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# Reform to Promote RES Investments in Building Sector

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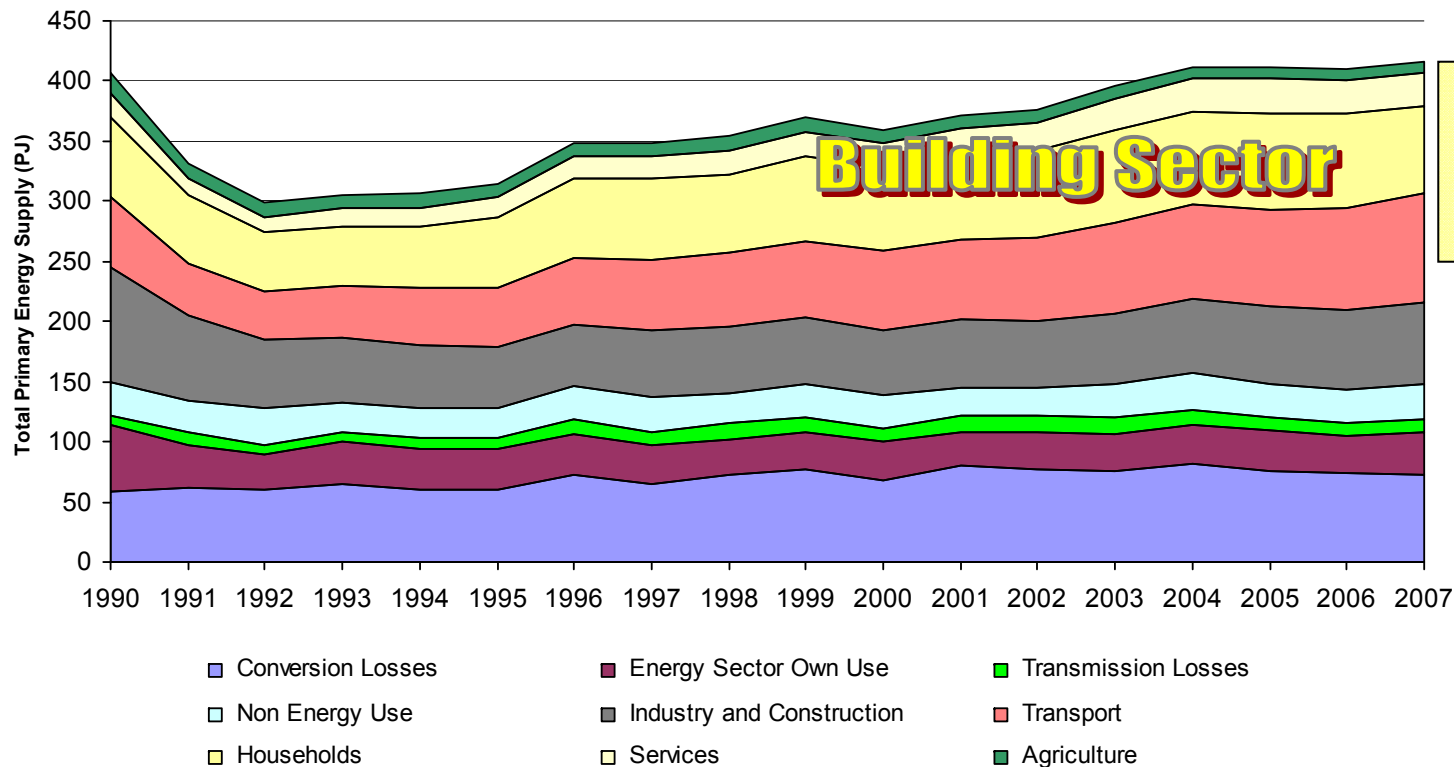
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# CONTENT

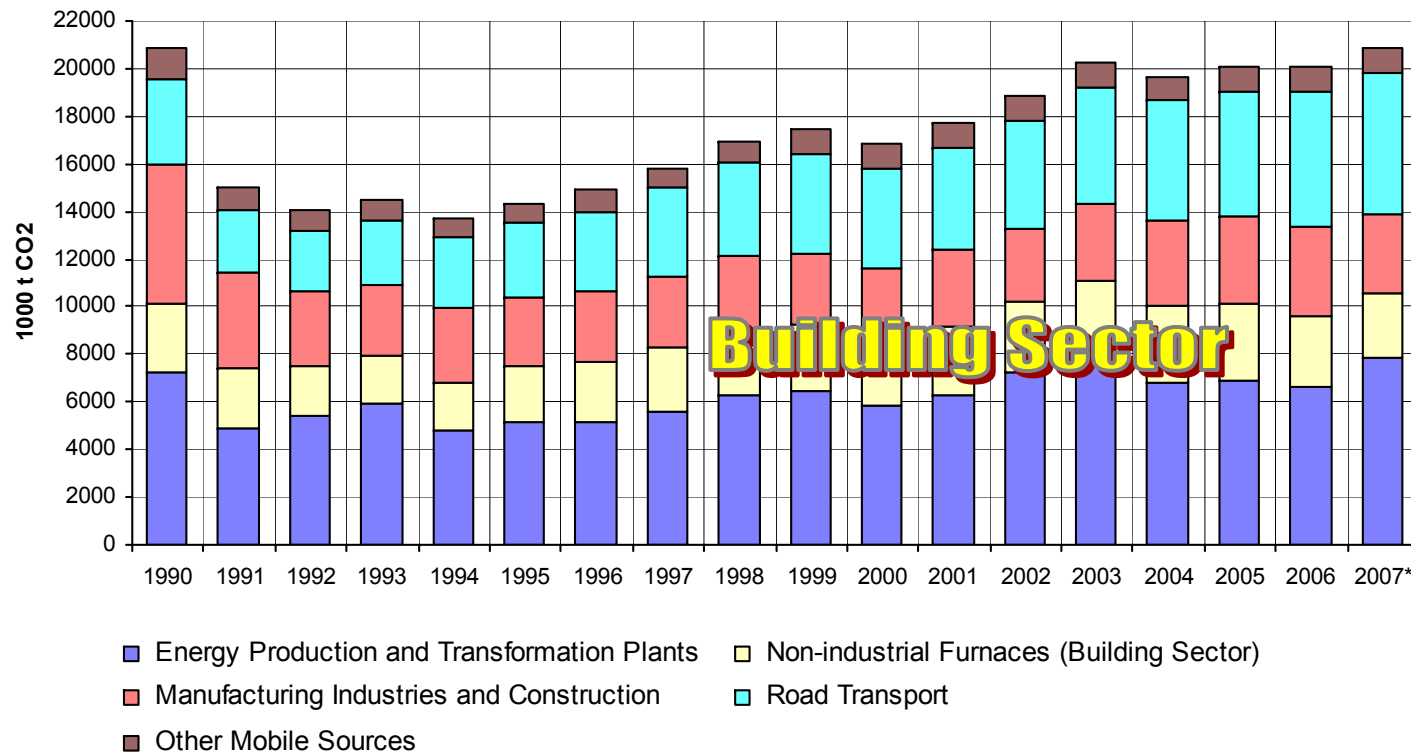
- **Characteristics of the Building sector**
- **Regulatory framework before the policy reform**
- **Policy reform to promote RES investments**
- **Identification of economically attractive RES projects**
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# CHARACTERISTICS OF BUILDING SECTOR

## TOTAL PRIMARY ENERGY SUPPLY



# CHARACTERISTICS OF BUILDING SECTOR CO<sub>2</sub> EMISSION



- CO<sub>2</sub> emission in 2008:  
20 mill. t  
- Building sector: 17% in  
CO<sub>2</sub> emission from  
stationary and mobile  
energy sources

The reason for lower contribution of CO<sub>2</sub> emission from the Building sector in comparison with contribution in energy consumption (around 25%) is due to significant amount of fuel wood consumption, as well as heat and electricity consumption.

## REGULATORY FRAMEWORK ENERGY STRATEGY & RES ACTION PLAN

- The Energy Strategy of the Republic of Croatia was adopted in October 2009.
- RES targets for 2020:
  - 20% of RES in gross final energy consumption
    - 35% of RES in electricity generation (including large HPPs) or 9.2% in gross final energy consumption
    - 10% of RES in transportation or 2.2% in gross final energy consumption
    - **20% of RES in heating and cooling or 8.6% in gross final energy consumption**
- Croatian Renewable Energy Action Plan has been drafted - obligation for member states (by June 30, 2010) in accordance with the directive 2009/28/EC on the promotion of the use of energy from renewable sources.

## REGULATORY FRAMEWORK ENERGY CERTIFICATION

- Based on EU Directives (2002/91/EC old & 2010/31/EU new) on the energy performance of buildings (EPBD), the framework for compulsory energy certification of the new and existing buildings was introduced into Croatian legislation in 2008.
  - the national Implementation Methodology for the Energy Audits of Buildings was adopted in 2009
  - the obligation to consider the modern energy concept of buildings and the application of alternative systems (including RES) was adopted through Technical Regulation on Energy Economy and Heat Retention in Buildings (OG 110/08, 89/09)
  - the education programme for energy auditors and energy certifiers started in October 2009
- Energy certification of new building began in April 2010.

# REGULATORY FRAMEWORK

## EXAMPLE OF ENERGY CERTIFICATE

**Energetski certifikat za stambene zgrade**

prema Direktivi 2002/91/EC

**Zgrada**  nova  postojeća

Vrsta zgrade  
K.č. k.o.  
Adresa  
Mjesto  
Vlasnik / investitor  
Izvođač  
Godina izgradnje

$Q_{H,nd,ref}$  kWh/(m<sup>2</sup>a) **Izračun** 95

A+	≤ 15
A	≤ 25
B	≤ 50
C	≤ 100
D	≤ 150
E	≤ 200
F	≤ 250
G	> 250

**Podaci o osobi koja je izdala energetski certifikat**

Ovlaštena fizička osoba  
Ovlaštena pravna osoba  
Imenovana osoba  
Registarski broj ovlaštene osobe  
Broj energetskog certifikata  
Datum izdavanja/rok važenja  
Potpis

**Podaci o zgradi**

$A_g$  [m<sup>2</sup>]  
 $V_g$  [m<sup>3</sup>]  
 $f_g$  [m<sup>-1</sup>]  
 $H'_{tot}$  [W/(m<sup>2</sup>K)]

**Klimatski podatci**

Klimatski podaci (kontinentalna ili primorska Hrvatska)

Broj stupanj dana grijanja SD [Kd/a]

Broj dana sezone grijanja Z [d]

Srednja vanjska temperatura u sezoni grijanja  $\theta_a$  [°C]

Unutarnja projektna temperatura u sezoni grijanja  $\theta_i$  [°C]

**Podaci o termotehničkim sustavima zgrade**

Način grijanja zgrade (lokalno, etažno, centralno, daljinski izvor)

Izvori energije koji se koriste za grijanje i pripremu potrošne tople vode

Način hlađenja (lokalno, etažno, centralno, daljinski izvor)

Izvori energije koji se koriste za hlađenje

Vrsta ventilacije (prirodna, prisilna bez ili s povratom topline)

Vrsta i način korištenja sustava s obnovljivim izvorima energije

Udio obnovljivih izvora energije u potrebnoj toplinskoj energiji za grijanje [%]

**Energetske potrebe**

	Za referentne klimatske podatke		Za stvarne klimatske podatke		Zahtjev	
	Ukupno [kWh/a]	Specifično [kWh/(m <sup>2</sup> a)]	Ukupno [kWh/a]	Specifično [kWh/(m <sup>2</sup> a)]	Dopušteno [kWh/(m <sup>2</sup> a)]	Ispunjeno DA / NE
$Q_{H,nd}$						
$Q_{W}$						
$Q_{H,s}$						
$Q_{W,h}$						
$Q_{H}$						
$E_{tot}$						
$E_{prim}$						
CO <sub>2</sub> [kg/a]						

Objašnjenje:  obvezna ispunjena  ispunjava se opcijски

**Građevni dio zgrade**

	$U$ [W/(m <sup>2</sup> K)]	$U_{max}$ [W/(m <sup>2</sup> K)]	Ispunjeno DA / NE
Vanjski zidovi, zidovi prema garaži, tavanu			
Ravni i kosi krovovi iznad grijanog prostora, stropovi prema tavanu			
Zidovi prema tlu, podovi prema tlu			
Stropovi iznad vanjskog zraka, stropovi iznad garaže			
Zidovi i stropovi prema negrijanim prostorijama i negrijanom stubištu temperature više od 0 °C			
Prozori, balkonska vrata, krovni prozori, prozorni elementi pročelja			
Vanjska vrata s neprozirnim vratnim krilom			

Objašnjenje:  obvezna ispunjena  ispunjava se opcijски

# POLICY REFORM TO PROMOTE RES INVESTMENTS

- Currently in Croatia, only the supporting scheme for RES electricity generation (feed-in tariffs) exists, for RES heat&cool production it is still missing.
- Preparation of sub-laws for subsidizing RES heat&cool (RES-H/C) production is foreseen by The Act on the Production, Distribution and Supply of Thermal Energy (OG 42/05). Expected sub-laws include:
  - **Ordinance on acquiring the status of subsidized RES heat&cool producer** - defining eligible RES heat&cool technology (biomass, solar, geothermal) and technical criteria for each technology
  - **Regulation on the minimum share of subsidized RES heat&cool production** - defining the minimum share of subsidized RES heat&cool production in total primary energy supply and final energy consumption for 2020
  - **Regulation on sources and amounts of financial incentives for subsidized RES heat&cool production** - defining the source and the amount of financial incentives for different RES heat&cool technologies
- RES-H/C sub-laws should be adopted by the end of 2010.

# IDENTIFICATION OF ECONOMICALLY ATTRACTIVE RES PROJECTS

- Impact of RES-H/C sub-laws on RES investments in Building sector → implementation of the following RES projects:
  - solar thermal collectors
  - biomass boilers (pellets, wood chips and wood logs)
  - geothermal heat pumps
- RES projects could be implemented in a house (one facility – one user), in a residential or commercial building (one facility – multi users) or in a municipality (district heating).
- Analysis of heat and cool demand was performed until 2020 (MAED model)
- Analysis was conducted for existing prices of electricity and natural gas, and for expected future prices.

## EXPECTED RESULTS OF THE POLICY REFORM ASSUMPTIONS

- *Scenario with measures* – bottom up approach
  - Measures implemented in 320 000 houses (20% of households in Croatia) and 7 100 objects in service sector till 2020
  - **Scenario S1**
    - 191 000 biomass (70% pellets & 30% wood logs), 68 000 solar thermal collectors and 61 000 geothermal heat pumps in households
    - 7 100 solar thermal collectors in services
  - **Scenario S2**
    - more solar collectors instead of biomass
    - 80 000 biomass (70% pellets & 30% wood logs), 179 000 solar thermal collectors and 61 000 geothermal heat pumps in households
    - 7 100 solar thermal collectors in services
- Incentives or “soft” credit lines will be necessary for realization of the *With measures scenarios*

# EXPECTED RESULTS OF THE POLICY REFORM

## ENERGY SAVINGS

	Year 2020	
	Scenario S1	Scenario S2
Biomass boilers/furnaces (PJ)	12.7	6.7
Solar thermal collectors (PJ)	0.9	1.6
Geothermal heat pumps (PJ)	4.3	4.3
<b>Total subsidized RES heat/cool production (PJ)</b>	<b>17.9</b>	<b>12.6</b>
Gross final energy consumption (PJ)	404.3	404.3
<b>Share of RES in Gross final energy consumption (%)</b>	<b>4.4</b>	<b>3.1</b>

- The share would be higher for the scenario S1, because biomass boilers can cover all heating needs (including hot water preparation) in the building, while solar thermal collectors usually cover 40-60% of needed hot water preparation and up to 20% of heating demand.

# EXPECTED RESULTS OF THE POLICY REFORM

## CO<sub>2</sub> EMISSION REDUCTION

CO <sub>2</sub> emission reduction in 2020	Scenario S1		Scenario S2	
	t CO <sub>2</sub>	%	t CO <sub>2</sub>	%
Solar thermal collectors - households	45321	4.2	119652	17.1
Solar thermal collectors - services	7015	0.7	7015	1.0
Geothermal heat pumps - households	207102	19.2	207102	29.6
Biomass (pellets) - households	548793	50.9	226094	32.3
Biomass (wood logs) - households	228103	21.1	97192	13.9
Biomass (wood chips) - services	42640	4.0	42640	6.1
<b>Total</b>	<b>1078973</b>	<b>100.0</b>	<b>699695</b>	<b>100.0</b>
Solar thermal collectors	52336	4.9	126667	18.1
Geothermal heat pumps	207102	19.2	207102	29.6
Biomass boilers/furnaces	819536	76.0	365926	52.3
<b>Total</b>	<b>1078973</b>	<b>100.0</b>	<b>699695</b>	<b>100.0</b>

## EXISTING SUPPORT MECHANISMS CROATIAN FUND

- The Croatian Environmental Protection and Energy Efficiency Fund is an extra-budgetary fund that finances projects, programmes and measures for the purpose of environmental protection, increase of energy efficiency and the usage of renewable energy sources in Croatia.
- The Croatian Fund supports the implementation of RES projects through four financial instruments:
  - Soft Loan: up to 40% of eligible costs or up to cca. 200 000 EUR, zero interest rate, repayment (grace period 2 years, payback 5 years)
  - Interest Subsidy: 2% decrease of the stipulated interest rate
  - Financial Aid (i.e. grant): for units of local/regional self-government 40%/60%/80% of eligible costs (depending on the location)
  - Donation: up to cca. 22 000 EUR, for promotion, research and development

## EXISTING SUPPORT MECHANISMS BUDGETS OF COUNTIES

- Support by counties:
  - The first county (Sisačko-moslavačka) started to support the installation of solar thermal collectors in 2008.
  - In 2009, three additional counties (Karlovačka, Krapinsko-zagorska and Zagrebačka) supported installation of solar thermal collectors and heat pumps.
  - Tenders for RES projects implementation for 2010 include not only solar thermal collectors and heat pumps, but also pellet boilers, small wind turbines and photovoltaic household systems.
- Incentives per RES installation usually amounted to 40% of the investment & installation costs (max. EUR 1 670); incentives will be received after the installation and audit by a county committee.
- Step by step approach will facilitate the development of RES markets. Additional momentum will be given by expected sub-laws, which will help in acceleration of RES-H/C projects implementation in Croatia.

## GOOD PRACTICE EXAMPLE

- Installation of solar thermal collectors in the hospital of the Karlovac city - technical details:
  - Costs of investment and installation: 165 000 EUR
  - Collector surface: 480 m<sup>2</sup>
  - Volume of tank: 20 000 l
  - Temperature of cold/hot water: 10/55 °C
  - Optical efficiency of solar collector: 0.8
  - Useful heat for hot water: 382 MWh
  - Light heating oil savings: 55 t (or 2 350 GJ)
  - CO<sub>2</sub> emission reduction: 172 t
- The project is co-financed by Croatian Fund, using financial mechanisms designed for units of local/regional self-government - Financial Aid (40%). Other 60% of investment/installation costs will be covered by the city's budget.

# RECOMMENDATIONS & CONCLUSIONS

- **RES-H/C project implementation should be regulated**
- **National targets** should be based on the actual generation of heating and cooling rather than on total capacity or number of installations; basing the incentives on plants capacities alone may risk the installation of RES-H/C technologies that are not actually utilised or utilized inefficiently)
- The supporting system should cover only **RES-H/C technologies of higher quality**, above defined technical level for each technology
- Creation of **stable, predictable and long-term supporting system** (avoiding “stop & go” situations in funding); financial incentives need to be periodically adjusted, based on market development and costs of technologies and fuels
- **Procedures** for applying projects and receiving incentives should be **simple and easy to evaluate**

# RECOMMENDATIONS & CONCLUSIONS

- After adoption of the legal framework, it will be necessary **to organise stakeholder institutions and educate staff** in order to enable each institution to take over its responsibility in RES-H/C projects implementation phase
- The **networking** is necessary on a technical, administrative, social and political level (spatial planning, environmental issues, licensing and permit procedures, banking and taxation systems etc.)
- The **monitoring/evaluation** system should be established in order to evaluate the accomplishment of national targets
- **Public awareness campaigns** should be organised to increase private and public demand for RES-H/C technologies and stimulate the market for these technologies (information centres for technical assistance and financial advice)
- **Education** of heating engineers, architects and installers, educational schemes for pupils, students and their teachers, as well as training seminars for project developers, investors and decision makers at national/local level

# RECOMMENDATIONS & CONCLUSIONS

- The policy reform will create business opportunities for investors and project developers, which should lead to acceleration of RES markets development, development of associated services, additional job creation and better positioning of Croatia on the EU RES markets.
- After implementation of RES heat/cool sub-laws, experiences could be promoted and shared with other countries as a good practise example.

# Thank You for Your Attention!



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