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PV boom in the Czech Republic

Paradise and hell after
A **personal** look behind the curtain

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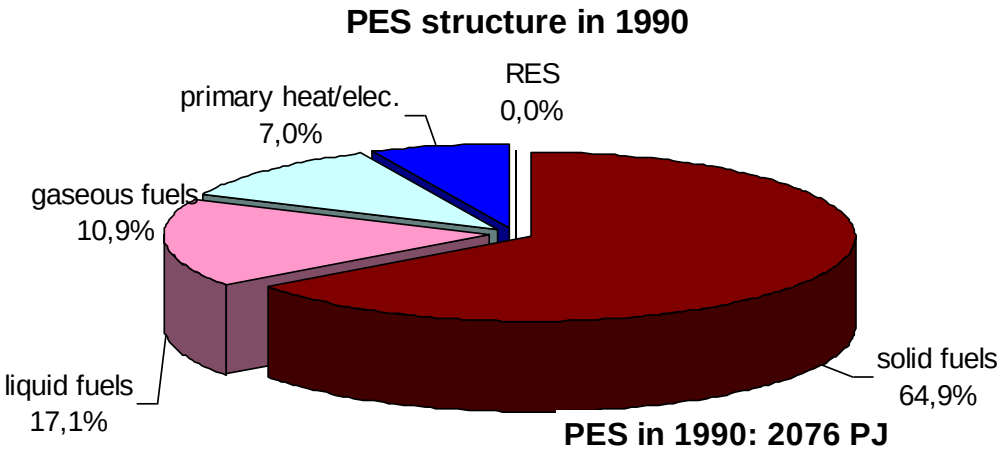
Content

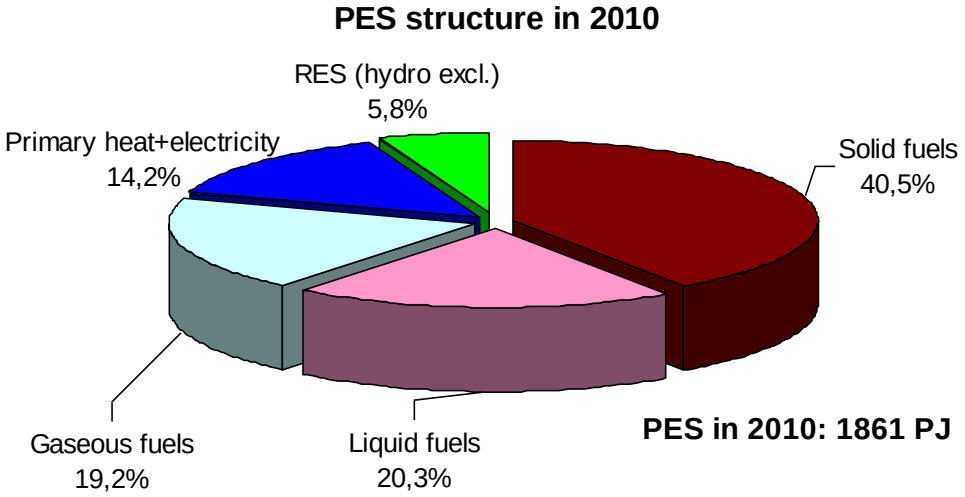
- Understanding the RES roots
- Complicated birth of RES support legislation in mid. Of last decade
- Logic of “previous” legislation – the Act 180/2005 Col.
- Understanding the rate of return approach
- Where were the gaps ?
- Factors playing the role in creation of PV paradise – a personal reflection of the story
- From one corner to the other – measures taken in 2010
- RES (PV) as the enemy, logic of the new legislation
- Personal reflection

Primary energy sources - development



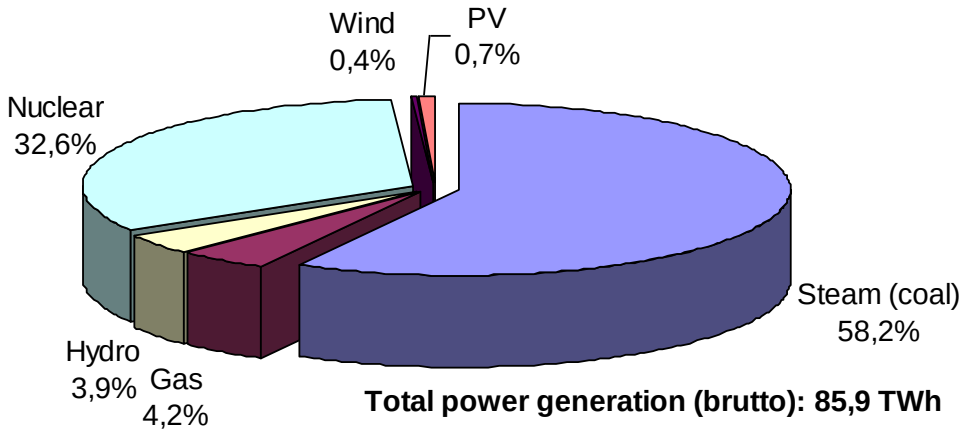
Solid fuels still dominates in PES structure – much higher share than in EU15 (EU average)

- Results e.g. in higher specific CO2 emission (per capita)



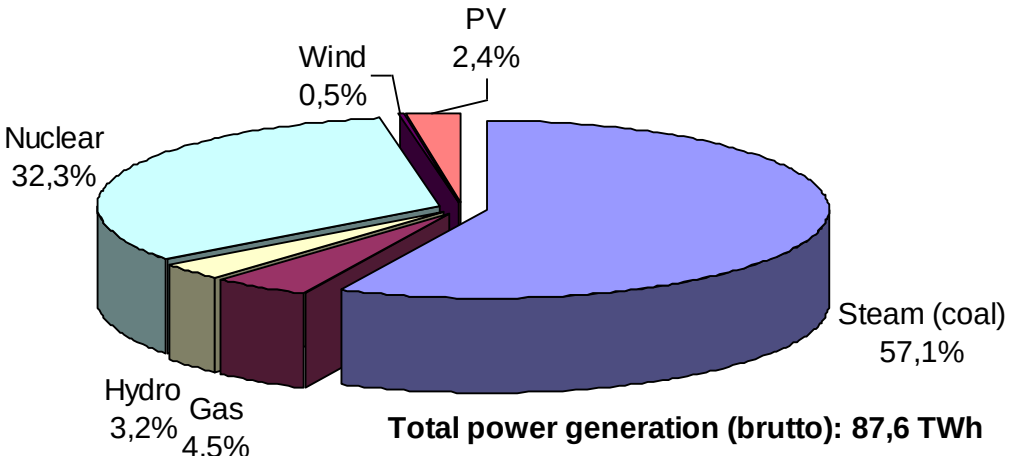
Structure of power generation

Power generation by type, Czech Rep. 2010



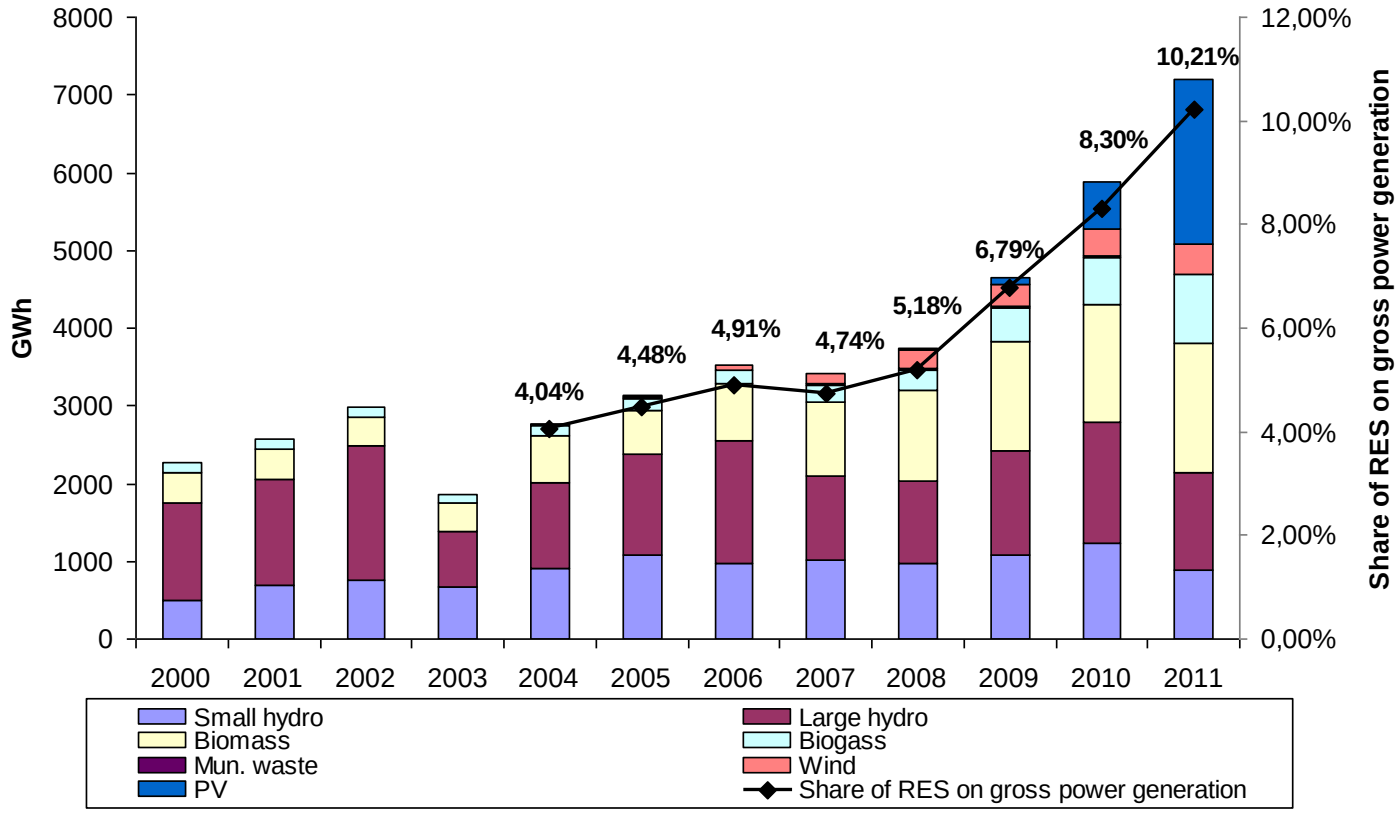
Total power generation (brutto): 85,9 TWh

Power generation by type, Czech Rep. 2011



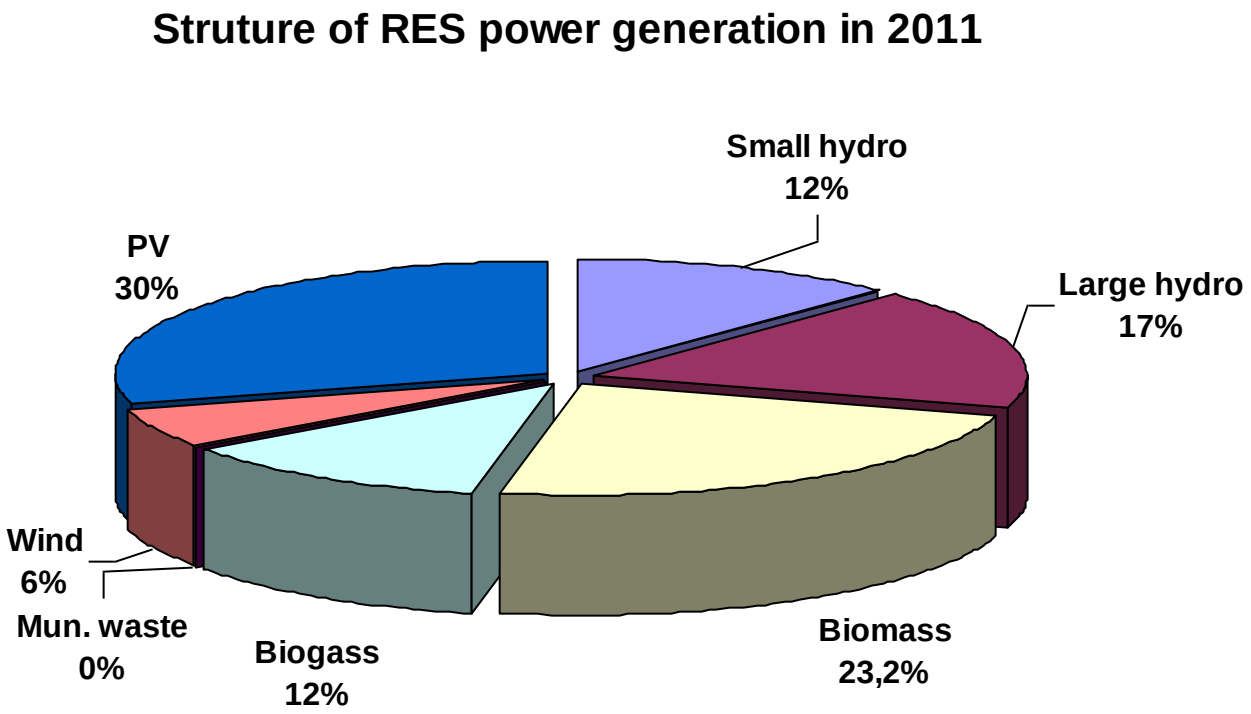
Total power generation (brutto): 87,6 TWh

Development of RES power generation



year 2009: 4,67 TWh, 2010: 5,89 TWh, 2011: 7,2 TWh
power consumption 72 TWh in 2008, 68,8 TWh in 2009, 70,9 TWh in 2010
indicate target 2010: 8% REACHED ! (originally unexpected !)

RES power generation



From history of CZ RES support

till 2001:
no systematic support, „market prices“ for power purchase applied
only not obligatory support from the funds of Energy Agency and State Environmental Fund available (limited sources) both for power and heat – hundreds millions of CZK annually

2002-2005:
support based on FIT system, tariffs were set up on year base by price decisions of Energy Regulatory Office (issued in November for next year)

- FIT defined based on economic analysis of reference projects, rate of return approach (regulated WACC value)
- Basic differentiation of FIT by the type of RES
- Risk for the investors – conditions legally guaranteed only for one year (only declaration of keeping the FIT values)
- Investors are „waiting“
- Co-firing support started from 2004
- 1,5 year discussions on RES-E Support Act

From history of CZ RES support 2

Since 1/2006:
new legislation – Act on RES-E support No. 180/2005

FIT and green bonuses system for RES-E projects

System solution for RES-E project
• creation long term and favorable conditions (?)

No solution for RES project for heat generation (deleted from Act proposal)

Original proposal of act was based on TGC – rejected in the discussion as too risky and not being attractive for the investors

From history of CZ RES support 3

Negotiation with EU - accession period

Necessity to adapt “aquis communitaire” incl. EU Directive 2001/77 (which is defining indicative targets for RES power generation on domestic gross consumption

CZ had many priorites (e.g. access to labor market), many of other “technical” things were left in hands of ministry officers (…why to be stressed by some percentages … bigger means better … or not after calculation of money needed ?

RES target of CZ was one of the last negotiated items in 12 new MS accession

From history of CZ RES support 4

Content / logic of Act on RES support

• personal standpoint at the beginning – the signed agreements should be fulfilled (or maximum possible effort to do it should be presented)

• no specific methodology defined, the EU target and boundary conditions defined (e.g. guaranteed period)

• great discussion how to attract investors (and not to spend to much money)

• devils is in the details – Act is realized (in a fact) through ERO and other Ministries notices

• after the discussion (Ministry of the Environment was the major advocate), the policy “of the same stomach” was applied – i.e. the same rate of return not depending on kind of RES, we have to give chance to all

Final logic of Act 180/2005

As can be personally understood (some other can have “now” after knowing the problem the different stand point)

As paragraphs of the Act goes

- **ERO has to created the motivation so that the indicative target would be fulfilled (end of 2010)**
- **Boundary conditions: guaranteed period 15 years (ERO notice changed it to 20) and payback period (to assure 1y years …)**
- **Reality of 2004/2005, what does it mean to create economic motivation ? Just to assure payback of the investment ? Is it realistic ?**

Look inward of methodology

Act 180/2005 does not define specific methodology for FIT and GB calculation

- They have to create „motivation“
- Basic explanation in ERU notice 475/2005
  - Rate of return approach applied
  - FITs for different RES should assure the same rate of return
  - Reference project for each RES type
  - CF analysis during the whole lifetime

Look inward of methodology - 2

Rate of return approach

- Calculation of minimum price c_{min} for each RES type (i.e. reference project)

$$NPV = \sum_{t=1}^{T_z} CF_t \cdot (1+r_n)^{-t} = 0$$

$$\sum_{t=1}^{T_z} [c_{\min t} \cdot Q_t + DOT_t] \cdot (1+r_n)^{-t} = \sum_{t=1}^{T_z} V_t \cdot (1+r_n)^{-t}$$

- T_z .. lifetime, r_n .. nom. discount, Q .. quantity produced, V .. expenses, DOT.. oper. subsidy
- Cash flow projection

Look inward of methodology - 3

Rate of return on capital invested

- NPV=0 means that rate of return on capital invested equals to discount rate
- Discount rate has meaning of WACC

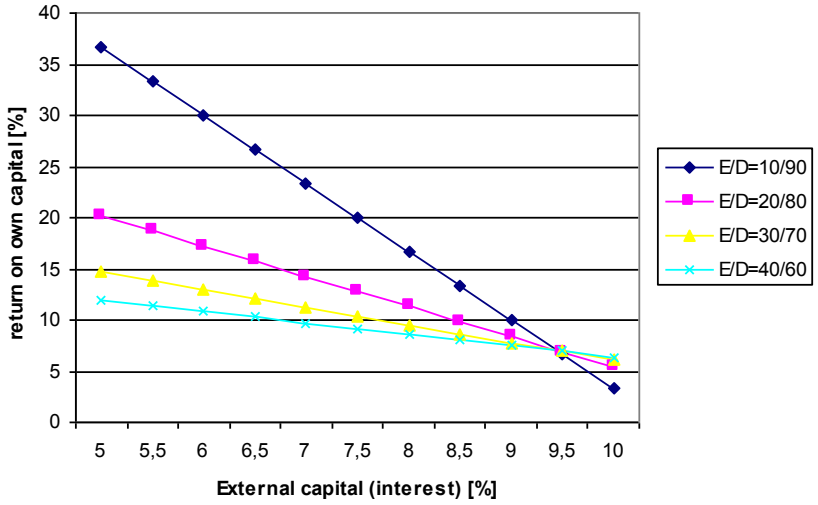
E ..equity, D .. debt capital, i .. interest rate, d .. rax rate

$$WACC = r_{ed} * \frac{E}{E+D} + i * (1-d) * \frac{D}{E+D}$$

Look inward of methodology - 4

Discount as WACC

- C_{min} calculation assume typical structure of financing (E/D): E share 20-30%



results in different rate of return to equity based on different access to capital

Look inward of methodology - 5

WACC value – app. 7% (derived from CAPM model)

2010-2012: 6.3%

- C_{min} taken as the basis for FIT definition
- Almost all business risk cut off
- Responsibility for power deviations on side of distribution company

Look inward of methodology - 6

C_{min} calculation

- Current CZ business conditions assumed (tax rate, tax depreciation policy, tax holidays, etc.)
- Inflation inclusion: 2,5% for all expenses and 2-4% for revenues (based on PPI value)
- Assumption of „rational“ utilization of originating heat (biomass and biogas applications – app. 150-200 CZK/GJ on the source output)

Who bears the cost of support

- FITs and GBs are paid by distribution and transmission companies
- Up to the end of 2010 support cost were fully transferred to the final power consumers proportional to their consumption via separate fee (defined by ERO as part of electricity price)
- In 2010 started to be obvious that due to enormous boom of PV these cost cannot be transferred in full to the final consumers
- Since 2011 combined financing introduced (participation of state budget, special fees imposed on emission allowances distributed to power companies and PV tax imposed to PV operators) – see later

BASIC IDEA OF RES-E SUPPORT (Act 180/2005)

TO MINIMIZE RISK FOR THE INVESTORS

Creation of stable and favourable conditions for the investors

↓

Creation of business environment to reach the indicative target for power from RES in 2010 (D. 77/2001)

Risk reduction also means reduction of fair rate of return on capital invested

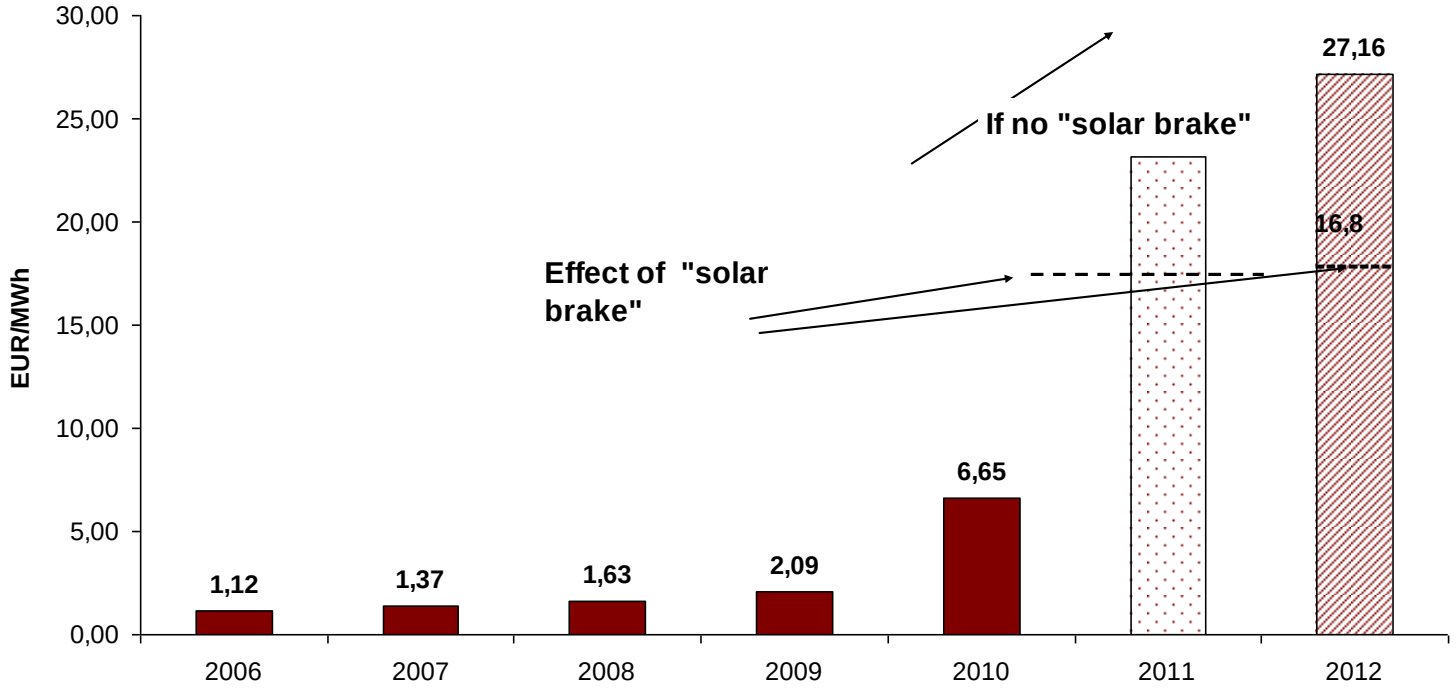
↓

Cost effective RES-E support scheme expected – minimization of impact on final power consumers or on state budget

Support scheme was assumed as the rational solution up to the end of 2008

RES-E support started to be the real problem in 2010(11)

Till the end of 2010 cost of RES-E support scheme was fully transferred to the customers



Fee includes RES, cogeneration and non-traditional sources support
RES share: more than 90%

Changes of Act 180/2005

Situation at the end of 2008:

No changes in 180/2005 Act are discussed

- No-one wants to open „Pandora box“

But some things discussed:

- Cancellation of tax holidays (would need recalculation of FIT)
- Reduction of FIT and GB in case of support from EU funds (not accepted)

Reality of 2009

Enormous PV boom started

- State authorities are not able to effectively react !

Stop of PV boom in February 2010 by transmission and distribution companies

- No new permission to the grid connection are issued

Changes in support scheme were introduced into support scheme (change of Act 180/2005) during 2010

- ***It is too late, conditions for 2010 already fixed***
- PV boom is in full run, CZ became the PV paradise
- Enormous extra profit (rate of return), FIT is 0.5 EUR/kWh, +40-45% more than is adequate

Factors creating PV boom

Cross combination of many factors (8-10??)

- Gaps in the legislation - no roofs for support (we behave as the richest country), effective reaction only through Act amendment
- CZ “president” of EU in first half of 2009 – concentration to its preparation, “negligible things omitted”
- CZ lost government during “EU president position” – EU record\
- 100 to 100 position in parliament – frozen position, no systematic work, emphasis of other “political” things
- Preparation of the general election, but constitutional court cancelled election prepared to October 2009 (agony continued to summer 2010) – 1,5 year (lack of responsibility, non political government here is not the win)
- Start of economic and the financial crisis – investors are searching for profitable and the non risky investments – just to “park” money for some years

Factors creating PV boom

Cross combination of many factors (8-10??) - continuation

- Quick fall of cost of PV technology
- Power companies are issuing “promises for the grid connection” without doing the sum (logic of previously applied decentralized approach for the permissions of “small” units – they waked only at the autumn 2009
- Lobbyism (some politician engagement ??)
- Underestimation of the problem – who can imagine it ?

Factors creating PV boom

Frow narrow point view

- To reduce risk for the investors limit for FIT reduction for the new project was defined: -5%
- FIT announced for one year
- Enable to quickly react for the fall of technology cost
- To react, changes of legislation (Act 180/2005 were needed)
- ERO started to indicate the problem at early 2009
  - But many of other “important things for the politicians”
  - Finally – no reaction in 2009
  - FIT for 2010 announced
  - Changes of legislation introduced during 2010 – it is too late to stop PV boom

2010 reality

April 2010:

- -5% limitation for new F.T. is not effective if payback time is less than 11 years

September 2010:

- governmental proposal to cancel PV support for plant on ground (since March 1st 2011)

2010 reality 2

November 2010: changes of „tax“ act

- **income tax holidays cancelled** for all RES applications (including already running, last applicable for tax period 2010)
- **changes in depreciation periods for PV**:
  - current situation: PV panels are 55-60% investment cost, but depreciation period is only 5 years
  - since 2011: depr. period is defined as 240 months (similarly for financial leasing, its length should be also 240 month) – valid also for already running projects, not depreciated part is allocated to 240 months minus number of month of depreciation

December 2011: Introduction of tax on gross revenues for PV

Lessons learnt from CZ case

FIT scheme is theoretically effective, but:

- Application of the same rate of return has led to the different motivation for the different RES type
  - *but original motivation has been the same chance !*
- Parallel support of some types of RES projects (e.g. biogas stations were eligible for investment support 30-60% from EU funds)
  - *but FIT were calculated assuming no other support*
- Missing the real possibility to reflect the changing priorities of state
  - *but SEP and NAP for RES as the other strategic documments*

Lessons Learnt from CZ Case - 2

FIT scheme is theoretically effective, but:

- Green bonuses have been defined to create motivation to the rational behavior for the investors
  - *but high majority of RES-E plant uses FIT scheme !*
- Periodical update of reference projects were seen as the effective tool for FIT definition
  - *but problem of strong lobbyism and data collection*
- Primary orientation to technical indicators (MW and MWh)
  - *but finally great surprise what the costs are and then searching who is responsible*
- Missing solution for utilization of originating heat
  - *it led to the wasting of RES potential (e.g. very high load factor for solid biomass application – no heat utilization)*

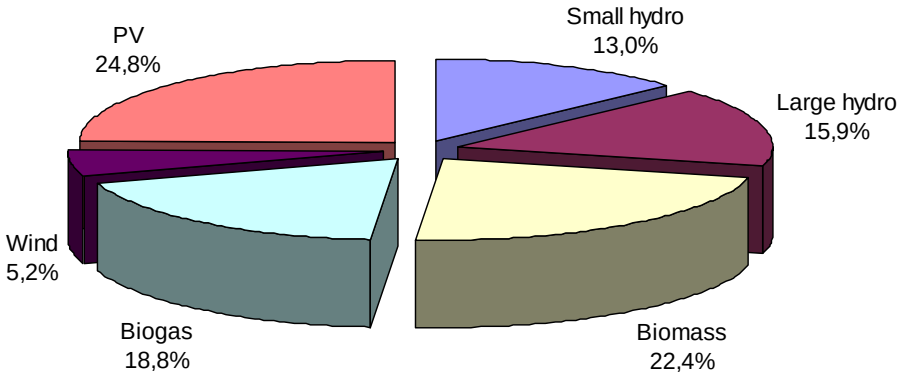
What happenned next ?

From one extreme to the another !

- Complete amendment of RES support legislation, Act 165/2012
- Extremely complicated discussion, strong lobbyism
- Selected changes:
  - Complete change of the economic logic – only 15 year payback is guaranted
  - creation of roofs for RES categories – link to NAP for RES
  - roof for support (4.5 CZK/kWh)
  - FIT available only for some RES categories, GB for others, hourly and yearly GB values
  - financial support administrated through OTE
  - prohibition of co-firing (end of support)
  - requirement for heat utilization (e.g. no biogas station without significant heat utilization, or biogas utilization)
  - reduction of FIT and GB values in case of investment subsidies

RES-E support started to be the real problem in 2010(11)

Individual shares on RES power generation 2012 estimate



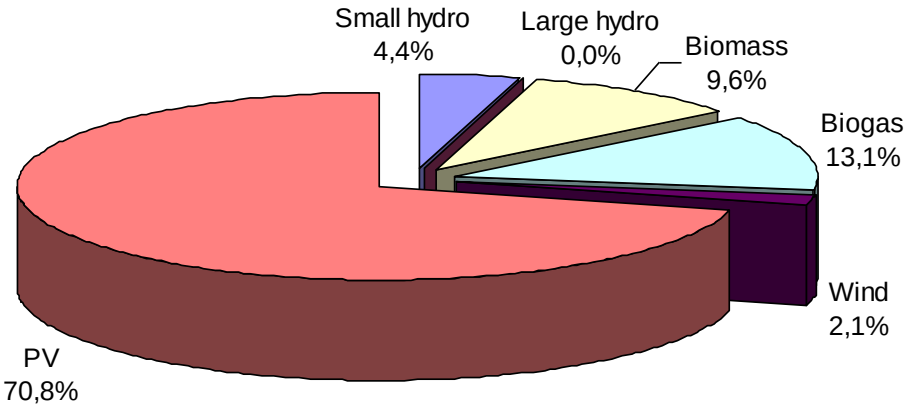
2012 estimate: 8,5 TWh

Source: own calculation

No excuse for any kind of consumers, problems:

- social (low income households)
- economic (competitiveness of industrial companies)

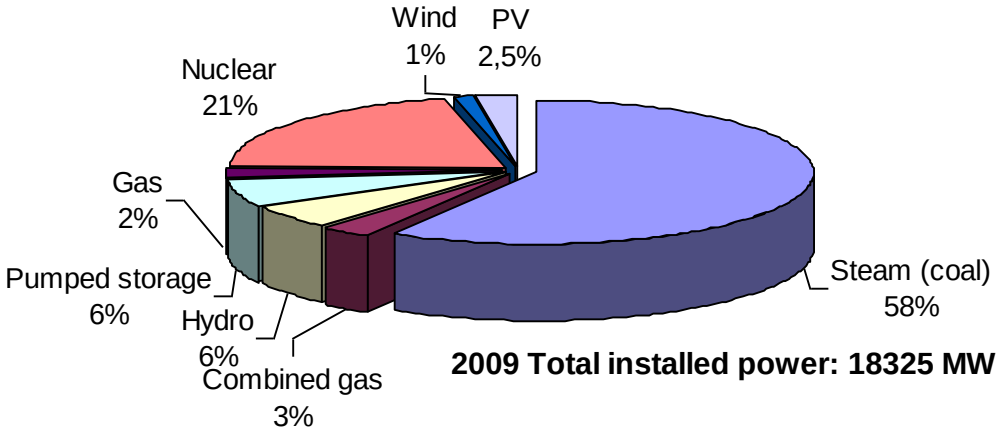
Individual shares on RES support cost 2012 estimate



2012 estimate: 1,33 bil. EUR

Source: own calculation

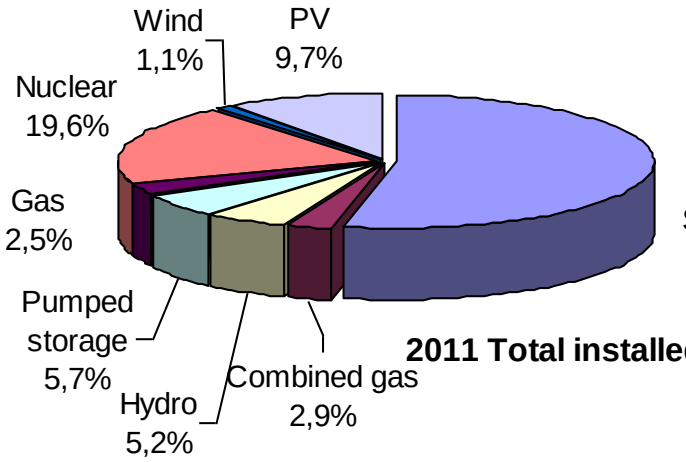
Structure of installed power



2009 Total installed power: 18325 MW

Currently existing coal fired PP will finish operation in 2015-2020(5)

Only a part of installed power will substituted with modern coal block

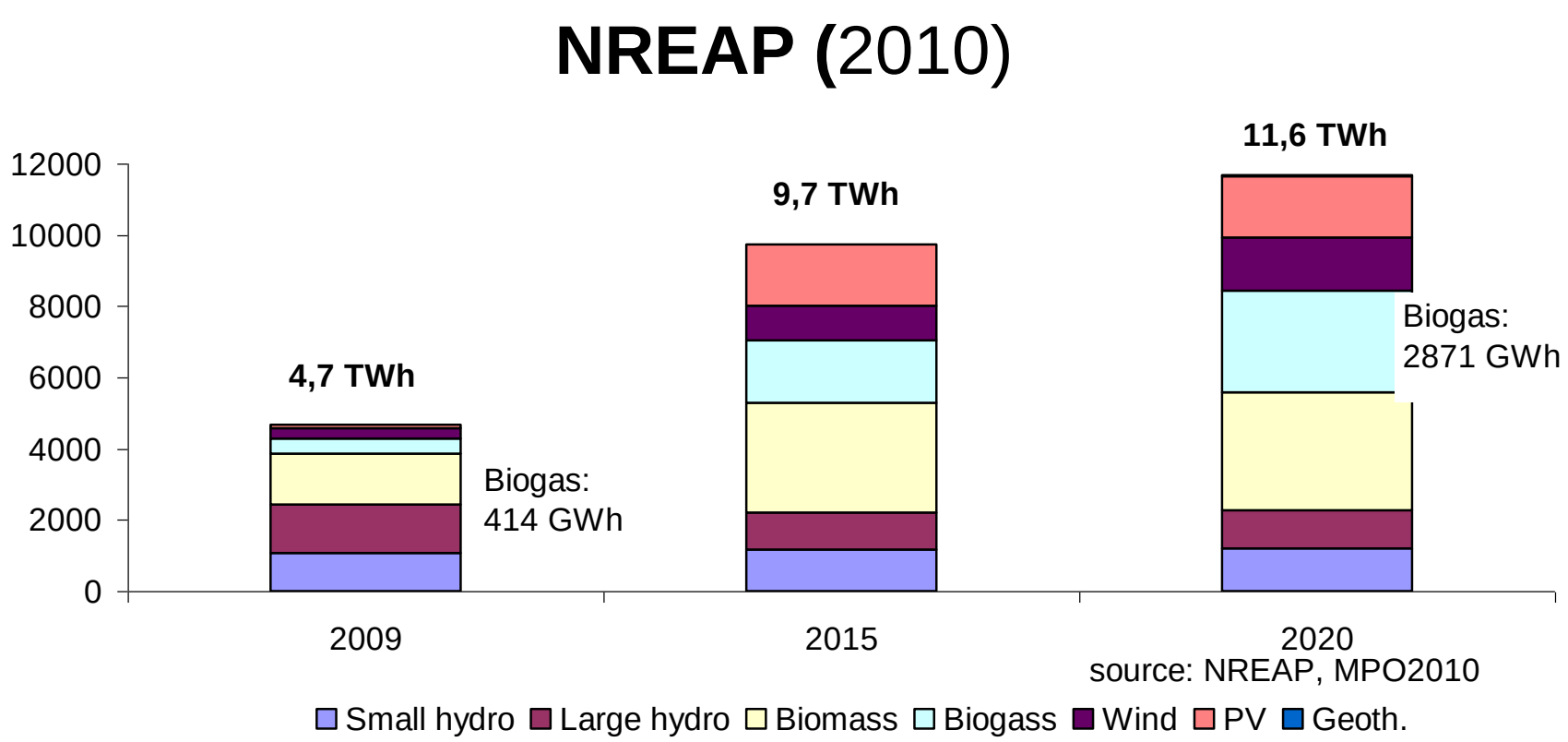


2011 Total installed power: 20249 MW

New capacities only in RES and cogeneration !

2013: launch of 880 MW CCGT in Počerady

Biomass (biogass) is discussed to be the new threat



Only biogas stations (assuming current values for biogas FIT and price of power) means additional app. 6 bil. CZK/year

Main principles of Act 180/2005

- Only for power from RES (+ methane from closed mines)
- FIT and green bonuses (GB) scheme - choice for each year
  - FITs and GBs are paid by distribution / transmission company
- Obligatory power purchase (F.T.), GB producer should find the customer
- Differentiation by RES type, logic of time matrix
- F.T. guaranteed explicitly for (at least) 15 years
- G.B. should reflect higher business risk, no limit for their changes from year to year (but you can go back to FIT scheme)

Situation in 2013

- Cost of support scheme are still growing – app. 1.5 bil. CZK currently

- Significant impact to electricity prices – causes troubles esp. for industrial companies
  - Note: CZ has high share of industry on GDP
  - CZ is extremely opened economy dependant on export of industrial products
  - It is necessary to keep economy competitiveness
- Since 2011 contribution from the state budget, but from special and limited taxation (tax imposed to PV projects, tax imposed to EA, etc. – ends in 2013)
- Absorption capacity of CZ households is 2-3 lower compared with Germany (for cost of support scheme transfer)

Situation in 2013

- Discussion on responsibility started in 2012
- Police investigation, discussion in parliament
- PV tax subject of legal court (incl. constitutional court) cases
- International arbitrages against the Czech Republic
- Discussion how to limit cost of support scheme – PV tax originally designed for 3 years only
- Several proposal, e.g. to keep support only for 10 years and after that investors have to approve that they still need support to “reach 15 years payback” or to check economies of individual projects (??)
- To remind: 15 years payback leads app. to 3.5% rate of return for the investors (and in a fact is realized after 15th year of operation – who would invest under these conditions ?
- Proposal to stop operational support (for new projects) since 2014 (or 2015)

Děkuji za pozornost!

Thanks for the attention !