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Advanced Renewable Tariffs in France: Results, New Schemes, Prospects

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Part 1

The French Energy policy Context



The French Energy Policy Context

- ❑ **A new "Energy Law" setting the short to long term energy policy framework and targets was passed on July 13th 2005**
 - ⇒ "POPE law": "Loi de Programme fixant les Orientations de la Politique Energétique"
- ❑ **Long term 2050 target for GHG decrease: -75 % from 1990 level**
- ❑ **For renewables, emphasis on 2010 contribution:**
 - ⇒ 10 % of total primary energy consumption from RES (around 6 % in 2004)
 - ⇒ **21 % target of RES for electricity in 2010 confirmed (vs 14 % in 1997)**
 - ★ This would require + 50 TWh compared to 1997 contribution
 - ★ 2005 actual contribution around 12 % (very low 2005 Hydropower yield)
 - ⇒ + 50% contribution from thermal renewables compared to 2004 contribution (+ 4 Mtoe from renewable heat from 2004 to 2010)
 - ⇒ 5.75 % of biofuels in transports confirmed, by 2008 and not by 2010

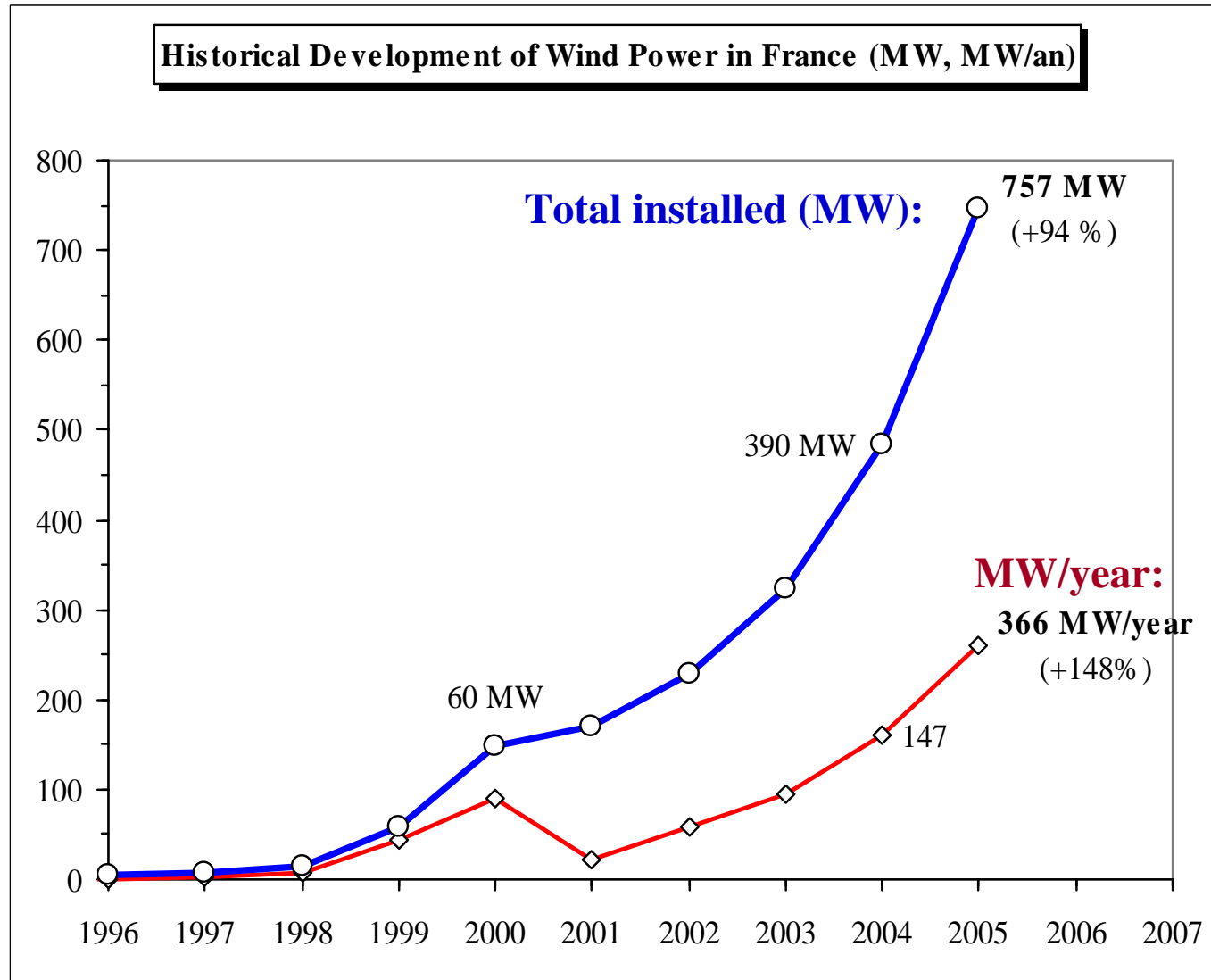


Part 2

Effects of French 2001 ARTs (Advanced Renewables Tariffs)



2001 Wind Energy Tariffs were efficient

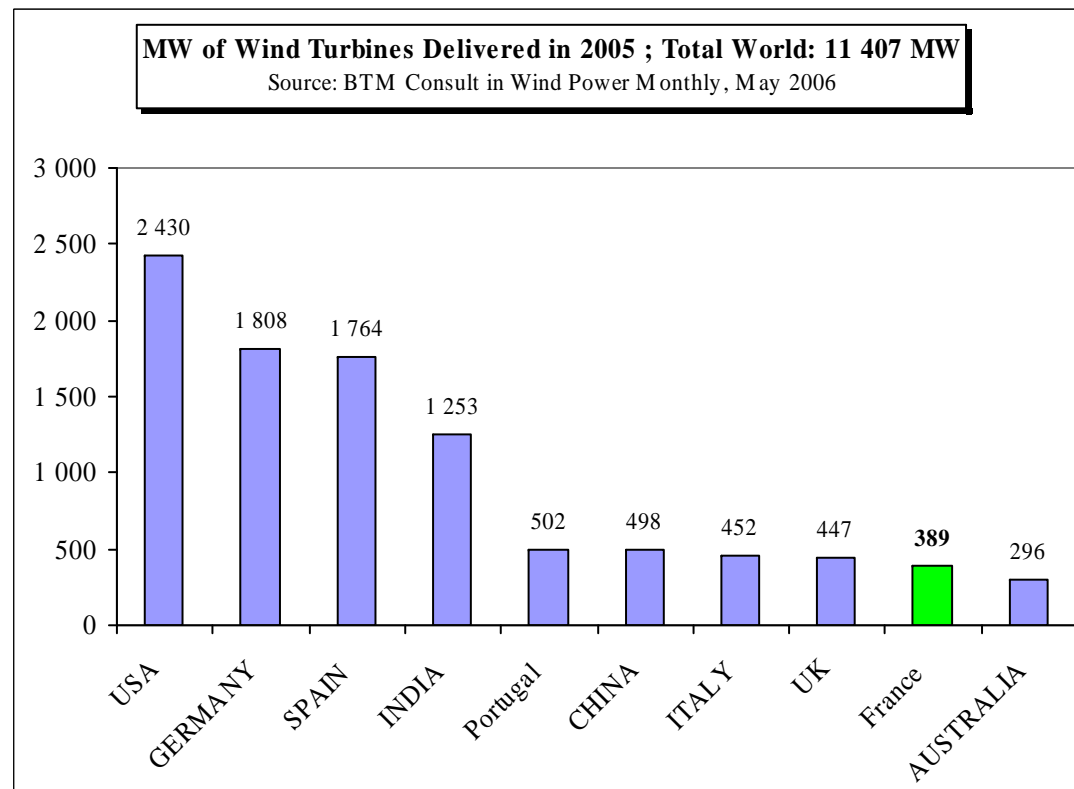


Source: B. Chabot, L. Buquet, « Le développement de l'énergie éolienne en France en 2005 » www.suivi-eolien.com



2001 French Wind Power Tariffs were efficient (2)

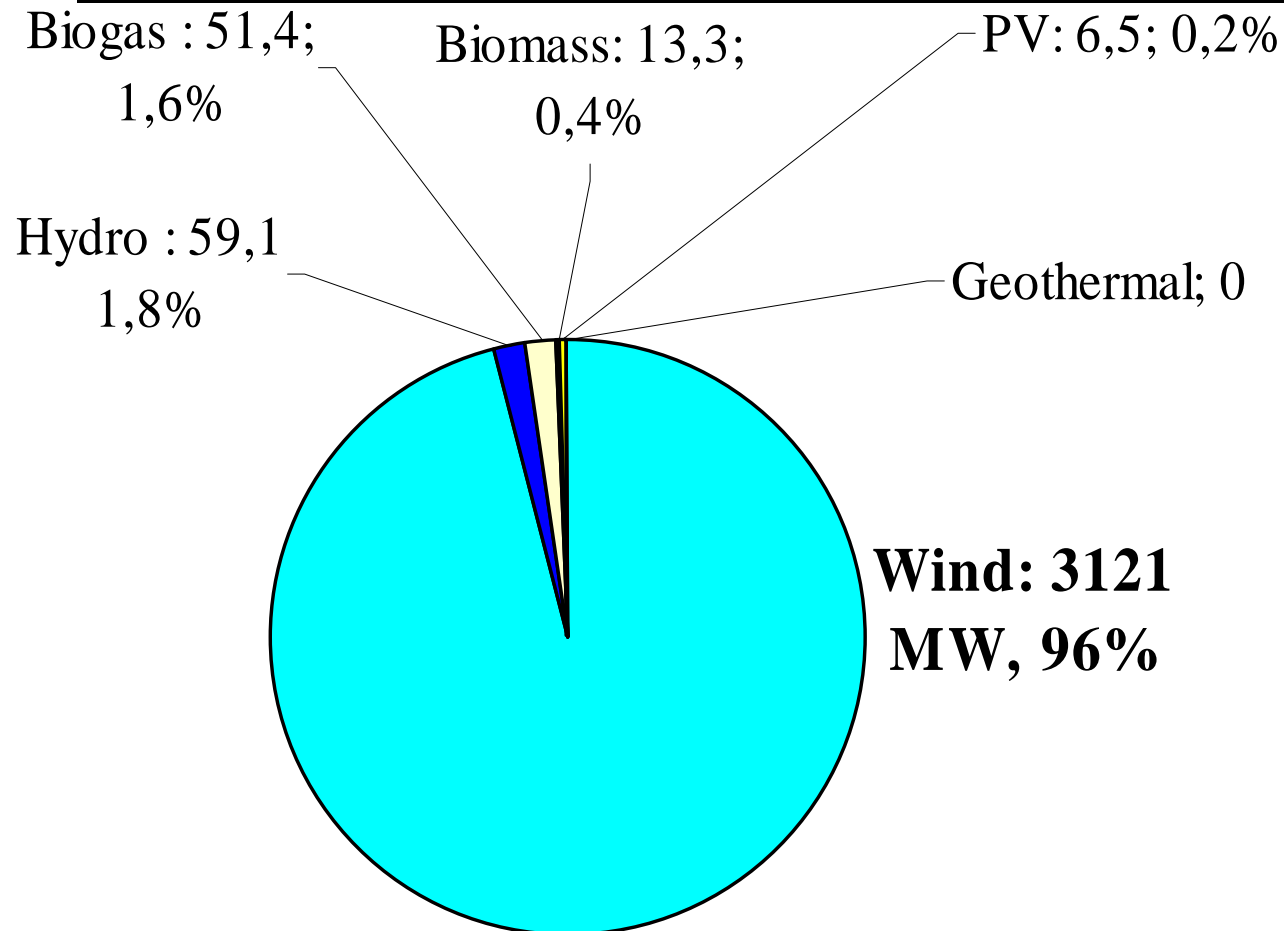
- ❑ **First TWh/year delivered in 2005**
- ❑ **First entry in the “Top Ten” Wind Turbines Markets in 2005**
- ❑ **First GW in operation in mid 2006**
- ❑ **First GW⁺/year market: in 2007/2008 ??**





Only 2001 wind tariffs were sufficiently attractive

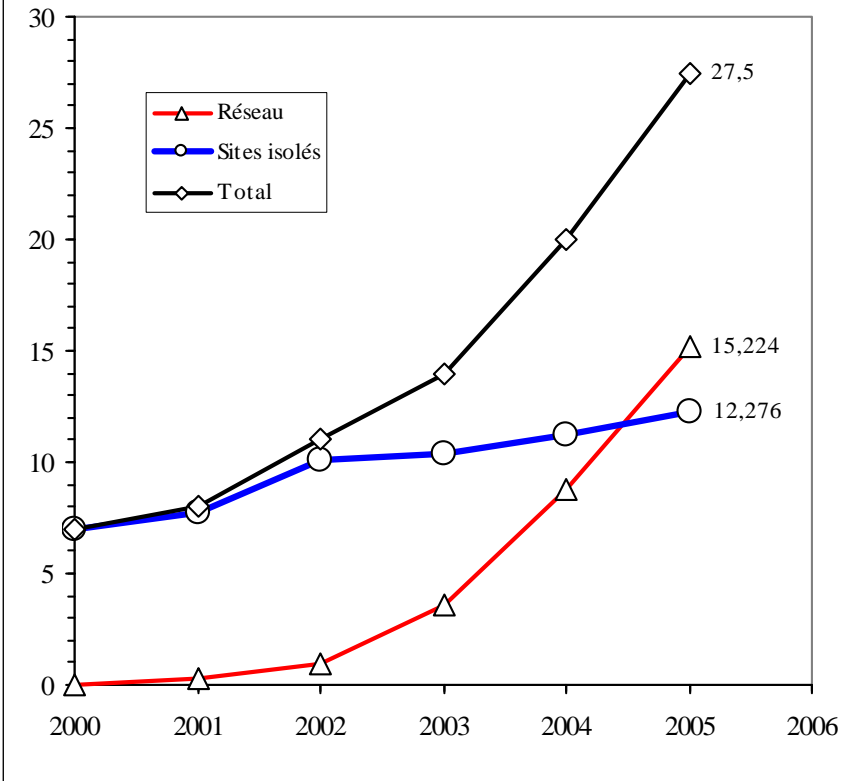
Share in Sept. 2005 of the 3251 MW of grid connection active files



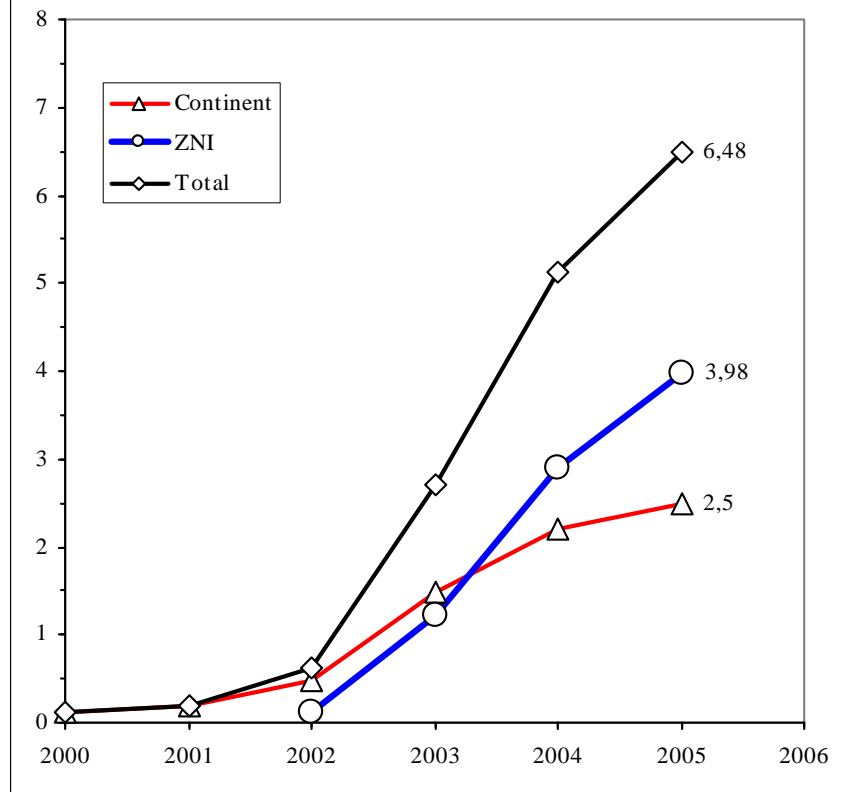


2001 PV tariffs not enough attractive except in islands

Parc PV en France (MW)



Marché annuel PV sur réseau en France (MW/an)





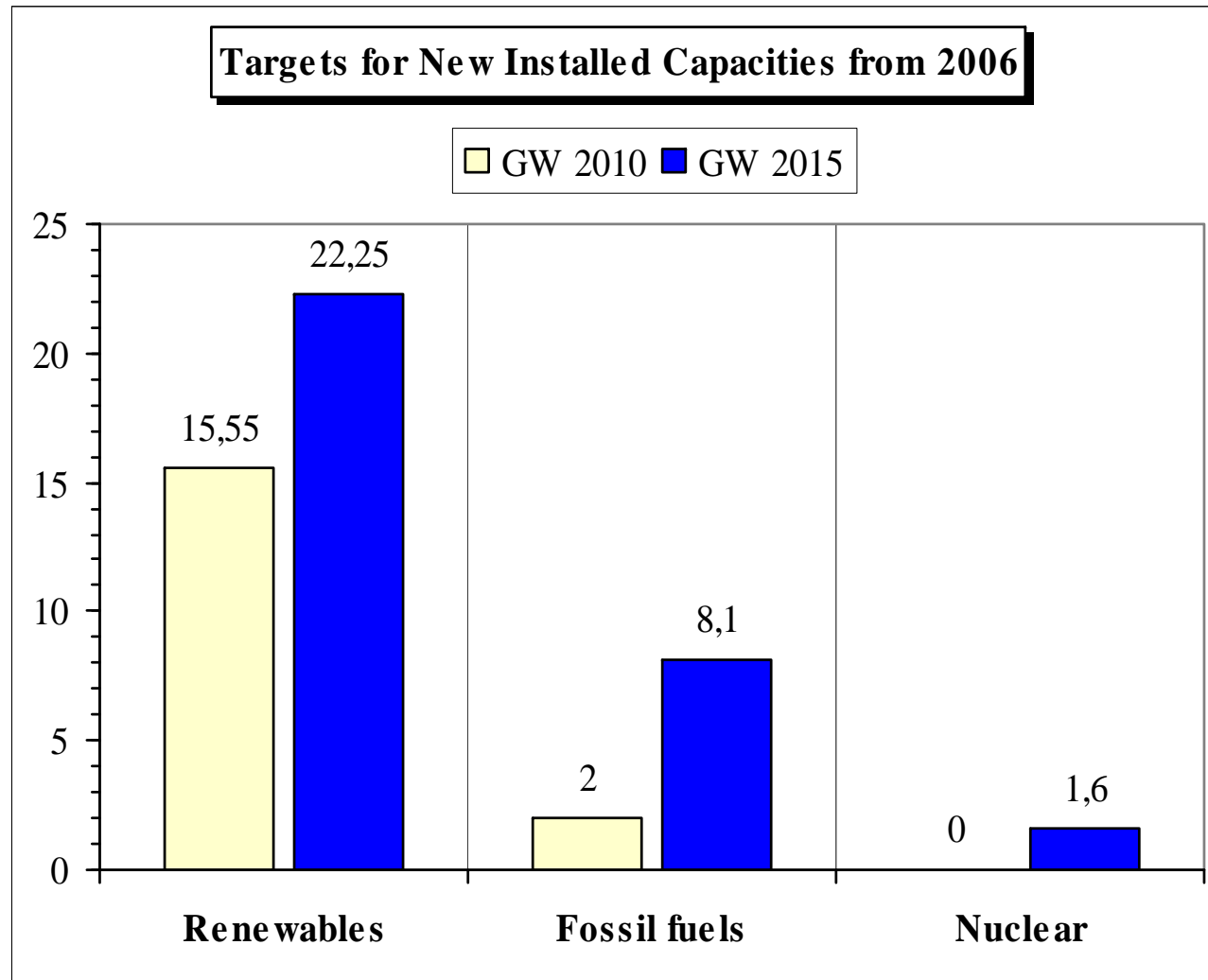
Part 3

New targets for RE electricity in France



The July 2006 new targets for power increases

- Renewables will represent the larger increase till 2010 and 2015

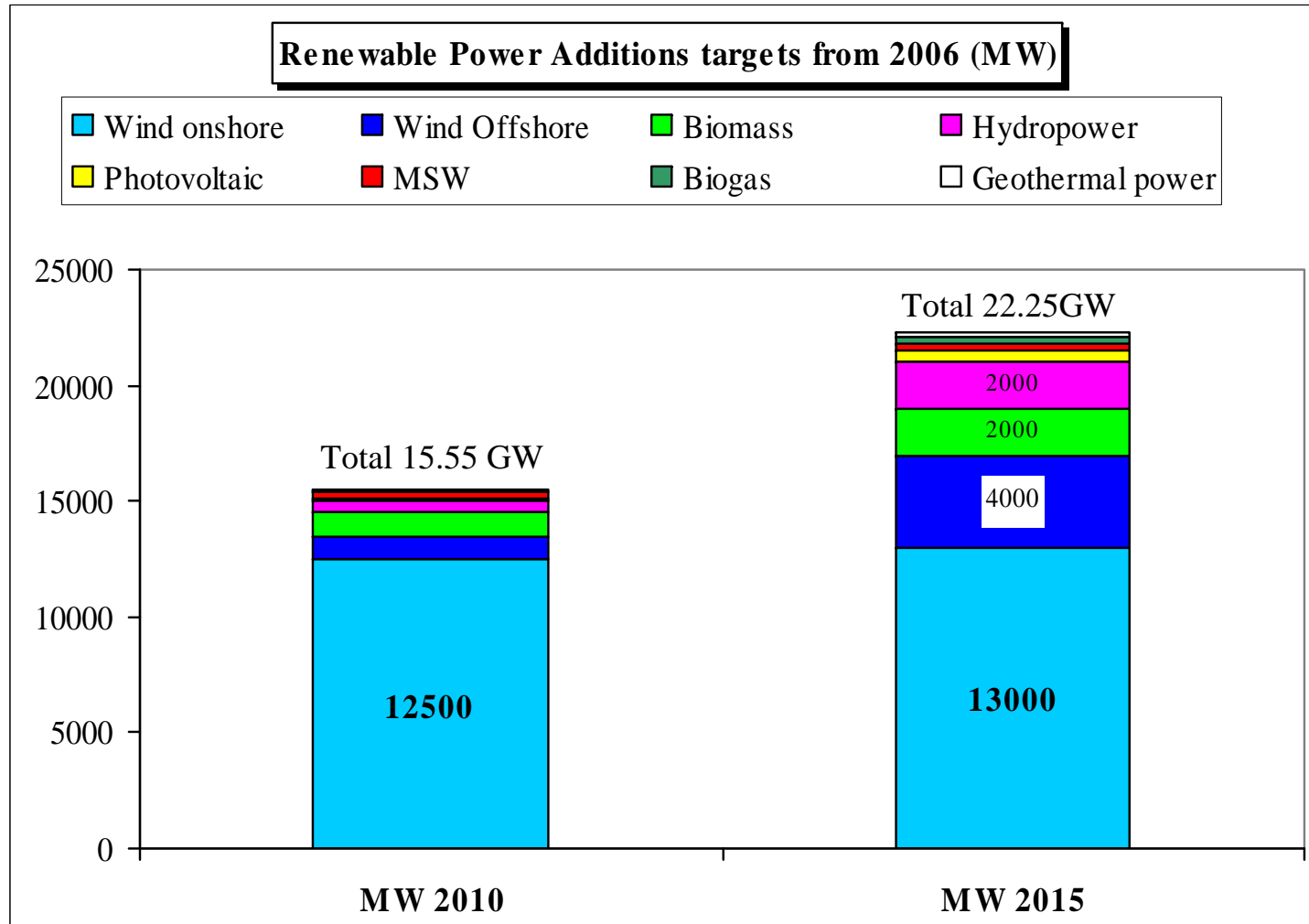


Source: Arrêté du 7/7/2006 relatif à la PPI, published in the "Journal officiel" on July 9, 2006



The July 2006 new targets for RE power increases (2)

- Wind power will represent the larger increase till 2010 and 2015





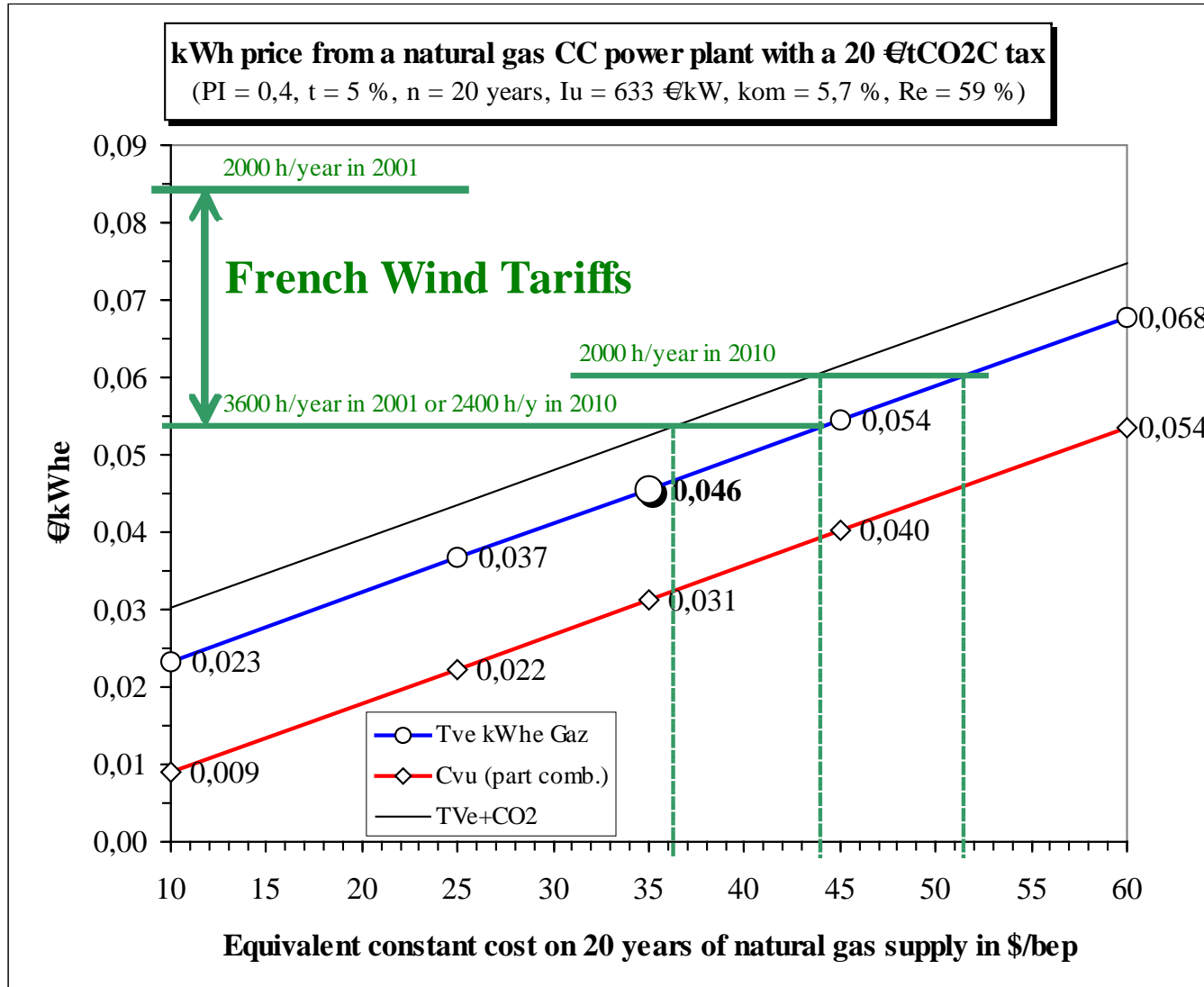
Part 4

The New Context from July 2006: New RE electricity Tariffs



Towards wind tariffs with no longer an over cost !

- Over-cost is calculated from electricity market price driven from NGCC





RE Feed-In Tariffs after the “POPE” Law (1)

❑ **The July 13th 2005 POPE law demanded for 2006:**

- ⇒ To determine if profitability from RE tariffs was “Normal”
- ⇒ To propose new tariffs according to this analysis

❑ **Results of analysis from Ministry of Industry:**

- ⇒ Profitability from 2001-2003 RE tariffs was not beyond “normal levels” and in fact was too low in some cases
- ⇒ New “2006 tariffs” already published :

- ★ **Photovoltaics**

- ★ **Biogas**

- ★ **Wind Power**

- ★ Geothermal Power

- ⇒ Other “new tariffs” to be published in 2006:

- ★ Small Hydropower

- ★ Electricity from Biomass

- ★ Electricity from MSW



Principles for the revised 2006 French RE tariffs

- ❑ **“Fair and efficient tariffs”**
 - ⇒ Designed to attract a sufficient number of investors
 - ⇒ Designed to give a fair economic profitability
 - ★ MoI working group: Measured by project real IRR
 - ★ With checks against ADEME Profitability Index recommended values
- ❑ **Specific tariffs for each technology (Wind, PV, Hydro, Biomass, Biogas, Geothermal)**
- ❑ **Specific conditions within a tariff to avoid over or under profitability**
 - ⇒ Wind: project tariff from measured capacity factor on 10 years
 - ⇒ Biogas: tariff from installed power range, methane processing...
 - ⇒ PV: tariff from location (continent, Islands) and use (bonus for building integration)
 - ⇒ ...



Principles for the revised 2006 French RE tariffs (2)

❑ **Taking into account future investment costs**

- ⇒ -2 %/year from 2008 for new wind contracts (vs -3.3 % in 2001)
- ⇒ No decrease for PV at the moment (to check market prices)
- ⇒ ...

❑ **Protection against inflation within a contract**

- ⇒ E. g. 60 % for wind tariffs
- ⇒ See specific slide

❑ **No caps**

- ⇒ But the “PPI” gives the government possibility:
 - ★ To “accelerate” with calls for tenders
 - ★ To revise tariffs if PPI targets are met in 2010 and 2015

❑ **Standard procedures and contracts for each technology**



An approach to inflation protection

- ❑ **Inflation was mainly created by oil crisis in 1974-1984**
- ❑ **Looming oil and gas crisis presents a new inflation risk**
- ❑ **Investments in technologies preparing an oil-free world and lowering climate change risk worth to be more protected against inflation effect than investments based on fossil fuel use**
- ❑ **Protection against inflation within a long term contract is a key parameter to decide to invest or not in a technology and a project**
 - ⇒ From banks (up to 80 % of the investment cost)
 - ⇒ From equity (from 20 % of the investment cost)
- ❑ **Two ways to protect against inflation :**
 - ⇒ Higher initial tariff and small protection: problem: future inflation rate not known !
 - ⇒ Lower initial tariff and higher part of the tariff protected (up to 100 %)
 - ⇒ See for example 2005 simulations for OSEA-OPA-OEB
 - ⇒ The worse decision: initial profitability calculated without inflation effect on 20 years and no or little protection against inflation !



The new photovoltaic tariff after the “POPE” law

□ The Feed-In tariffs for Photovoltaics (on 20 years):

⇒ “old” tariffs continental France: 0.15 €/kWh ; islands: 0.3 €

⇒ “New July 10th 2006” PV tariffs (continental France):

★ Base tariff: 0.3 €/kWh.

★ **Bonus for “Building integrated systems”: 0.25 €/kWh**

→ **Total in this case: 0.55 €/kWh**

→ The decree defines some solutions for “building integration” and a letter from the Ministry of Industry will give more technical details

→ The project owner has to testify in a letter that its system is building integrated

→ Private householders can benefit from a 50 % tax credit on hardware cost

★ No longer -5 % / year for new projects

★ 60 % of the tariff within a contract is protected each year from inflation

⇒ New impetus foreseen for grid connected PV in France !

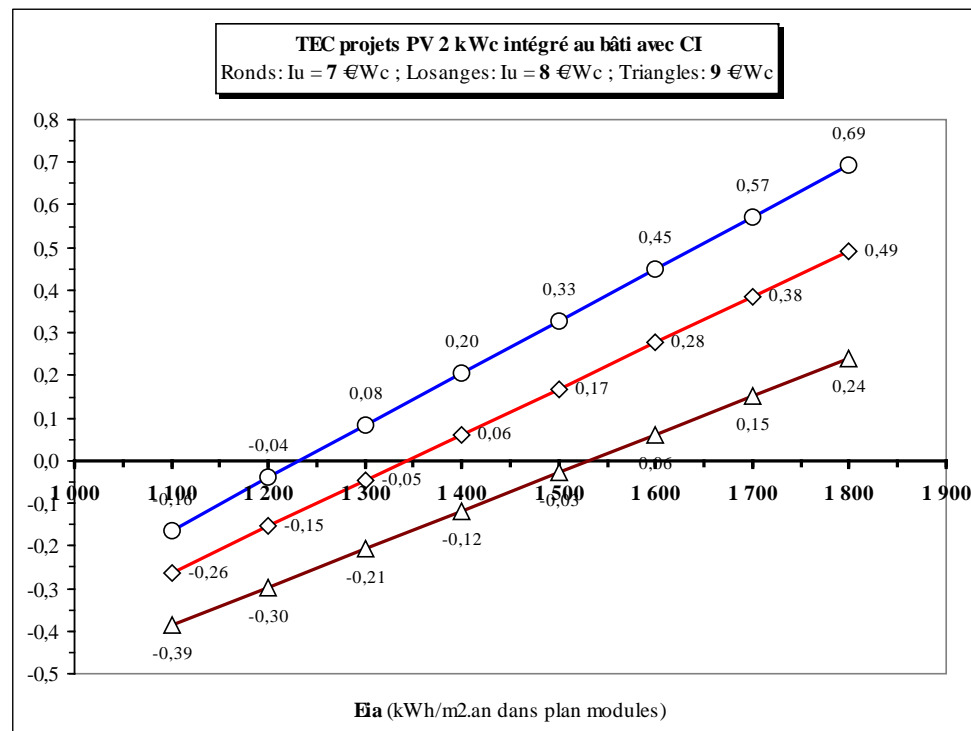
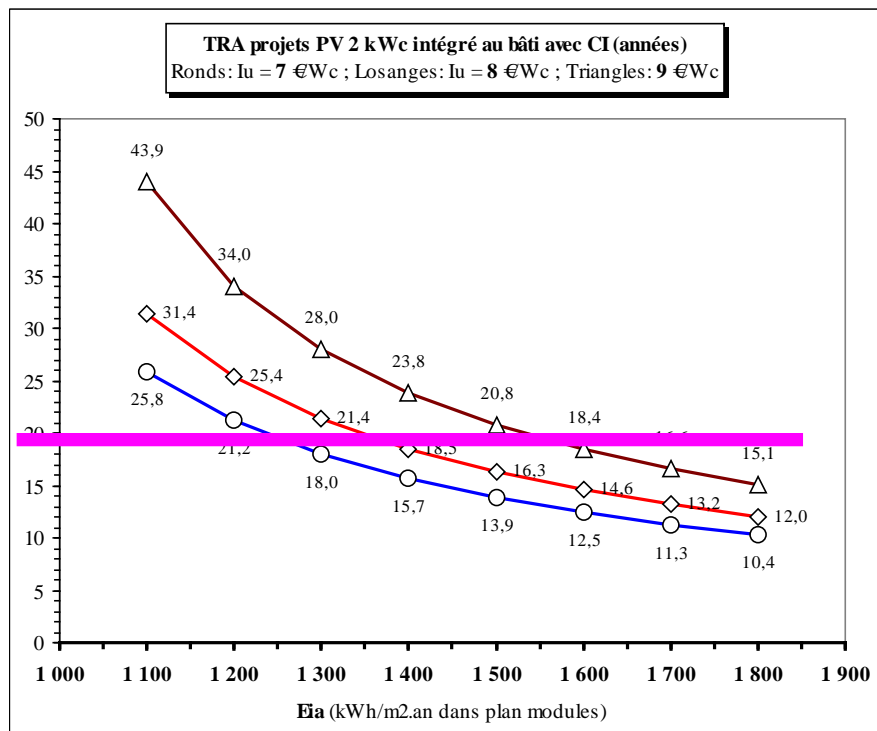
★ The 160 MW target in 2010 and 500 MW in 2015 can easily be reached

★ Will favour development of the French PV industry & BI products



New PV Feed-In Tariffs after the ‘POPE’ Law (2)

- ❑ Attractive discounted pay-back time (left figure) and profitability index (right figure) for building integrated PV
- ❑ Very sensitive to location and initial investment cost





Biogas Feed-In Tariffs after the “POPE” Law

□ **The Feed-In tariffs for Biogas (on 15 years):**

⇒ “old” tariffs (continental France): too low from a factor 2

⇒ “New July 10th 2006” Biogas tariffs (continental France):

★ Base tariff: from 9 c€/kWh if $P < 150$ KW to 7 c€/kWh if $P > 2$ MW

★ Bonus for “CHP operation”:

→ 3 c€/kWh if Overall efficiency > 75 % down to 0 c€ if global efficiency < 40 %

★ Bonus for specific Methane production process: 2 c€/kWh.

★ No tariff decrease for new projects (100 % protection against inflation)

★ 70 % of the tariff within a contract is protected each year from inflation effect

⇒ New impetus foreseen for electricity and heat from biogas in France !



Context for Wind Power after the “POPE” Law (1)

❑ **Two parallel mechanisms:**

⇒ Power purchase obligation and Feed-in Tariffs

⇒ Competitive calls for tender launched by CRE on behalf of Ministry of Industry within the “PPI” requirements

❑ **To benefit from the power purchase obligation and feed-in tariffs:**

⇒ New projects must be located within a “ZDE”:

★ **“Zone de Développement de l’Eolien”**: “Zone for Wind Power Development”

★ Up to local municipalities to ask or not for minimum and maximum limits for wind farms rated power (the “12 MW limit” is no longer mandatory)

⇒ Except up to July 12 / 2007 for projects with already a complete file for application for building permit and eligible to the power purchase obligation (less than 12 MW)

❑ **EIA & Public inquiry mandatory if hub height > 50 m**



Wind Feed-In Tariffs after the ‘POPE’ Law

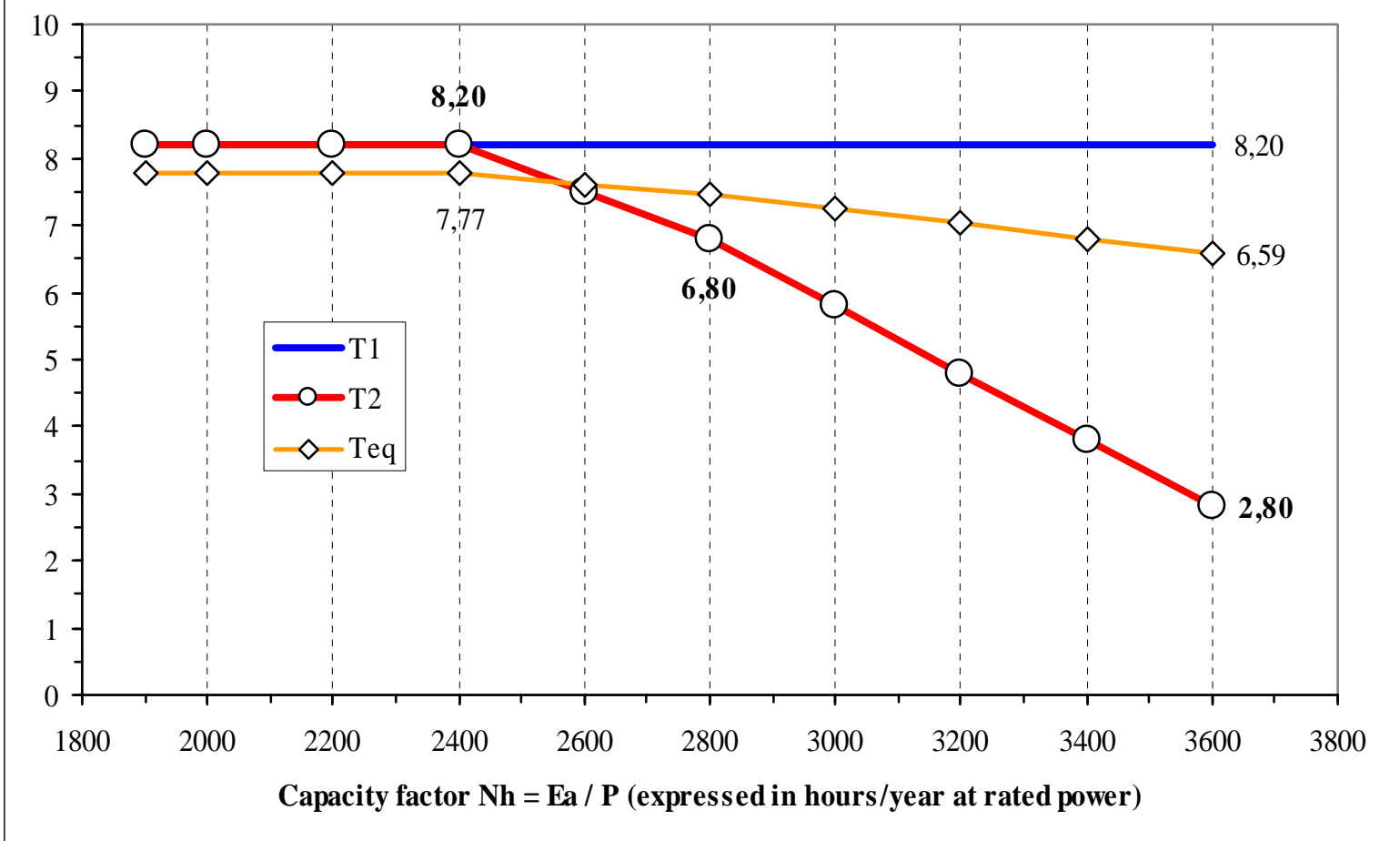
□ The Feed-In tariffs for wind power (on 15 years):

- ⇒ No longer 10 % tariff decrease after 1.5 GW of signed PPA
- ⇒ Decrease for new contracts from 2008:
 - ★ - 2 % /year instead of - 3.3 %/year
 - ★ 100 % corrected from inflation effect (in nominal €)
- ⇒ From a 5 years at T1 tariff + 10 years at T2<T1 tariff to a 10 years at T1 tariff + 5 years at T2<T1 tariff
- ⇒ Small decrease of T1 tariff: 8.2 c€/kWh versus 8.38 c€/kWh
- ⇒ Tariff T2 for years 11 to 15 calculated from measured capacity factor Nh on years 1 to 10 with new reference values:
 - ★ Nh < 2400 h/year: T2 = 8.2 c€/kWh (vs 2000 h/y and 8.38 c€in 2001)
 - ★ Nh = 2800 h/year: T2 = 6.8 c€/kWh (vs 2600 h/y and 5.95 c€in 2001)
 - ★ Nh = 3600 h/year: T2 = 2.8 c€/kWh (vs 3600 h/y and 3.05 c€in 2001)
- ⇒ Within a contract: 60 % of tariff corrected from inflation each year (same as in 2001).



2006 wind power tariffs (Continental France)

2006 Continental France Wind Power Tariffs Years 1 to 10 (T1), Years 11 to 15 (T2) and Equivalent Constant Tariff on Years 1 to 15

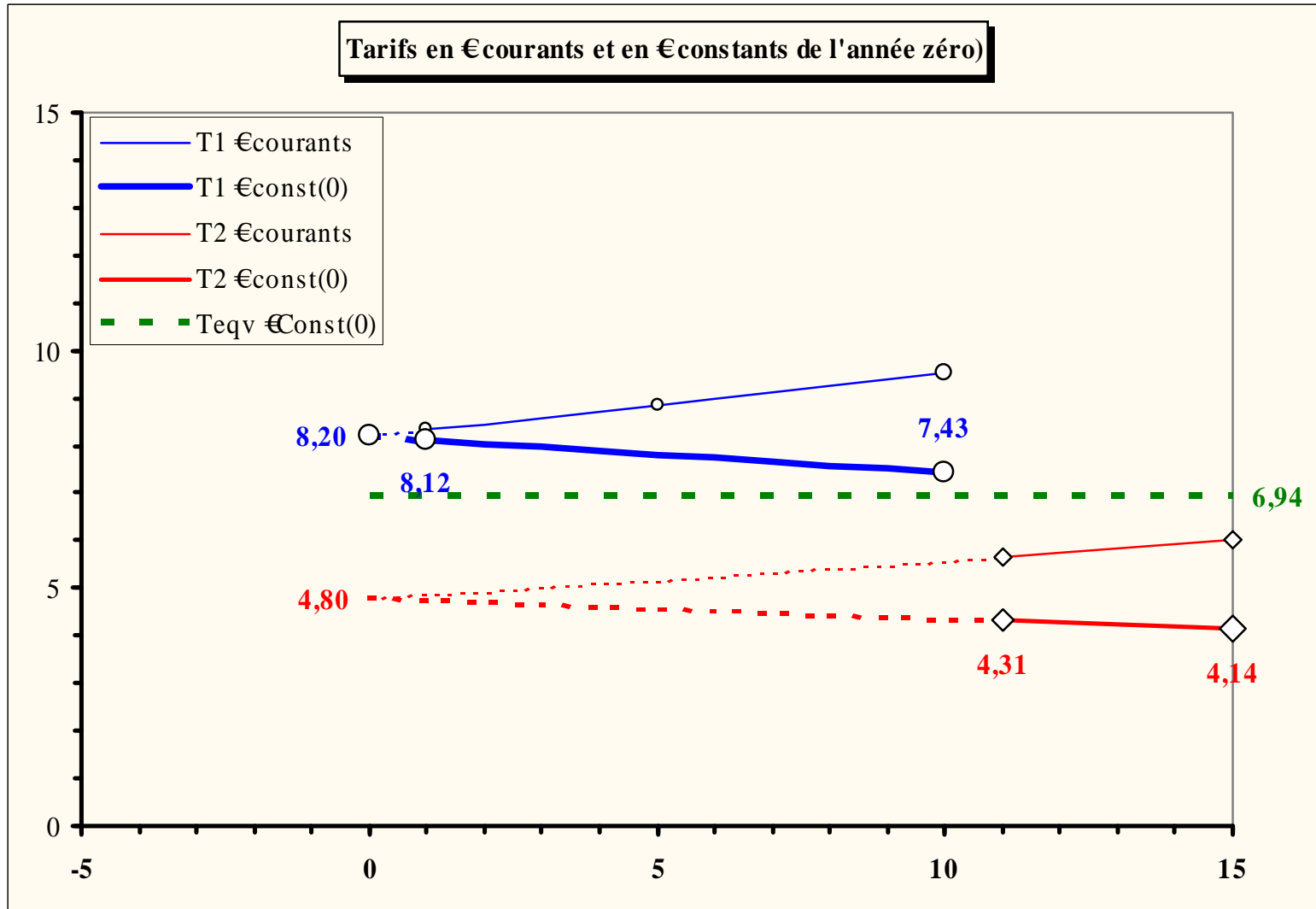


Equivalent constant tariff T_{Veq} are calculated here with a 6 % real discount rate and a 2 % inflation rate



Example of tariffs evolution inside a contract

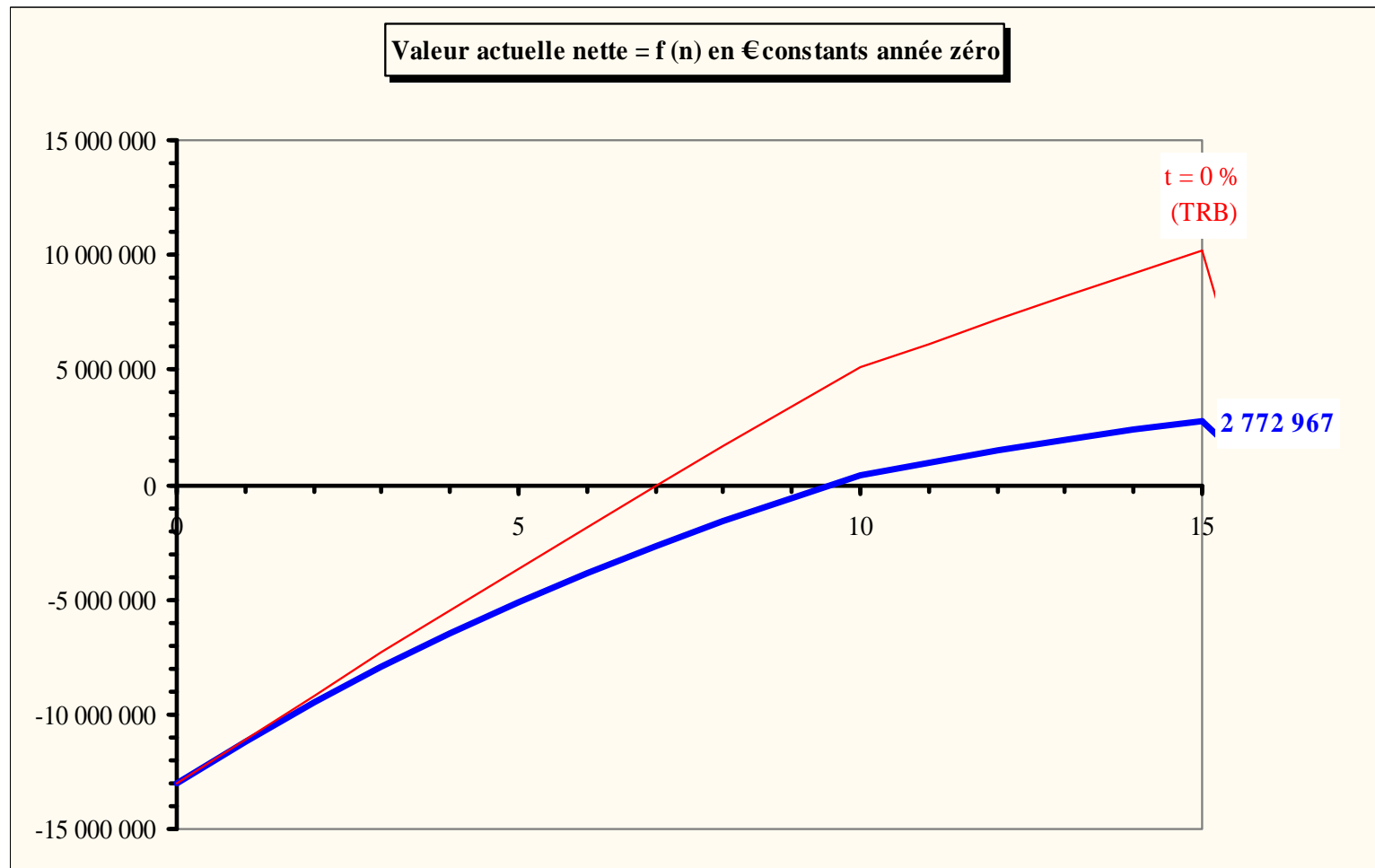
Case: $N_h = 3200$ h/year ; $t = 6\%$, $i = 2.5\%$; tariffs in nominal € and in constant € of year (0)





Example of profitability from 2006 wind tariff

Case: $N_h = 3000$ h/year ; $t = 6\%$, $I_u = 1300$ €/kW, $K_{om} = 4\%$, $P = 10$ MW
Results: $PI = NPV/I = 0.21$; project IRR = 9.6 % real; DPBT = 9.6 years





Conclusions

❑ **A new context favourable for RE development**

⇒ Ambitious government targets for renewables

★ + 50 % heat in 2010

★ 21 % of electricity in 2010 and related ambitious “PPI” for 2010 and 2015

★ 5.75 % from biofuels in 2008 and 7 % in 2010

⇒ Adapted regulatory framework

★ New Feed-in tariffs for RE based electricity

★ Fiscal incentives for biofuels, and for solar, biomass and geothermal systems for householders.

★ New rules for wind power projects: “ZDE”

❑ **New RE electricity tariffs will make the bulk of new investments compared to competitive calls for tenders**

❑ **Fair and efficient tariffs for PV and biogas (hopefully biomass announced in short term) will allow also a fast development as for wind from 2001 tariffs**