
EFFECTIVENESS OF CZECH SUPPORT SCHEME FOR RES-E PROJECTS

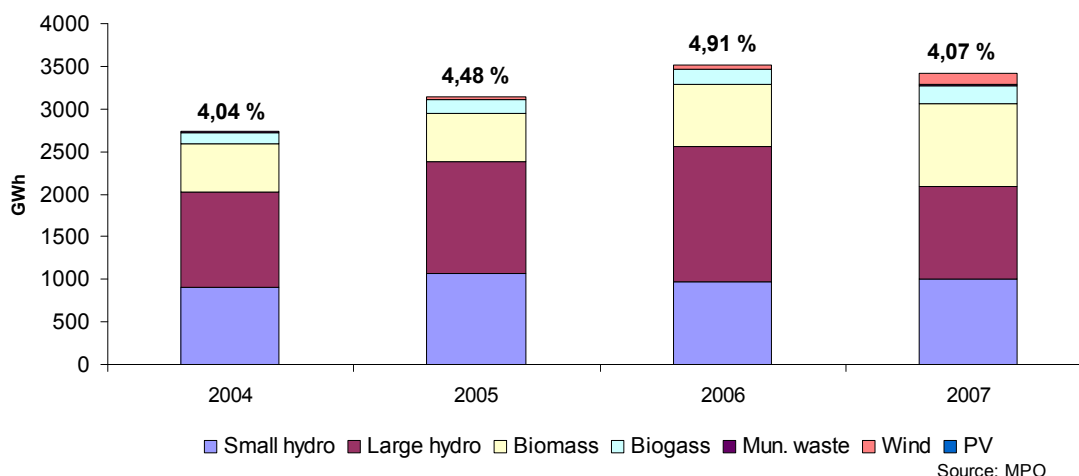
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Carolinum April 16th, 2009

POWER GENERATION FROM RES

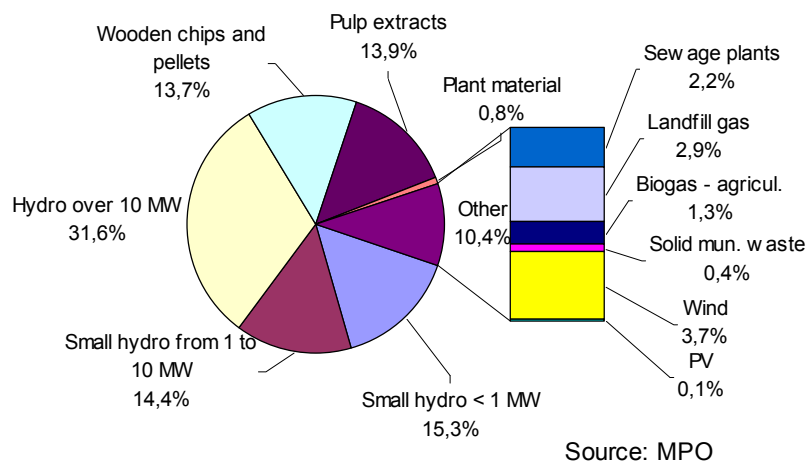
Power generation from RES in CR
RES-E share on gross consumption



STRUCTURE OF POWER GENERATION - 2

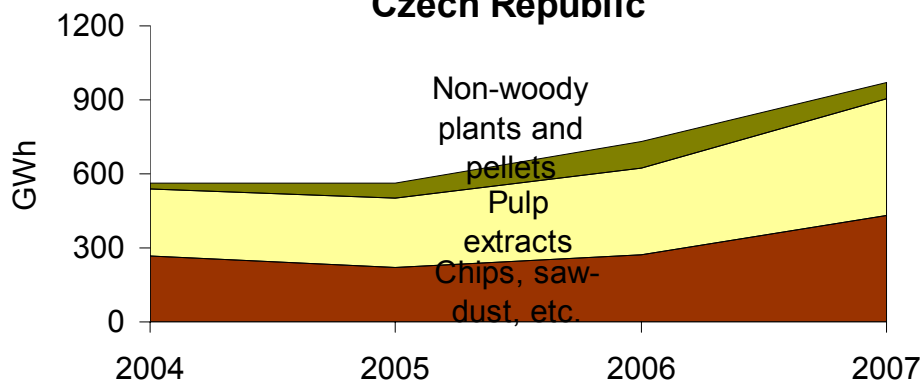
Structure of power generation from RES

Czech Rep., 2007



POWER GENERATION FROM BIOMASS

Power Generation from Biomass Czech Republic



Power generation in 2007: 968 GWh, co-firing and pulp extracts utilization

SYSTEM SOLUTION FOR RES-PROJECTS

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

- Feed-in tariffs and green bonuses system for RES-E projects
- System solution for RES-E project
- No solution for RES project for heat generation (deleted from Act proposal)

LOGIC OF SCHEME – ACT 180/2005

- Risk minimization for the investors (intention to minimize cost of green power, to simplify support scheme, to motivate inv.)
- Support is paid by power consumers prop. to consump. via separate distribution / transm. fee
 - 2006: 28,26 / 2008: 40,75 / 2009: 52,18 CZK/MWh
- Key role of ERU

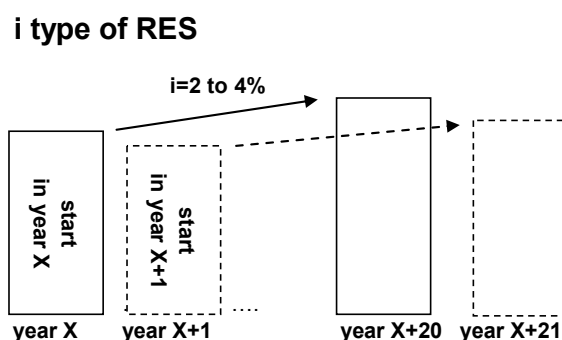
MAIN PRINCIPLES OF ACT 180/2005

- Feed-in tariffs, green bonuses - paid by distribution / transmission company
- Obligatory power purchase (F.T.)
- Differentiation by RES type, time matrix
- F.T. assured during at least 15 years, G.B. should reflect higher risk (20, 30 years)
- Annual updating of F.T. by inflation (PPI)

F.T. AND G.B. VALUES

Defined for next year by corresponding Price decision of ERU (8/2008 for 2009)

- Logic of time matrix



MAIN PRINCIPLES OF ACT 180/2005 - 2

- Reduction of F.T. for next year – only for new sources -5% at max.
- F.T. and G.B. are annually announced by ERU (Price decision 8/2008 for 2009)
- Co-firing supported only by green bonuses
- Economic preference of intentionally grown biomass

MAIN PRINCIPLES OF ACT 180/2005 - 3

- ERU is responsible for creation of economic motivation to meet 2010 indicative target
 - No specific methodology for F.T. and G.B. calculation mentioned in the Act
- Differentiation of biomass types for support by MoE notice 482/2005 Sb.
- G.B. also for power generated for „own“ consumption of producer

LOOK INWARD OF METHODOLOGY

Act 180/2005 does not define specific methodology for F.T. and G.B. calculation

- They have to create „motivation“
- Basic explanation in ERU notice 364/2007
 - Rate of return approach applied
 - F.T. 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

LOOK INWARD OF METHODOLOGY - 3

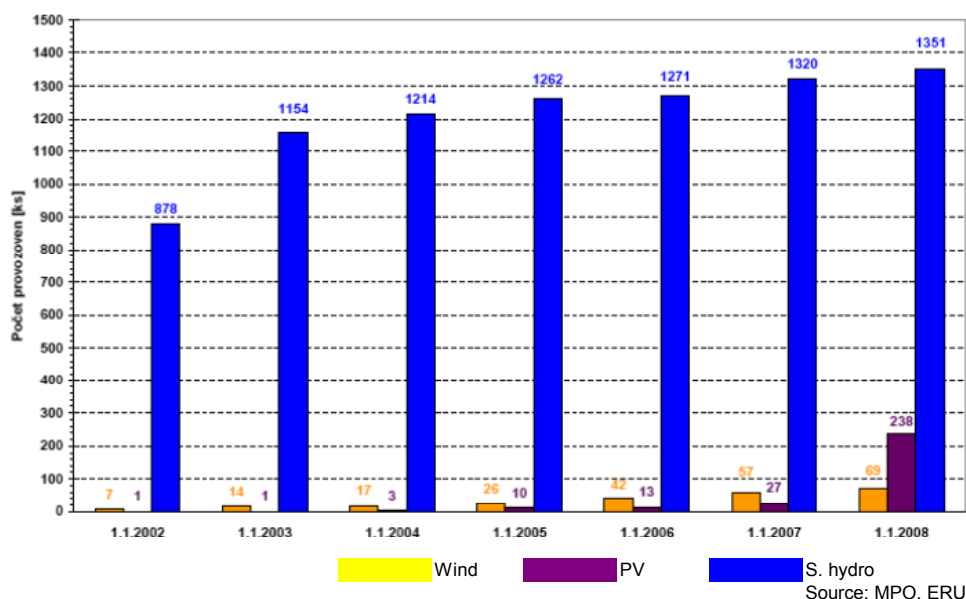
Rate of return on capital invested

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

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

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

DEVELOP. OF LICENSED RES PLANTS

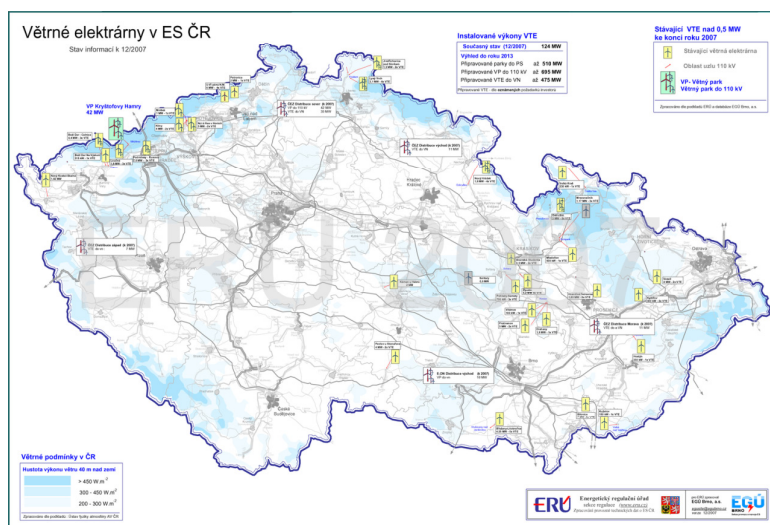


INVESTORS INTEREST ON RES-E PROJ.

PV and wind power projects are in centre of investors interests at the moment

- Support seems to be attractive
- Stable investors conditions
- „Easiest projects“

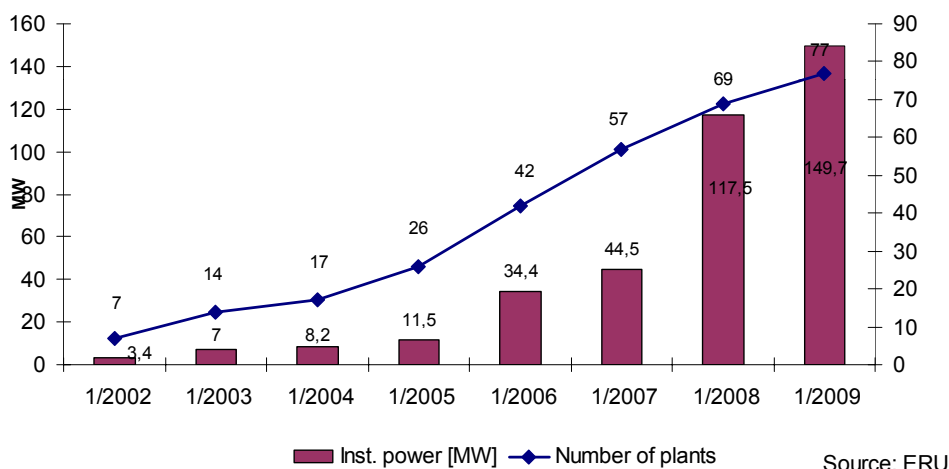
WIND PROJECTS



Beg. of 2009: Total installed capacity app. 150 MW
Outlook to 2013: up to 1600 MW (considered proj.)

WIND PROJECTS - 2

Development of installed power in wind appl.



Start of F.T. system since 2006 is obvious

PV PROJECTS

- No limit for total installed capacity
- Big projects under investors' interest
 - E.g. PV plant Dubnany (9/2008), 2,1 MW
 - Majority of projects under preparation
 - End. of 2007: app. 3,4 MW
 - Boom of PV in 2008-9

PV PROJECTS - 2

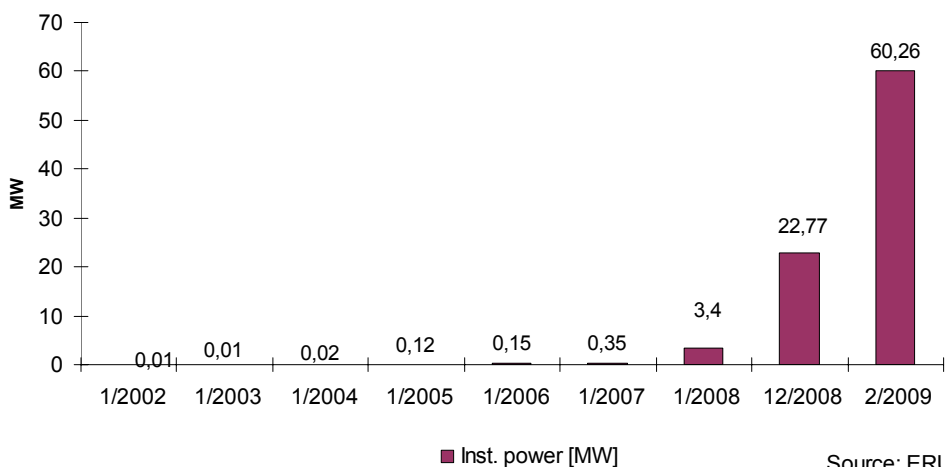
- Highest interest of investors in Southern Moravia

– Annual solar radiation MJ/m²



PV PROJECTS - 3

Development of installed power in PV appl.



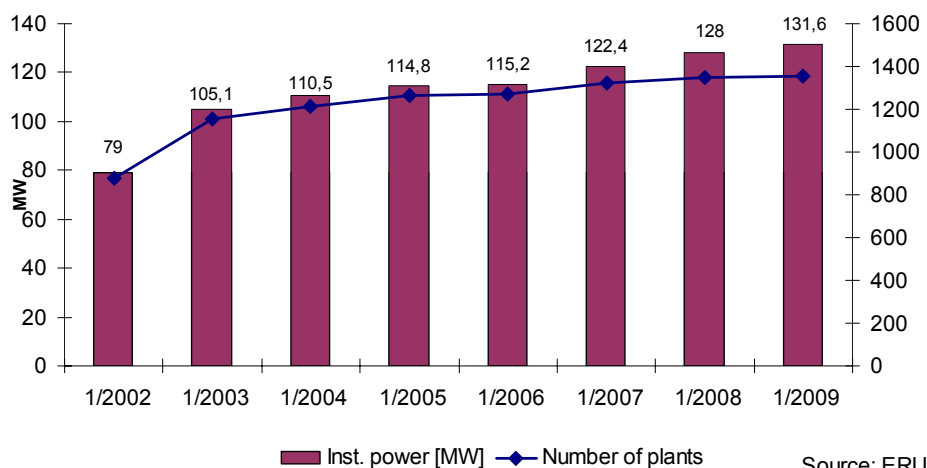
Start of F.T. system since 2006 and favourable economic conditions are obvious

SMALL HYDRO

- SH < 1 MW app. 132 MW
- SH from 1 to 10 MW app. 152 MW
- Power generation in 2007: **1012 GWh**
- Long tradition in SH construction
- Reconstruction in 90's and beg. of this decade (support from Czech Energy Ag.)
 - Limited possibilities for new SH plants

SMALL HYDRO - 2

Development of installed power in SH < 1 MW



Source: ERU

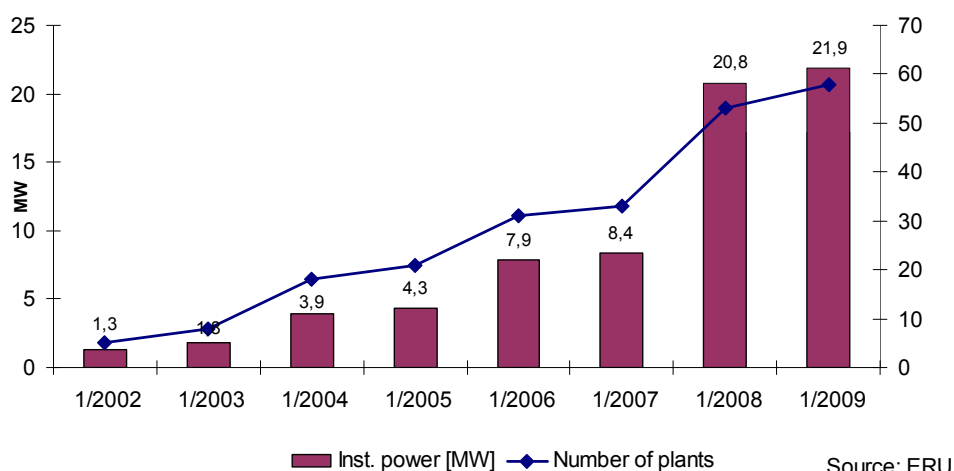
Reconstruction can increase power generation

LANDFILL AND SEWAGE GAS

- Fast development at the beginning of support
- Landfill gas plants (2007)
 - 57 locations, 21,7 MW, 98 GWh
- Sewage gas plants (2007)
 - 109 locations, 17,3 MW, 74 GWh
- Majority of suitable locations used

LANDFILL GAS - 2

Development of installed power in landfill gas appl.



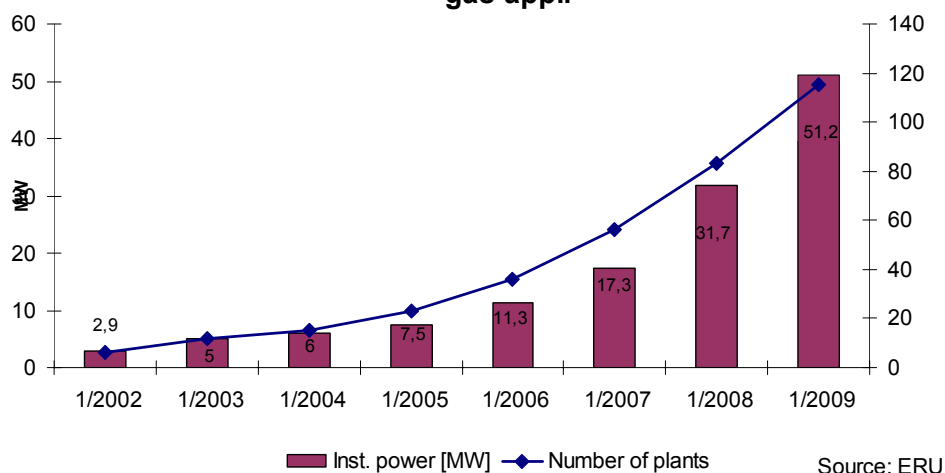
Problems with heat utilization

BIOGAS APPLICATIONS

- Supported as the tool for diversification of activities in agriculture
 - Supported within Rural development plan
 - Up to 470 GWh of power generation assumed
 - App. 1 bil. CZK of inv. support already assigned
 - Can help to reduce dependency to agr. market
 - Can help to solve problem with grass from permanent grass lands

BIOGAS AND SEWAGE GAS APPL.

Development of installed power in biogas and sewage gas appl.



Source: ERU

Biogas appl.: assumption on rational use of heat

BIOMASS APPLICATIONS FOR POWER

- Biomass differentiation
 - 1. Planted, 2. residual biomass from agriculture and forestry, 3. wooden chips and wooden residuals from wood processing industry
 - Co-firing (biomass/coal mixture) originally assumed as the major contribution in period to 2010
 - But significantly limited by shortage of suitable biomass and absence of long term contracts

PLAYERS ON RES-E MARKET

- Big investors and power producers
 - Interest in this field started since 2006
 - Interest focused on prepared projects
 - ČEZ, a.s. has „big“ plans for RES-E, but
- SME and private investors
 - Long preparation of projects (esp. wind)
 - Good knowledge of conditions in given location
- Financial investors

F.T. AND G.B. VALUES - 3

Values for 2009

F.T. and G. B. [CZK/MWh] for 2009

	F.T.	G.B.
Wind	2340	1630
S. hydro	2700	1260
Biogas AF1	4120	2580
Biogas AF2	3550	2010
Landfill gas	2420	880
Sewage gas	2420	880
Biomass 100%	4490/3460/2570	2950/1920/1030
Co-firing	-	1350/690/40
Paralel co-firing	-	1620/960/310
PV over 30 kW	12790	11810
Geothermal	4500	3140
Gas from mines	2420	880

Biomass types 1/2/3

- 1: intentionally planted biomass
- 2: forestry residuals and agricultural waste
- 3: other types of biomass (wood chips, etc.)

SUPPORT SCHEME IS BASICALLY CONSISTENT

- Sufficient economic motivation exists
- Other barriers block faster RES-E projects development
- No system support for heat based on RES
- CZ support scheme does not include tools to prefer some RES types
 - no roofs for RES-E projects of given type

OTHER IMPERFETIONS OF SUPPORT SCHEME

WACC approach

- Big power companies has better access to capital (lower interest rate – higher rate of return on equity)
- Possible problems of small investors with negative CF during bank repayment
- G.B. for co-firing can distort biomass market price

NEWS FOR 2009

- Update of technical and economic parameters for reference projects
- Plans for RES support for high effective cogeneration
- Green bonuses need assumptions on market values for 2010 power