

# Croatia

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## 1. SUMMARY

Based on the projections in Croatia's Second, Third and Fourth National Communication (NC), Croatia is projected to meet its revised Kyoto Protocol target of 34.2 MtCO<sub>2</sub>-eq, a 5% reduction in base year emissions by 2010. Greenhouse gas emissions are projected to be 1% above the base year in the "with existing measures" scenario and 11% below the base year in the "with additional measures" scenario. Including the effect of carbon sinks (1 MtCO<sub>2</sub>-eq.) together with additional measures with results in a projection of 13% below base year emissions.

Comparing sectoral projections with emissions in 1990, the Kyoto base year, greenhouse gas emissions from the waste sector are projected to increase threefold by 2010, while those in the energy sector are also expected to increase significantly, by around 28% in the "with existing measures" scenario and 11% in the "with additional measures" scenario. Emissions from the industrial processes sector are expected to halve and those from the agriculture sector to reduce by 28%.

Key policies and measures (PAMs) identified in Croatia's 2nd, 3rd, 4th NC are those in the energy supply sector relating to the deployment of more renewable energy particularly solar and geothermal, and more efficient heat generation, including more cogeneration (CHP); reducing industrial process emissions in Croatia from cement, ammonia and nitric acid production; and in the agriculture sector, encouraging improved use of fertilisers and measures to enhance carbon uptake by agricultural soils.

In terms of report completeness and clarity, Croatia's reporting could benefit from summary tables showing projections for each scenario, including a split by each sector and gas. The 2nd, 3rd, 4th NC provides graphs for total projections (Fig 5-1) and the energy sector (Fig 5-2), but the actual values were not reported. As a result, some values for the energy sector are missing from this Country Profile. Also, the total projected emissions for each scenario in 2010 as used in the Country Profile could only be deduced from the report text about the amount of Kyoto commitment exceedences for the "with existing measures" (5.22 MtCO<sub>2</sub>-eq.) and "with additional measures" (1.3 MtCO<sub>2</sub>-eq.) scenarios.

Future submissions would benefit from a summary table showing the base year, Kyoto target and progress to target, and summary tables showing quantified savings from PAMs for gases and sectors other than CO<sub>2</sub> and energy.

## 2. GHG PROJECTIONS AND PROGRESS TO KYOTO TARGETS

Base-year emissions of greenhouse gases for Croatia are calculated using 1990 emissions for all gases including fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

The 2nd, 3rd, 4th NC provides projections for the following sectors: energy (including transport), industrial processes, agriculture, forestry and waste management.

The following Table 1 shows, for all gases and main sectors:

- GHG emission projections for the two scenarios “with existing measures” (WEM) and “with additional measures” (WAM), as reported by Croatia;
- Historic emissions (in the “reference year”) as reported together with projections. For Croatia the reference year is 1990.

Table 2 shows, for all gases and main sectors:

- 1990 GHG emissions as reported in the latest (2008) GHG emissions inventory (1990-2006);
- Adjusted GHG emission projections for the WEM and WAM scenarios. This adjustment of the projections reported in Table 1 is carried out to allow consistency and comparability between projections and the latest (2008) GHG inventory data<sup>1</sup>. In Croatia’s case the correction factor slightly increases the projections in the 4NC, as shown in Figure 2.

Figure 3 allows for a comparison of projections with emissions in 1990, the Kyoto base year. Greenhouse gas emissions from the waste sector are projected to increase threefold by 2010, while those in the energy sector are also expected to increase significantly, by around 28% in the “with existing measures” scenario and 11% in the “with additional measures” scenario. Emissions from the industrial processes sector are expected to halve and those from the agriculture sector to reduce by 28%.

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<sup>1</sup> The adjustment consists in applying an adjustment factor to projections from Table 1. This factor is the ratio between total emissions in the reference year as reported in the 2008 GHG inventory report (or, if the reference year is the base-year under the Kyoto Protocol, in the report of the review of the initial report under the Kyoto Protocol) and total emissions in the reference year as reported by the country with projections (Table 1).



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**Table 1. Summary of reported projections by sector and by gas in 2010 (Mt CO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM
<b>Energy (excl. transport)<sup>2</sup></b>	21.0	25.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	22.6	28.6	24.7
Energy supply	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Energy – industry, construction	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Energy – other (commercial, residential, agriculture)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Transport (energy)</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Industrial processes</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	3.9	2.3	2.3
<b>Waste</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.9	1.2	1.2
<b>Agriculture</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	4.3	3.2	3.2
<b>Other</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Total (excl. LULUCF)</b>	21.0	25.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	31.7	35.3	31.4

**Key:**

Reference year: 1990 for all gases. The total is not the same as the Kyoto base year as the latter was revised in 2008 and includes an additional 3.5 MtCO<sub>2</sub>-eq (see Metadata).

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Croatia's 2nd, 3rd and 4th NC, November 2006.

<sup>2</sup> For Croatia, this is the energy sector total, **including** transport.

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**Table 2. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (MtCO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)<sup>3</sup></b>	21.3	25.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	22.9	29.4	25.4
Energy supply	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Energy – industry, construction	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Energy – other (commercial, residential, agriculture)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Transport (energy)</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Industrial processes</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	4.6	2.4	2.4
<b>Waste</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.4	1.2	1.2
<b>Agriculture</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	4.6	3.3	3.3
<b>Other</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Total (excl. LULUCF)</b>	19.9	25.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	32.5	36.3	32.2

**Note:** The 1990 total is not the same as the Kyoto base year as the latter includes an additional 3.5 MtCO<sub>2</sub>-eq (see Metadata).

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Croatia's 2nd, 3rd and 4th NC, November 2006 and Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.

<sup>3</sup> For Croatia, this is the energy sector total, **including** transport.

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**Table 3. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (index 100 = 1990)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)<sup>4</sup></b>	100	120.2	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	128.4	110.8
Energy supply	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
Energy – industry, construction	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
Energy – other (commercial, residential, agriculture)	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
<b>Transport (energy)</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
<b>Industrial processes</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	51.2	51.2
<b>Waste</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	310.3	310.3
<b>Agriculture</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	72.0	72.0
<b>Other</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
<b>Total (excl. LULUCF)</b>	100	128.8	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	111.5	99.1

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Croatia's 2nd, 3rd and 4th NC, November 2006 and Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.

<sup>4</sup> For Croatia, this is the energy sector total, **including** transport.

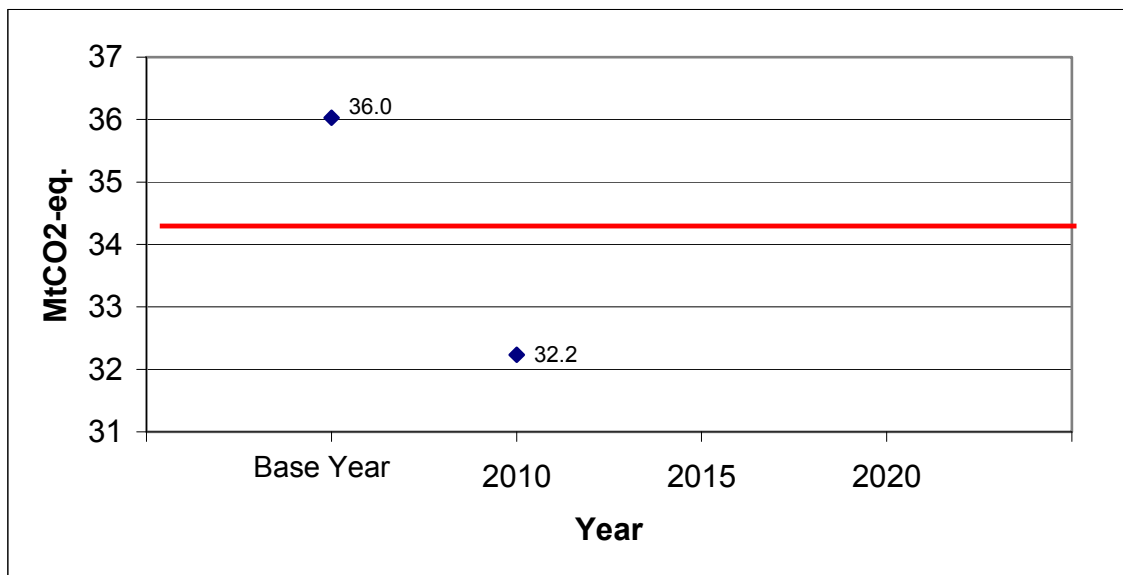
**Table 4. Summary of projections in 2010 compared to base year emissions under the Kyoto Protocol**

	Unit	Base-year emissions under the Kyoto Protocol	2010 projections 'with existing measures'	2010 projections 'with additional measures'
Total GHG emissions (excluding LULUCF)	Mt CO <sub>2</sub> -eq.	36.0	36.3	32.2
	Index (base-year emissions = 100)	100	100.6	89.5

**Source:** Croatia's 2nd, 3rd and 4th NC, November 2006, and Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.

In Figure 1, the same correction factor used in Table 2 has been applied to the 2010 projection for the "with additional measures" scenario. 2015 and 2020 projections were not reported in the 2nd, 3rd and 4th NC.

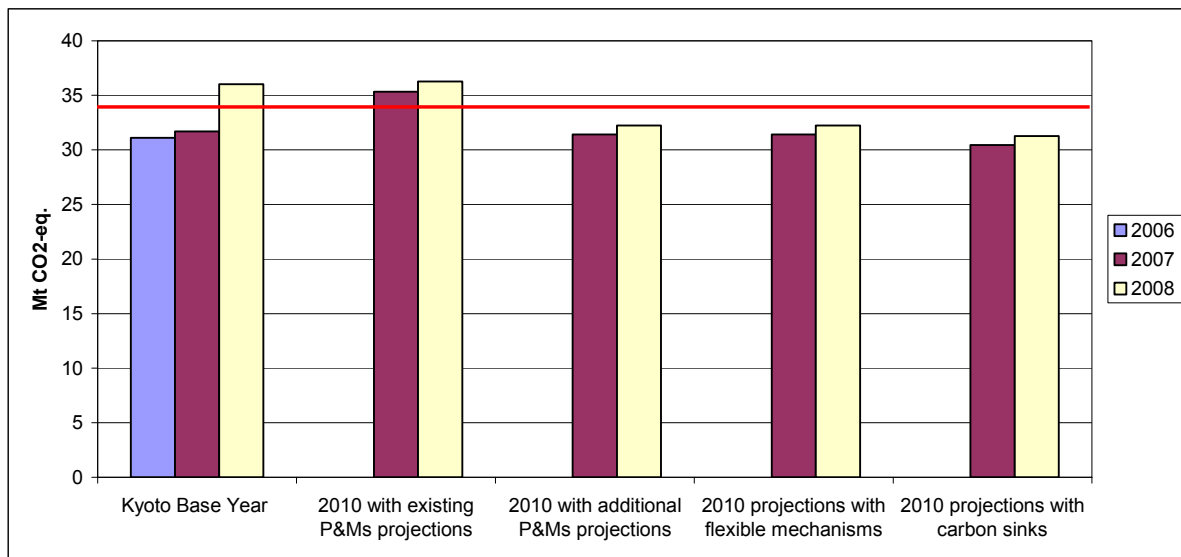
The red lines in Figure 1 and 2 indicate the Kyoto target of 34.2 Mt CO<sub>2</sub>-eq.

**Figure 1. Greenhouse gas projections in 2010, 2015 and 2020 (Mt CO<sub>2</sub>-eq.)**

Source: Croatia's 2nd, 3rd and 4th NC, November 2006, and Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.



**Figure 2. Comparison of 2010 projections reported in 2006, 2007 and 2008**



Source for 2006 data is the First National Communication of Croatia, 2002.

Sources for 2007 and 2008 data: Croatia’s 2nd, 3rd and 4th NC, November 2006, and in 2008: Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.

In Figure 2 it should be noted that no ‘with existing measures’ or ‘with additional measures’ projections were provided in the First NC, the source of information for 2006. The 2nd, 3rd and 4th NC were used for both 2007 and 2008 Country Profiles and so the difference in Figure 2 is the result of the correction factor applied in 2008.

### 3. CLIMATE CHANGE MITIGATION POLICIES AND MEASURES

The energy sector total calculated by the top down method includes transport as no subsectoral breakdown was provided in Croatia's 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> NC. The energy total could be calculated for planned measures (WAM minus WEM), however it was not possible to calculate for existing measures as only a WOM graph was provided for the energy sector, without the corresponding values.

The main existing policies and measures (PAMs) identified in Croatia's NC are those in the energy supply sector relating to the deployment of more renewable energy particularly solar and geothermal, and more efficient heat generation, including more cogeneration (CHP). In total these PAMs are expected to deliver 0.81 MtCO<sub>2</sub>-eq. in 2010. There is also expected to be a relatively minor contribution from existing transport PAMs in 2010, namely fuel cells, biodiesel and hydrogen (together 0.07 MtCO<sub>2</sub>-eq.). It is interesting to note that projected savings from all of these PAMs are much more substantial in 2020, with 1.9 MtCO<sub>2</sub>-eq. from the energy supply sector and 0.3 MtCO<sub>2</sub>-eq. from transport.

In addition the NC describes PAMs in the industrial processes, waste and agriculture sectors, although the effect of individual PAMs was not quantified. Key sources of industrial process emissions in Croatia are cement, ammonia and nitric acid production, accounting for 87% of emissions from the sector in 2003, and the focus of PAMs. In the waste sector Croatia has adopted a number of measures to reduce waste generation and the amount of waste being disposed of to landfill. Key PAMs in the agriculture sector include those encouraging improved use of fertilisers and measures to enhance carbon uptake by agricultural soils.

Planned PAMs include similar energy supply and transport initiatives to those in the "with existing measures" scenario as well as PAMs in the "energy – industry, construction" and "energy - other (commercial, residential, agriculture)" subsectors. The greatest savings are expected from more efficient generation of low-temperature heat in industry, thermal insulation improvements and use of biomass for heating energy in households.

**Table 5. Summary of the effect of policies and measures included in the 2010 projections (Mt CO<sub>2</sub>-eq.)**

	Top down calculation		Bottom Up calculation	
	Existing Measures	Planned Measures	Existing Measures	Planned Measures
<b>Energy (total, excluding transport)</b>	NE	3.92	0.81	1.99
Energy supply	NE	NE	0.81	0.73
Energy – industry, construction	NE	NE	0.00	0.26
Energy – other (commercial, residential, agriculture)	NE	NE	0.00	1.00
<b>Transport (energy)</b>	NE	NE	0.07	0.06
<b>Industrial processes</b>	0.82	0.00	NE	NE
<b>Waste</b>	0.35	0.00	NE	NE
<b>Agriculture</b>	0.72	0.00	NE	NE
<b>Cross-sectoral</b>	NE	NE	NE	NE
<b>Total (excluding LULUCF)</b>	1.89	3.92	0.87	2.05

Note: The effects of measures detailed above are calculated firstly by determining the difference between total projections in each scenario ('top down calculation') and secondly by summing the reported effect of individual measures ('bottom up calculation').

Source: Croatia's 2nd, 3rd and 4th NC, dated November 2006.

**Table 6. Detailed information on Existing Policies and measures**

Croatia's 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> National Communication provides the following table quantifying the effect of policies and measures in the "with existing measures" scenario, for the energy sector only:

Emission reduction measures	2010				2020			
	CO <sub>2</sub> (kt)	CH <sub>4</sub> (t)	N <sub>2</sub> O (t)	CO <sub>2</sub> eq (kt)	CO <sub>2</sub> (kt)	CH <sub>4</sub> (t)	N <sub>2</sub> O (t)	CO <sub>2</sub> eq (kt)
Wind power plants	108.9	2.1	1.3	109.4	285.1	3.6	3.4	286.3
Small hydropower plants	64.2	1.2	0.8	64.4	125.1	1.6	1.5	125.6
Use of biomass in cogeneration	44.1	1.1	0.2	44.2	204.9	5.1	0.8	205.2
Fuel cells	14.0	0.3	0.2	14.0	48.8	0.6	0.6	49.0
Biodiesel and hydrogen	53.8	4.4	0.4	54.1	261.7	27.7	2.2	263.0
Solar energy	311.6	15.4	3.4	313.0	624.8	32.7	6.0	627.3
Geothermal energy	239.1	11.0	2.6	240.1	539.2	25.8	5.3	541.4
More efficient heat generation	33.7	2.7	0.5	33.9	78.6	6.5	1.2	79.1
<b>TOTAL</b>	<b>869.4</b>	<b>38.2</b>	<b>9.4</b>	<b>873.1</b>	<b>2168.2</b>	<b>103.6</b>	<b>21.0</b>	<b>2176.9</b>

Source: Croatia's 2nd, 3rd and 4th NC, dated November 2006, Table 5-1, p. 74.

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**Table 7. Detailed information on Planned Policies and measures**

Croatia's 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> National Communication provides the following table quantifying the effect of policies and measures in the "with additional measures" scenario, for the energy sector only:

Emission reduction measures	2010				2020			
	CO <sub>2</sub> (kt)	CH <sub>4</sub> (t)	N <sub>2</sub> O (t)	CO <sub>2</sub> eq (kt)	CO <sub>2</sub> (kt)	CH <sub>4</sub> (t)	N <sub>2</sub> O (t)	CO <sub>2</sub> eq (kt)
<b>ELECTRIC POWER SUPPLY</b>	<b>727.3</b>	<b>13.9</b>	<b>8.5</b>	<b>730.2</b>	<b>1225.4</b>	<b>15.3</b>	<b>14.5</b>	<b>1230.2</b>
Savings in electricity transmission and distribution	39.6	0.8	0.5	39.8	99.2	1.2	1.2	99.6
Wind power plants	451.1	8.6	5.3	452.9	762.1	9.5	9.0	765.1
Small hydropower plants	62.7	1.2	0.7	62.9	105.9	1.3	1.3	106.3
Use of biomass in cogeneration (electricity generation)	174.0	3.3	2.0	174.7	258.2	3.2	3.1	259.2
<b>INDUSTRY</b>	<b>258.8</b>	<b>12.6</b>	<b>3.4</b>	<b>260.1</b>	<b>795.6</b>	<b>19.0</b>	<b>12.2</b>	<b>799.8</b>
Motor drive regulation	12.2	0.2	0.2	12.3	470.7	5.9	7.4	473.1
Contribution of cogeneration plants	52.8	0.9	0.9	53.1	150.1	2.7	2.7	151.0
More efficient generation of low-temperature heat	115.2	5.4	1.1	115.7	102.1	4.8	1.0	102.5
More efficient generation of high-temperature heat	78.5	6.0	1.2	79.0	72.7	5.6	1.1	73.1
<b>TRANSPORT</b>	<b>59.4</b>	<b>4.1</b>	<b>0.5</b>	<b>59.6</b>	<b>910.2</b>	<b>70.4</b>	<b>34.5</b>	<b>922.3</b>
Measures in long-distance passenger transport	0.0	0.0	0.0	0.0	93.0	21.5	16.6	98.6
Measures in public passenger transport	0.0	0.0	0.0	0.0	77.0	15.4	11.9	81.0
Measures in goods transport	0.0	0.0	0.0	0.0	458.5	14.4	3.7	460.0
Increase in biodiesel use	59.4	4.1	0.5	59.6	281.6	19.2	2.3	282.7
<b>SERVICES</b>	<b>406.8</b>	<b>21.4</b>	<b>4.4</b>	<b>408.6</b>	<b>835.5</b>	<b>44.3</b>	<b>7.9</b>	<b>838.8</b>
Savings on electricity for non-heating purposes	14.4	0.3	0.2	14.5	32.1	0.4	0.4	32.2
Increased use of solar energy	78.5	3.9	0.8	78.8	140.2	7.3	1.3	140.7
Increased use of thermal energy	16.4	0.8	0.2	16.4	27.9	1.3	0.3	28.0
Increased use of central heating systems and cogeneration	66.8	3.6	0.7	67.1	145.6	8.0	1.4	146.2
Thermal insulation improvements	230.8	12.8	2.5	231.8	489.6	27.2	4.6	491.6
<b>HOUSEHOLDS</b>	<b>586.8</b>	<b>22.4</b>	<b>4.4</b>	<b>588.6</b>	<b>1789.2</b>	<b>87.0</b>	<b>13.9</b>	<b>1795.3</b>
Increased use of solar energy	28.4	1.8	0.2	28.5	286.7	21.3	1.9	287.7
Savings on electricity for non-heating purposes	12.4	0.2	0.1	12.5	192.3	2.4	2.3	193.0
Increased use of central heating systems and cogeneration	20.7	2.2	0.1	20.8	156.8	17.2	1.1	157.5
Thermal insulation improvements	73.0	2.5	0.7	73.2	376.4	18.7	3.1	377.8
Use of biomass for generation of heating energy (cogeneration + boiler houses)	452.2	15.6	3.1	453.5	777.0	27.4	5.5	779.3
<b>TOTAL EMISSION REDUCTION POTENTIAL</b>	<b>2039.1</b>	<b>74.3</b>	<b>21.2</b>	<b>2047.2</b>	<b>5555.8</b>	<b>236.1</b>	<b>83.1</b>	<b>5586.5</b>

Source: Croatia's 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> NC, dated November 2006, Table 5-3, p. 75.

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### Sources of information

Croatia's Second, Third and Fourth National Communication submitted under the UNFCCC, dated November 2006.

Croatia's Annual greenhouse gas inventory 1990 - 2006 and inventory report, 24 May 2008.

Base-year emissions from the UNFCCC website,

[http://unfccc.int/ghg\\_data/kp\\_data\\_unfccc/base\\_year\\_data/items/4354.php](http://unfccc.int/ghg_data/kp_data_unfccc/base_year_data/items/4354.php)

### Kyoto base-year emissions

Kyoto base-year emissions are presented throughout, except Table 1 which presents projections reference year emissions (see below). Kyoto base year emissions of greenhouse gases were calculated using 1990 emissions for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

Kyoto base-year emissions have now been reviewed and set for all EEA countries.

Croatia submitted a request to the Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) for the recognition of specific circumstances under Article 4.6 of the UNFCCC, to increase the base year emission levels. The resulting Decision 7/CP.12 of 17 November 2006 allows Croatia to add 3.5 Mt CO<sub>2</sub> equivalent to its 1990 (base year) level of greenhouse gas emissions.

### Projections reference year emissions

Projections reference year emissions are presented in Table 1.

Projections reference year emissions are defined as projections-consistent emissions data for a given historic year, as chosen by the Member State. Inventory recalculations from year to year may mean that latest inventory data cannot be compared with projections based on older inventory data. Where such an inconsistency has arisen, MS projections have been corrected by applying the following formula, in Table 2:

Corrected projection = reported projections \* latest inventory total GHG emissions / Table 1 reported total GHG emissions for the same reference year

### Quality of Reporting

National reporting in the sources detailed above was assessed semi-qualitatively. Scoring was attributed according to the level of detail and clarity: from 0 (representing not reported) to +++ (representing very detailed and/or clear reporting). Guidance used for this assessment included the reporting requirements laid down in the UNFCCC reporting guidelines for

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national communications available in English, French, Spanish (“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications - FCCC/CP/1999/7”).

The following tables detail reporting considered to be best practice for the purposes of this assessment.

Information provided	Example of good practice
Policy names	Clear names and description provided with unique identifier.
Objectives of policies	Good description of objectives
Types of policies	Type of policy instrument specified e.g. regulatory, fiscal
Which greenhouse gases?	Specifies which gases each PAM affects
Status of Implementation	Clear for each PAM: planned, adopted, implemented, expired
Implementation body	Clear which authorities are responsible for implementation
Quantitative assessment of emission reduction effect and cost of policies	Almost all PAMs are actually quantified. Total effect of all PAMs specified. WOM projection provided.
Interaction with other national and EU level policies	Detailed discussion and analysis of policy interactions.
Measures implementing community legislation	Report details which national policies are implementing individual pieces of EU legislation.
Arrangements for flexible mechanisms	Details arrangements for use of flexible mechanisms.
Balance between domestic action and flexible mechanisms	Regarding reductions required to meet Kyoto target, details proportion to result from domestic action and flexible mechanisms.

Category of Information	Example of good practice
Projection scenarios	"With existing measures" and "with additional measures" projections required, "without measures projection" optional.
Policies included in each projection	Clear presentation of the policies included in each projections scenario.
Expressed relative to historic reference year data	Projections are presented alongside consistent historic emissions.
Starting year	Starting year and emissions used as basis for projections is detailed.
Split of projections	Projection split by all 6 gases (or F-gases together), all sectors and years
Presentation of results	Clear, both tables and graphs provided and/or used excel reporting template.
Description of methodologies	Description of approach, model and assumptions
Sensitivity analysis	Was an analysis carried out to determine the sensitivity of projections to variance in the input parameters? Are high medium and low scenarios presented?
Discussion of uncertainty	Is an uncertainty range for the projections provided?
Details of parameters and assumptions	Are parameters as required under Monitoring Mechanism 280/2004/EC reported?
Indicators for projections	Are indicators for projections as required under Monitoring Mechanism 280/2004/EC reported?

In the case of Croatia, the projection scenarios for the non-energy sectors are labelled as “no measures/with measures” in the report. In this Country Profile we have reassigned these

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scenarios so that “with existing measures” is separate to “no measures”, with nomenclature as follows:

Country Profile	2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> NC
“without measures”	“no measures” in energy sector; “no measures/ with measures” in other sectors
“with existing measures”	“with measures” in energy sector; “with additional measures” in other sectors
“with additional measures”	“with additional measures” in the energy sector.

This effectively means that there are “without measures” and “with existing measures” scenarios for all sectors, and a “with additional measures” scenario for the energy sector only.

**Table 8. Information provided on policies and Kyoto flexible mechanisms**

Information provided	Level of information provided	Comments
Policy names	++	Mostly specified
Objectives of policies	++	Some description
Types of policies	+	Some description in text but not explicitly stated per policy
Which greenhouse gases?	++	Only specified for PAMs in the energy sector
Status of Implementation	+	Not clear
Implementation body	+++	Specified
Quantitative assessment of emission reduction effect and cost of policies	+	Only for the energy sector in 2010 and 2020.
Interaction with other national level policies	0	Not discussed.
Arrangements for flexible mechanisms	0	It is assumed that Croatia is not intending to make use of flexible mechanisms.
Balance between domestic action and flexible mechanisms	0	as above

**Table 9. Information provided on projections**

Category of Information	Level of information provided	Comments
Projection scenarios	+++	“Without measures”, “with existing measures” and “with additional measures” (energy sector only) scenarios.
Policies included in each projection	++	Clear for energy sector with separate WEM & WAM tables, but not so clear that policies in other sectors are only in the WEM scenario.
Expressed relative to base year	+++	Relative to 1990 base year
Starting year	?	Not clear

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Split of projections	++	<p>Sector splits are provided for energy (including transport), industrial processes, agriculture, forestry and waste management. However only a graph (Fig 5-2) is provided for the energy sector; the projection values (numbers) are not reported.</p> <p>No split of projections by gas.</p> <p>Full time series given: 1990, 1995, 2000, 2005, 2010, 2015, 2020.</p>
Presentation of results	++	<p>Graphs only are provided for the total projections (Fig 5-1) and energy sector (Fig 5-2); the required values cannot be deduced.</p> <p>No split/summary tables by gas.</p>
Description of methodologies (approach, model and assumptions)	0	Not provided
Sensitivity analysis	0	Not provided
Discussion of uncertainty	0	Not provided
Details of parameters and assumptions	+	Only two parameters/assumptions are discussed in the report.
Indicators for projections	0	Not provided



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Parameters for projections are presented in Table 10.

Croatia's 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> NC includes the following table for the "with existing measures" scenario with projections out to 2020 (the CO<sub>2</sub> emissions provided are for the energy sector only):

	1990	1995	2000	2005	2010	2015	2020
Total energy requirements (PJ)	408	314	370	411	453	503	552
CO <sub>2</sub> emission according to "with measures" scenario (kt)	20,959	15,082	17,447	21,678	24,959	27,674	30,390
Electricity consumption (GWh)	14,749	11,404	13,836	16,048	19,127	22,103	24,865

There is no further discussion of modelling parameters and assumptions in the report.

**Table 10. Parameters for Projections**

1. Mandatory parameters on projections	2005	2010	2015	2020	Units
<b>Assumptions for general economic parameters</b>					
GDP (value at given years or annual growth rate and base year)					
Population (value at given years or annual growth rate and base year)					
International coal prices at given years in euro per tonne or GJ (Gigajoule)					
International oil prices at given years in euro per barrel or GJ					
International gas prices at given years in euro per m3 or GJ					
<b>Assumptions for the energy sector</b>					
Total gross inland consumption (PJ) (split by oil, gas, coal, renewables, nuclear, other)					
Total electricity production by fuel type (oil, gas, coal, renewables, nuclear, other)					
Energy demand by sector split by fuel (delivered)					
Assumptions on weather parameters, especially heating or cooling degree days					
<b>Assumptions for the industry sector</b>					
<i>For Member States using macroeconomic models:</i>					
The share of the industrial sector in GDP and growth rate					
<i>For Member States using other models:</i>					
The production index for industrial sector					
<b>Assumptions for the transport sector</b>					
<i>For Member States using macroeconomic models:</i>					
The growth of transport relative to GDP					
<i>For Member States using other models:</i>					
The growth of passenger person kilometres					
The growth of freight tonne kilometres					
<b>Assumptions for buildings (in residential and commercial or tertiary sector)</b>					
<i>For Member States using macroeconomic models:</i>					
The level of private consumption (excluding private transport)					
The share of the tertiary sector in GDP and the growth rate					
<i>For Member States using other models:</i>					
The rate of change of floor space for tertiary buildings and dwellings					

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The number of dwellings and number of employees in the tertiary sector					
<b>Assumptions in the agriculture sector</b>					
<i>For Member States using macroeconomic models:</i>					
The share of the agriculture sector in GDP and relative growth					
<i>For Member States using other models:</i>					
Livestock numbers by animal type (for enteric fermentation beef, cows, sheep, for manure management pigs and poultry)					
The area of crops by crop type					
Emissions factors by type of livestock for enteric fermentation and manure management (t)					
<b>Assumptions in the waste sector</b>					
Waste generation per head of population or tonnes of municipal solid waste					
The organic fractions of municipal solid waste					
Municipal solid waste disposed to landfills, incinerated or composted (in tonnes or %)					
<b>Assumptions in the forestry sector</b>					
Forest definitions					
Areas of:					
managed forests					
unmanaged forests					

2. Recommended parameters on projections	2005	2010	2015	2020	Units
<b>Assumptions for general economic parameters</b>					
GDP growth rates split by industrial sectors in relation to 2000					
Comparison projected data with official forecasts					
<b>Assumptions for the energy sector</b>					
National coal, oil and gas energy prices per sector (including taxes)					
National electricity prices per sector as above (may be model output)					
Total production of district heating by fuel type					
<b>Assumptions for the industry sector</b>					
Assumptions fluorinated gases:					
Aluminium production and emissions factors					
Magnesium production and emissions factors					
Foam production and emissions factors					
Stock of refrigerant and leakage rates					
<i>For Member States using macroeconomic models:</i>					
Share of GDP for different sectors and growth rates					
Rate of improvement of energy intensity (1990 = 100)					
<i>For Member States using other models:</i>					
Index of production for different sectors					
Rate of improvement or index of energy efficiency					
<b>Assumptions for buildings (in residential and commercial / tertiary sector)</b>					
<i>For Member States using macroeconomic models:</i>					
Share of tertiary and household sectors in GDP					
Rate of improvement of energy intensity					
<i>For Member States using other models:</i>					
Number of households					
Number of new buildings					

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Rate of improvement of energy efficiency (1990 = 100)					
<b>Assumptions for the transport sector</b>					
<i>For Member States using econometric models:</i>					
Growth of transport relative to GDP split by passenger and freight					
Improvements in energy efficiency split by vehicle type					
Improvements in energy efficiency split by vehicle type, whole fleet/new cars					
Rate of change of modal split (passenger and freight)					
Growth of passenger road kilometres					
Growth of passenger rail kilometres					
Growth of passenger aviation kilometres					
Growth of freight tonne kilometres on road					
Growth of freight tonne kilometres by rail					
Growth of freight tonne kilometres by navigation					
<b>Assumptions for the agriculture sector</b>					
<i>For Member States using econometric models:</i>					
Agricultural trade (import/export)					
Domestic consumption (e.g. milk/beef consumption)					
<i>For Member States using other models:</i>					
Development of area of crops, grassland, arable, set-aside, conversion to forests etc					
Macroeconomic assumptions behind projections of agricultural activity					
Description of livestock (e.g. by nutrient balance, output/animal production, milk production)					
Development of farming types (e.g. intensive conventional, organic farming)					
Distribution of housing/grazing systems and housing/grazing period					
Parameters of fertiliser regime:					
Details of fertiliser use (type of fertiliser, timing of application, inorganic/organic ratio)					
Volatilisation rate of ammonia, following spreading of manure on the soil					
Efficiency of manure use					
Parameters of manure management system:					
Distribution of storage facilities (e.g. with or without cover):					
Nitrogen excretion rate of manures					
Methods of application of manure					
Extent of introduction of control measures (storage systems, manure application), use of best available techniques					
Parameters related to nitrous oxide emissions from agricultural soils					
Amount of manure treatment					