective buildings (10 kW to 100 kW)
- ✓ Roofing systems for industrial and tertiary large roofs (several 100 kW)
- ✓ PV power plants on the ground (several MW)

PV France : present status

□ PV Value chain actors (2008)

(nb of companies involved)



PV France : present status

□ Industry : materials and cell / module manufacturing industry (1)

- ✓ « **Solar quality** » **silicium** : projects under development
- ✓ **Wafer based multicrystalline silicon**: ingots, wafers, ribbons (under development), **cells and modules**
- ✓ **Thin film amorphous silicon (a-Si:H)** on glass substrate
- ✓ **Thin film CuInSe₂/CdS** on glass substrate (pilot development)

PV France : present status

□ Industry (2)

□ Estimated **ingots and wafers** manufacturing capacity

	Products	Capacity 2009
Photowatt	ingots	1000 tonnes
	wafers	60 MW
Emix	ingots	360 tonnes

Source : SER (Syndicat des Energies Renouvelables)

PV France : present status

□ Industry (3)

□ Estimated **cells** manufacturing capacity

	2006	2009
Photowatt	35 MW	60 MW
PV Alliance	/	25 MW
Free energy	1,2 MW	1,2 MW
Total France	~36 MW	~86 MW

Source : SER (Syndicat des Energies Renouvelables)

PV France : present status

□ Industry (4) :

□ Estimated **modules** manufacturing capacity

	2006	2009
Photowatt	40 MW	60 MW
PV Alliance	/	25 MW
Free Energy	1,2 MW	1,2 MW
Tenesol	15 MW	50 MW
Fonroche	/	26 MW
Sunland 21	/	8 MW
Sillia énergie	/	20 MW
Total France	~56 MW	~190 MW

Source : SER (Syndicat des Energies Renouvelables)

PV France : present status

□ R&D context:

- ✓ PV R&D projects are managed by **industry in partnership with public research organizations** : CNRS, CEA, Universities, Engineering schools
- ✓ A new public institute : **INES** (Institut National pour l'Energie Solaire) devoted to **research, promotion and training** (~150 people, objective 500 in 2013)
- ✓ Projects are partially financed by national public institutions : **ANR** (Agence nationale pour la Recherche), **ADEME** (Agence de l'Environnement et de la Maîtrise de l'Energie), **OSEO** (financing body for innovation), **Regional councils**.

PV France : present status

□ PV R&D highlights:

- ✓ **R&D Solar Nano Crystal project (2008-2012)** (ADEME and OSEO funded)
 - ✓ A pilot manufacturing facility (Lab-Fab) to test, on **industrial scale (25 MW)**, **technical innovations** from public research laboratories

- ✓ **Programme HABISOL** (ANR funded)
 - ✓ Method of **energy management in the homes**;
 - ✓ **Energy efficiency** and development of renewable energy use in buildings;
 - ✓ Development of PV for **widespread use in buildings**.

- ✓ **~40 R&D projects supported by ANR et ADEME since 2005**

PV France : present status

□ PV R&D highlights (2):

✓ INES fields of PV R&D:

- ✓ R&D platform for silicon manufacturing process
- ✓ New concepts for innovative cells
- ✓ Organic cells
- ✓ High efficiency cells manufacturing process
- ✓ PV Systems energy management
- ✓ Energy storage
- ✓ PV modules and systems performance assessment



□ Average turnkey prices

System	2 kW roof « added on »		2 kW roof « integrated »	
	2006	2008	2006	2008
Year of installation				
Average turnkey price (EUR/W _c)	7,82	7,58	8,56	8,35

Source: www.outilsolaires.com



A PV « boom »: why and how ?

Which development factors and supports ?

Development factors

- European context**
- French energy policy**
- French PV policy**
- Operational support for PV development**
- Quality policy**

Development factors

□ European context:

- ✓ **European Commission**
 - ✓ Strategic Energy Technology Plan (SET Plan)
 - ✓ Climate energy package

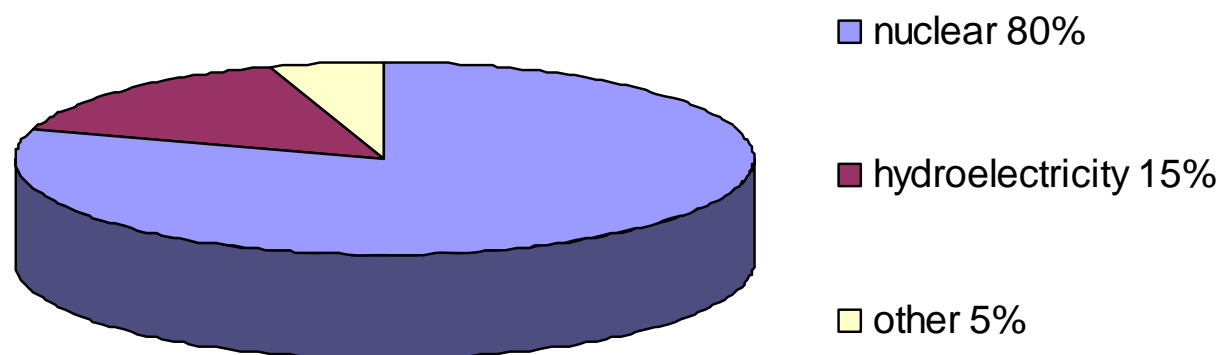
- ✓ **European PV platform, Strategic Research Agenda and implementation programme**

- ✓ **EPIA (European Photovoltaic Industry Association)**
 - ✓ Target : PV supplies 12% of Europe 's electricity demand by 2020
 - ✓ Grid-parity cornerstone (reach 0,17-0,20 EUR/kWh in southern european countries)

Development factors

□ French energy context

✓ **Reminder: today's electricity production in France :**



✓ **92 GW peak power demand in January 2009**

Development factors

□ French energy policy context: political decisions

- ✓ Energy framework law (2005) and « **Grenelle of Environnement** » law (2009)

- ✓ **Renewables** will contribute more to energy mix and climatic change
 - ✓ 23% by 2020
 - ✓ Target for photovoltaics : 5 400 MW by 2020

- ✓ « **changing era** » : everybody can become actor of CO₂-free energy production

- ✓ Going **from centralized to decentralized** power generation

Development factors

□ French solar PV policy :

Focus on building applications and BIPV

- ✓ Potential for a market providing **added value**
- ✓ **BIPV** approach : making **PV** as a natural construction element of every building in the long term
- ✓ Building applications supported by **preferential tariffs**

Development factors

□ Tariffs to promote PV applications

	Continental France	Overseas department and Corsica
	EUR/kWh	
Any application (including ground –based PV plants)	0,32823	0,43764
<i>Large area commercial and industrial buildings</i>	<i>0,45000 (new tariff, not yet operational)</i>	
BIPV small area, private homes	0,60176	

Source: EDF-Obligation d'achat

Note 1 : 20 years contract, tariff financed through CSPE (compensation body for public electricity service); financial contribution collected by EDF and paid by electricity consumers : 0,0045 EUR/kWh

Note 2 : price of electricity for ordinary customer in France (e.g. private home) : 0,11 EUR/kWh

Development factors

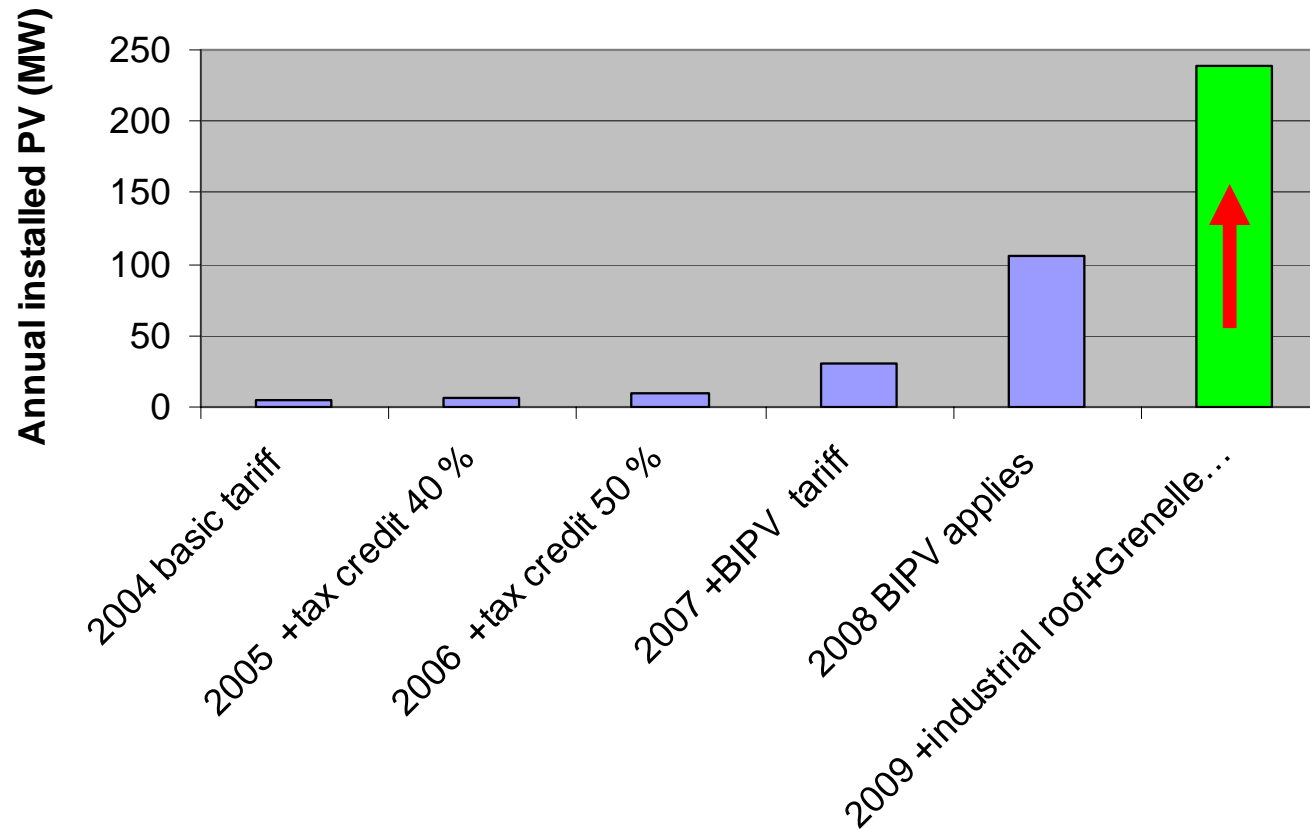
□ Other incentives to promote PV applications:

□ Tax credits to promote individual applications <3 kW :

- ✓ Private income tax payers are entitled to tax credit and feed-in tariffs
- ✓ Tax credit : 50% of equipment cost (not installation labour)
- ✓ Low VAT on equipment: 5,5% (instead of 19,6%)
- ✓ No VAT and no income tax on PV power sales by private owner (<3 kW)
- ✓ Some regional councils may add other types of subsidies

Development factors

□ Impact of stimulation measures



Development factors

□ BIPV strategy :

- ✓ A BIPV is a construction element...which produces electricity
- ✓ A BIPV element will become cheaper than a (standard PV module roof-added+roofing function)
- ✓ A BIPV element offers more added value



□ Availability :

- ✓ 70 BIPV products available on french market, for different roofs/ façades configurations
- ✓ Innovation is on-going to develop new BIPV products



BUT.....

.....To be or not to be...a BIPV ?

Yes, BIPV tariff bonus



Yes, BIPV tariff bonus



Yes, BIPV tariff bonus



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Yes, *BIPV tariff bonus*, same approach for solar thermal and PV



Yes..., and PV in the built environment triggers creativity



Parking lot of shopping centre: 1,15 MW, Saint-Aunès (concept Sunvie.eu)

No BIPV tariff bonus, sorry



No BIPV tariff bonus, sorry



Development factors

□ A major event : the « Grenelle of Environment » (1)



- ✓ An on going discussion in society on **sustainability**
- ✓ **Public hearings** started on july 2007
- ✓ First round table conclusions on october 2007
- ✓ October 2008: **legislation** (50 articles discussed)
- ✓ Grenelle « 1 » law adopted by Parliament (oct 2008) and Senate (feb 2009)

Development factors

- ❑ **Some approved objectives of the « Grenelle of Environment » (2)**
 - ❑ **Energy efficiency :**
 - ❑ Reduction of energy consumption in existing buildings (38% by 2020)
 - ❑ New buildings annual primary consumption (< 50 kWh/m², starts year 2010/2013)
 - ❑ Transport 20% reduction GHG (/ level 1990)
 - ❑ **RES :**
 - ❑ 23% of final energy consumption covered by RES by 2020
 - ❑ Contribution from 17 to 37 Mtep (PV 0,45 Mtep)
 - ❑ Adaptation of the electricity grid (smart-grid concept)
 - ❑ Capitalizing on the regional potential
 - ❑ **PV**
 - ❑ 120 million m² of potentially equipped public sector buildings
 - ❑ 300 MW of PV plants installed by 2011 in french regions (ranging from 5 MW to 20 MW)
 - ❑ 5 400 MW of PV installed by 2020

Development factors

□ Quality policy

ADEME implements the ‘Grenelle of environment’ policy in energy efficiency and PV in building

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CSTB (Centre Scientifique et Technique du Bâtiment)

brings its know-how in quality assessment, innovative engineering, know-how dissemination, research

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Development factors

□ Quality policy

- ✓ Testing and qualification of PV components

Both **INES** and **CSTB** are industry partners for product testing and qualification

ADEME along with **CSTB**, **INES** and **SER** (professional association for renewables) are partners of quality product policy



Development factors

□ Quality policy

✓ CSTB technical assessment (Atec)

- For non-conventional building technologies (such as PV modules for the moment) there is a need for an Atec
 - An Atec is a **voluntary procedure**. Validity is time limited (2 to 7 years), renewable
 - A certification (e.g. CSTbat) can be associated to assess factory production process

- An Atec gives confidence to **building sector users** and **insurance companies** (in relation with the decennial guarantee)



Development factors

□ Quality policy

✓ Quali PV: quality label for PV installers

- A branch initiative, provided by the **SER Association**
- A standard for well trained professionals
- Voluntary: respecting the charter « 10 solar points »
- Launched in October 2007
- More than **3 300 companies** have received the label (**May 2009**)



Development factors

□ Quality policy

✓ Other supports : to project developers

- Technical guides, promoted by ADEME
 - Guide for writing the technical specifications
 - Building integrated photovoltaics: examples
 - How to manage a private individual photovoltaic project (Perseus)

Downloadable from www.ademe.fr :

Development factors

□ Quality policy

✓ Other initiatives: contribution to international cooperation

IEC/TC82 (Solar Photovoltaic Energy Systems)

□ Technical Specification IEC TS 62257-1/13 for rural electrification systems




- Based on preliminary work made by EDF and ADEME
- Maintenance supported by ADEME

IEA PVPS Programme

- Task 1: Exchange and dissemination of information on PV systems
- Task 9: Photovoltaic services for developing countries
- Task 10: Urban scale PV applications
- Task 11: Hybrid systems within mini-grids

Development factors

□ Employment impact

	2006	2007	2008
Direct jobs	~1 100	~2 130	~4 000
2007/2006			+ 94%
2008/2007			+90%
2008/2006			+ 260%

Summary (1/2)

Installed PV power 2008: 3 x installed PV power 2007

Political support essential to promote deployment of energy efficiency and renewable energy sources:

- ✓ Market development
- ✓ Technical improvement
- ✓ Industry and business structuration
- ✓ New jobs

Fiscal and tariff measures: an efficient tool

Summary (2/2)

PV applications in buildings and BIPV in particular

- ✓ **Makes PV modules a standard construction component**
- ✓ **Contributes to higher environmental quality buildings**
- ✓ **Stimulates innovation in PV industry and building sector**
- ✓ **Allows everybody to produce CO₂-free electricity**

Technical Assessment (ATec) on products from independent scientific/technical body gives confidence to building sector users and insurance companies

National and local financial incentives for investors can cover both projects development and industrial investments

Danke

