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RENEWABLE ENERGIES TO SUPPORT SUSTAINABLE DEVELOPMENT IN THE UNECE REGION

(A regional initiative)

At its meeting in June 2003, the extended Bureau of the UNECE Committee on Sustainable Energy discussed whether the UNECE should initiate a sub-programme on renewable energies, within its work programme on sustainable energy, and more specifically what should be the UNECE niche, amongst other international organisations working in this area. For this purpose, the Bureau requested the secretariat to put forward a proposal on enlarging the scope of the current programme activities by including a new sub-programme on renewable energies (RES) for discussion by the Committee on Sustainable Energy, at its thirteenth session. This proposal is prompted by the growing political attention being given to renewables as a means of reinforcing environmental protection and ensuring sustainable development in the UNECE region. It is also partly in response to the Plan of Implementation flowing from the World Summit on Sustainable Development in Johannesburg, in September 2002 and the Kiev Ministerial Declaration on the Environment. The extended Bureau also requested the secretariat to propose draft Terms of Reference outlining the objectives, scope, modalities and related working methods for carrying out the sub- programme (see Annex I).

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I. Background

1. Following up the recommendations of the Rio Earth Summit in 1992 and the Plan of Action on strategic directions and priorities, adopted by the UNECE in 1997, the Committee on Sustainable Energy decided, at its annual session in 1997, to reorient the programme of work in energy to give more emphasis to issues related to the sustainable production and use of energy in order to better respond to the key energy challenges in the UNECE region (document ECE/ENERGY/32, Annex I, Terms of Reference). Some activities were abandoned, and a number of others, favouring sustainable development objectives, were initiated. At the time, there was not enough support from member countries to continue with the programme of work on renewable energy resources; it was not seen as a priority area for UNECE involvement. However, selected technical assistance activities in the field were transferred to the Coordinating Unit for Operational Activities. Two workshops on renewable energies were held in central Asia in 1997 but the programme was subsequently phased out.

2. At its ninth session in 1999, the Committee decided to contribute a regional perspective to the preparations and lead-up to the ninth annual session of the United Nations Commission on Sustainable Development (CSD-9, New York, April 2001). The documents prepared for CSD-9 subsequently served as a basis for the preparation of the energy sections of the basic draft documents (e.g. WSSD Plan of Implementation) submitted for consideration to the World Summit on Sustainable Development (Johannesburg, September 2002).

3. For this reason, the Committee established an Intergovernmental Task Force with a mandate that included the following three objectives: (a) to identify the key energy policy issues, and potential energy policy responses, confronting the UNECE region; (b) to organise a High-Level Multi- Stakeholder Forum (held during the tenth annual session of the Committee, in November 2000); and (c) to elaborate a Declaration for submission to CSD-9. (*"One More Step on the Path to a Sustainable Energy Future"* submitted as a UNECE regional contribution (ECE/ENERGY/43, Annex I).).

4. Serious consideration has been given to renewable energies during the last few annual sessions of the Committee. At its tenth session, the Committee ranked RES among the five priority sustainable policy issues from a regional perspective, to be addressed within its programme of work. Unfortunately, this is the only issue that has not as yet been added to the programme of work. In the above-mentioned Declaration, delegates called on ECE member countries for the " the *implementation of an enabling environment for the development and use of renewable sources of energy and their more effective integration into the energy systems"*. Likewise, delegates suggested that *"the promotion and dissemination of information and provision of technical assistance to countries with economies in transition in the field of renewable energy"* be included in the programme of work of the Committee (document ECE/ENERGY/43, Annex I, paragraphs 24 and 29).

II. Political impetus to renewable energy today

5. During the period 2000-2003, political support to renewable energies has continuously grown, both at the national and international level. The European Commission approved the implementation of the "Community Strategy and Action Plan on Renewable Energy"; and the European Parliament adopted a Directive on "The Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market" (Directive 2001/77/EC- the Directive on Renewables" (DR).).

Ambitious renewable energy targets at both the national and EU level have been set, with a goal to double the share of RES by the year 2010. Likewise, the United States is considering measures to enhance the use of renewable energy resources in the 2002 Energy Bill which at the timing of writing was being debated by the US Congress. Furthermore, a number of transition countries have adopted national programmes and also set numerical targets for the share of renewables in their energy mix.

6. At the World Summit on Sustainable Development (WSSD), held in Johannesburg in 2002, delegations adopted a Joint Declaration on "The Way Forward on Renewable Energy". The Summit recommended that the United Nations regional commissions and international organisations promote "*diversified energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuels and renewables…" (WSSB Plan of Implementation)*. This proposal was reinforced by the G-8, at their meeting in Evian, France, in May 2003, where the G-8 leaders pledged to develop cleaner, efficient technologies, including through UNECE programmes.

7. Finally, the fifth Ministerial Conference on Environment for Europe (Kiev, Ukraine, May 2003) recognised the importance of integrating environmental aspects and sustainable development into energy policy in the UNECE region and stressed the need to implement this. The Conference supported "*with a sense of urgency actions to be taken to substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognising the role of national and voluntary regional targets and initiatives. We, the Ministers and Heads of delegation of States that adopted the Joint Declaration on "The Way Forward on Renewable Energy" at Johannesburg, invite all countries to do so."* The Conference also invited the UNECE Committees on Environmental Policy and on Sustainable Energy "*to examine the role of economic instruments in promoting the use of renewable energy taking into account the work of OECD and other international organisations"*. (document ECE/CEP/94/Rev.1; Ministerial Declaration, paragraphs 47 - 48, available on website www.unece.org/Environment & Human Settlement).

III. Potential for renewable energies in the UNECE region

General overview

8. In the UNECE region, renewable energy sources have considerable potential and they could make an increasingly substantive contribution to supply diversification, emission reductions, security of supplies and sustainability of the energy sector as a whole, over a long-term perspective. The current largest proportion of total primary renewable energy supply is solid biomass (United States, Canada, Russian Federation, Finland, Sweden), followed by hydropower (Canada, Norway, Russian Federation, Sweden, Austria). Both solid biomass and hydropower combined provide around 80-85% of the total renewable energy supply of the region. Geothermal is the third largest source (Iceland, Italy, North America); other RES, less exploited but with significant potential, are wind (mostly in north-and south-east Europe, North America, Russian Federation) and solar (Mediterranean region, Central Asia). However, in relative terms, the share of renewable energy in the UNECE region, including large hydro, remains below 5% in the current total primary energy supply.

9. Currently, electricity generated from renewable energy sources (RES-E) represents more than 15% of the total electricity in the UNECE region, of which 90-95% is provided by hydropower plants (including large hydro projects). During the period 1990-2000, gross electricity production from renewable sources declined in North America, but increased in the EU Member States and Central European transition countries while remaining relatively stable in the Baltic States and South-East Europe (Annex III, data provided by the Energy Regulators Regional Association (ERRA) on nine countries from Central and South-East Europe). All these developments were dictated by hydropower generation, except in the EU Member States, where thanks to stronger supportive policies, the renewable mix was improved by increasing the share of wind power, solid biomass, renewable municipal solid waste and solar photovoltaic. In the UNECE region, the potential for the development of wind, solid biomass/solid municipal waste and solar renewable energy sources is large, while hydro- power and geothermal have almost reached their potential development capacity limits.

Need for targets

10. The importance and necessity of renewable energy targets are considered differently across countries, regions and institutions. Some consider that targets can work effectively in countries where strong cohesion or synergies exist between policy measures, regulatory incentives and market mechanisms, all three factors necessary to drive successfully the implementation process. For others, the setting of targets is viewed as a way to drive policy- makers into action. However, this latter strategy can be risky, particularly if political will and commitment is lacking.

11. Certainly, without clear objectives achievements are less likely. What is the attitude of UNECE member States in this regard? The position of each country or sub-region is dictated by its own energy policy objectives, the availability of indigenous renewable resources, market level/size of locally- developed technologies, commitment to GHG emission reductions, and ultimately by the level of awareness that renewables may contribute to the different dimensions of sustainable development. Some countries consider that targets should be fixed on a voluntary basis, while others, in particular when linked with conventional agreements, suggest compulsory targets.

12. The variety of attitudes was demonstrated during the World Summit on Sustainable Development, where many countries pushed for the inclusion in the Plan of Implementation of a *global quantitative target and timetable* for the amount of energy to be obtained from renewable sources. In the end, no compromise was reached, although the WSSD endorsed increased reliance on renewables. The fossil fuel industry, namely oil exporting countries and the United States, considered that political decisions to introduce quantitative renewable energy targets would lead to market distortions.

13. In Western Europe, increasing the share of renewable energies is viewed as a strategic way of reducing or avoiding GHG emissions. In Johannesburg, the European Union strongly pushed for a global quantitative target. The EU White Paper sets a common average target which is to increase the share of renewables in Total Primary Energy Supply (TPES) from the current 6% to 12% by 2010; and RES-E from 14% to 22% respectively, targets which if met would correspond almost to the EU commitment on CO2 emissions reduction by 2012. The EU Directive on Renewables urges EU Member States, to "*set national indicative targets for the consumption of electricity produced from renewable energy*". The national targets " *should be consistent with any national commitment made as part of the climate change commitments accepted by the Community under the Kyoto Protocol*".

14. UNECE transition economies are positively disposed to the promotion of renewable energy sources. Many countries view renewables as a way of promoting the development of small local businesses in selected areas and diversifying supply patterns, at the regional level. Some countries have developed national programmes on renewable energies, and a number of them have also set national indicative targets. For example, the first group of EU accession countries are now aligning their programmes to comply with the EU Directive on Renewables. However, financial constraints, energy pricing policies and the lack of supportive schemes continue to hamper the development of renewable energy sources in many of the countries with transitional economies. Moreover, there is still a large potential in these countries to reduce GHG emissions and meet the Kyoto Protocol commitments through energy efficiency improvements and conservation measures.

The current market and costs

15. Certainly, the potential for renewable energies in the UNECE region is large, but to what extent and how quickly might renewable energies increase their market share? According to numerous scenarios carried out by United Nations organisations, International Energy Agency, International Atomic Energy Agency and World Energy Council, the share of renewable energies will grow but still remain, in the foreseeable future, a complement to rather than a replacement for fossil fuels.

16. While wind, small hydro, solar and biomass can be successfully deployed in specific areas under favourable conditions, their widespread use will continue to be constrained by economic and, to some extent, environmental factors. Under present market conditions, renewables are, on the whole, not competitive and their widespread use cannot be accelerated without the provision of direct or indirect subsidies. Some participants in the energy market argue that this would undermine basic market principles while others, mostly proponents of renewable energies, claim that targeted subsidies for a limited time period are needed to encourage the development and use of renewables (e.g., needed for "take off").

17. Since 1997, thanks to technological improvements, the costs of RES have dropped dramatically, especially in the case of wind and solar, whose development has progressed by an annual rate of 28% and 26% respectively, over the last three years. In 2003, the total installed capacity of wind turbines reached 31,000 MW, 95% of which were located in the UNECE region, with 75% in Europe. By increasing the size of wind turbines from 70 KW in the 1980s, to 3 MW today, and 5 MW beyond 2005, the costs of electricity are being significantly reduced. Currently, onshore wind energy is the lowest cost renewable energy source. However, despite declining production costs, renewable energy sources are still not competitive with fossil fuels.

Table 1: Renewable Electricity Cost Assessment

	Current cost	Likely average cost reduction by 2020
Bioenergy	High. Cost effective in CHP applications with low fuel cost. Co-firing is a relatively low-cost retrofit option	10%-15%
Wind shore	Relatively low. Lowest compared to other renewable energy sources	15-25%
Wind offshore	High	20%-30%
Solar photovoltaic	Very high. Cost- effective only in niche markets	30%-50%
Solar thermal	Very high	30% +
Geothermal	High	10%
Hydro	Relatively lower for large hydro; higher for mini-hydro	10%

Source: World Energy Outlook 2001, Insight, OECD/IAE, Paris

IV. Policies to support the market

18. A key strategy for market acceleration is to remove the existing trade and investment barriers between countries endowed with significant renewable resources. In European UNECE countries, this requires substantive work on establishing effective policies, regulations and market instruments. The EU Directive which aims to provide a Community framework for increasing the market share of renewable energies can serve as a starting point.

19. The European Union Member States are using, at national level, different policy instruments, including green certificates, tax exemptions or reductions, investment aid, tax refunds and direct price support schemes. Currently, the proper functioning of these mechanisms is of paramount importance to maintain investor confidence, before establishing a reliable overall Community framework.

20. Harmonization of policy instruments to increase the market share of electricity from renewable energies could be more effective, under the conditions of a single electricity market (on-grid market), rather than harmonization of policies in off-grid markets. In the current EU internal electricity market, trade exchanges of electricity from renewable energies are likely to be eased by introducing a *guarantee of origin for renewables* and an *exchangeable green certificates system*. Furthermore, by enhancing the functional compatibility between the EU Directive on Renewables and that on the Internal Electricity Market (Directive 96/92/EC) favourable conditions could be provided for *creating a stable RES market, in the current and subsequently wider single European electricity market*. Such a market could undoubtedly *boost a second market for the technology* to exploit renewable resources. EU enlargement will also favour local manufacturing in the new Member States.

21. Besides this case, which needs to be confirmed in the future, practice has shown that there is no single policy implementation model that can be recommended. Different circumstances call for different solutions and this is particularly valid for renewables because of the wide variety of types of renewable energies and their characteristics, and also because they can be connected to on-grid or off-grid markets.

22. At its meeting in June 2003, the extended Bureau of the Committee on Sustainable Energy suggested that the UNECE secretariat organise, during the annual session of the Committee, a round table where the following questions would be discussed:

- Whether and how strongly current policies support the development of renewable energy resources. To what extent do they help to achieve existing targets?
- Do countries need common/harmonized policies on renewables and if so, under what conditions?
- Are the EU accession countries ready to adapt their legislation to the provisions of the EU Directive on renewables in a timely fashion?
- Does an enabling environment exist in transition economies to promote the development of renewable energy sources?
- What can be the role of "capacity building" in countries with economies in transition to encourage policy changes and raise awareness of renewables?
- What opportunities are there to increase the use of renewable energy sources through the Kyoto Protocol Mechanisms?
- Can the transparent use of government policies, regulatory incentives and market mechanisms to promote renewable energy resources be compatible with undistorted competitive energy markets?

V. Who is doing what on renewable energies in the UNECE region

23. The extended Bureau of the Committee has also requested the secretariat (a) to take stock of the current activities undertaken by international and regional organisations in the field of renewable energy resources; and (b) to consider whether there is a niche among those activities for the UNECE Committee on Sustainable Energy.

24. At intergovernmental level, the major organisations dealing with renewable energies in the UNECE region are the European Commission, OECD/IEA, EBRD and a number of United Nations organisations, namely UNDP/GEF; UNEP; UNIDO and UNESCO. They are involved in a range of activities, some focussing on a particular area, sub-region or market (see Table 2).

Table 2: International organizations dealing with RES in the ECE region

Organization	Policies		Regulations		Market/technology development		Technical assistance			DI
	Re	Im	Re	Im	Prom	Finance	Cb	T	Pd	
EC	+	+	+	+	+	+	+	+	+	+
OECD/ IEA	+		+		+					+
UNDP/ GEF						+	+	+	+	
UNEP					+				+	+
UNIDO										+
UNESCO								+		+
EBRD						+				

Re- Recommend; Im-Implement; Prom-Promotion; Cb- Capacity building; T-Training; Pd-Project development; DI-Dissemination of information

25. The EU Commission is the only legally empowered institution among all the above-mentioned which has the mandate not only to recommend but also to implement policies within its Member States. Through its financial mechanisms, such as the Sixth Framework Programme (2003-2006), ALTERNER, Campaign for Take-off and Intelligent Energy-Europe, the Commission supports renewable energy market and technology development, capacity building, regional/local project proposals.

26. The OECD/IEA recommends renewable energy -related policy and regulations, collects and disseminates information, and carries out comparative studies. The family of United Nations organisations deals with a range of programmes and activities: the UNDP/GEF focuses on capacity building, training and project development, and provides grants to small-scale projects; UNEP promotes technologies and provides also grants through the GEF programme to small-scale projects; and UNESCO provides educational programmes to universities. Three of the regional commissions (ESCAP, ESCWA and ECLAC) have regional programmes on renewable energies, with only the UNECE and ECA without a programme. Likewise, UNDESA has a programme on renewable energies oriented to projects in developing countries and rural areas.

27. Since WSSD took place, a few sub-regional initiatives (Type II Initiatives) have emerged in the UNECE region. The first is the Mediterranean Renewable Energy Programme (MedRE Program), a voluntary project of governments and the private sector, whose primary objective is to boost the market for renewables in the Mediterranean region by developing market mechanisms that can accelerate trade; and assisting the promotion of RES projects in priority areas, including assisting investments. Another similar initiative is the Renewable Energy and Energy Efficiency Partnership (REEEP), under the leadership of the Government of the United Kingdom, which has the same objective, but on a more global scale.

28. Under these circumstances, the following questions arise:

- Can the Committee further promote sustainable policies, through its work programme, without having a renewable energy component?
- And hence, should UNECE include renewable energies within its programme of work on sustainable energy?
- And if so, how should the programme be shaped to avoid duplication with other intergovernmental organisations in the UNECE region?

VI. Where is the niche for UNECE?

29. Following the decision of the extended Bureau, the secretariat has prepared a Draft Proposal for the Terms of Reference (see Annex I) defining objectives, scope and modalities for carrying out a sub-programme on renewable energies, within the work programme of the UNECE Committee on Sustainable Energy. The Proposal contained herein will be discussed by delegates on Wednesday, afternoon, 19 November, during the round table on renewable energies. This Draft Proposal is not intended in any way to prejudge any decisions; on the contrary, delegations are encouraged to use this document as a starting point before taking a final decision on whether, where and how the Committee should work in the area of renewable energy sources.

ANNEX I

PROMOTING RENEWABLE ENERGIES THROUGH THE UNECE PROGRAMME

DRAFT TERMS OF REFERENCE

Driving forces: Political commitments of UNECE member States to facilitate the transition of national economies and energy markets towards more sustainable patterns (Johannesburg Plan of Implementation; WEHAB proposals and partnership initiatives; CSD-9 recommendations; Kyoto Protocol commitments; G-8 Meeting Declaration, Evian, May, 2003; the identification of renewables by the UNECE Committee on Sustainable Energy as a priority sustainable policy issue in the UNECE region; and the UNECE Declaration-Contribution to CSD-9 (ECE/ENERGY/43 and Annex I).

Mandate: UNECE Declaration-Contribution to CSD-9 and programme of work (para. 29); Kiev Ministerial Declaration, paras.47 and 48; the extended Bureau meeting of the Committee on Sustainable Energy, June 2003; a positive decision by the thirteenth annual session of the Committee (if taken).

Medium Term General Objective: to contribute to increasing the market share of RES in the current energy mix by promoting (to the extent possible, by non-and-least market distorting measures) policy instruments, regulatory incentives and market mechanisms in UNECE member States, with an emphasis on the economies in transition which are non EU- accession countries. This promotion is to be carried out in a balanced way, with full respect for and coordination with other sub-programmes of the UNECE Committee on Sustainable Energy and other international organizations.

Short Term Objectives:

- To focalize the RES-related political commitments of WSSD into regional, concrete policy action;
- To encourage and assist UNECE member States, particularly countries in eastern Europe and central Asia, in their efforts to set up national goals and objectives for the development of renewable energy resources;
- To promote best practices regarding supportive policies, particularly in countries of eastern Europe and central Asia;
- To contribute to creating an enabling environment for the deployment of renewable energies in the UNECE region, both on-grid and off-grid;
- To increase awareness of policy makers and the general public to the contribution that renewable energy sources could make to energy supplies and sustainable development.

Scope, in terms of RES inclusion: The Committee will have to decide whether to focus activities on:

- major renewable energy sources in the UNECE region, e.g., small-scale hydro; biomass; geothermal; wind and solar; or
- all renewables, including municipal and industrial wastes.

It will also have to decide to include or not in the programme:

- the promotion of hydrogen;
- the promotion of hybrid fuels options, such as coal/biomass, in cooperation with other UNECE subsidiary bodies, such as the Ad Hoc Group of Experts on Coal in Sustainable Development.

Scope, in term of activities: The Committee will have to decide on which areas to focus on, bearing in mind the activities of other international organisations (see paras. 22-26; and Table 2), namely:

- the development of recommendations and promotion of policy instruments, regulations and best practices;
- assessment of market and technological developments;
- provision of technical assistance, including capacity building, training and RES-related project development (financial engineering) to countries in eastern Europe and central Asia;
- preparation of comparative studies, dissemination of information.

Note: The proposal of the UNECE secretariat is:

- to promote policy instruments, regulations, market mechanisms and best practices to support the development and use of RES (without focussing on technological issues), in particular in countries in eastern Europe and central Asia (i.e., transition economies not part of the EU);
- to provide assistance to the above-mentioned group of UNECE member States in RES-related project development, including the use of the Kyoto Protocol Mechanisms;
- to disseminate information, with the purpose of raising awareness of renewable energies.

Working methods: Activities should be carried out by a new Intergovernmental Expert Group, a subsidiary body of the UNECE Committee on Sustainable Energy. Bearing in mind the increased political support to and current relevance of renewable energies, the secretariat suggests that this Group be established as a Working Party on Renewable Energies. The Working Party would be serviced by the UNECE secretariat providing support to the Committee on Sustainable Energy and on particular environmentally-related issues, cooperation with and support by the secretariat servicing the Committee on Environmental Policy, within currently existing resources. Activities under technical assistance, if approved by the Committee (such as project development and emissions trading) would be performed together with the Energy Efficiency 21 Project. Cooperation with the UNECE Timber Committee is recommended, as far as biomass is concerned. The involvement of professional organisations, private/public initiatives (PPP), international organisations, and in particular OECD/IEA, EC, UNEP, WHO would be desirable.

ANNEX II

STATISTICAL INFORMATION ON RENEWABLE ENERGIES
- UNECE Region -

Table 1* : Share of TPES from renewables, by country (in %)

Country**	1990	1995	1996	1997	1998	1999	2000	annual rate %
European Union	**4.8**	**5.2**	**5.2**	**5.4**	**5.5**	**5.4**	**5.7**	**1.6**
Austria	21.6	23.6	22.3	22.3	22.3	23.3	22.9	0.6
Belgium	1.3	1.3	1.2	1.2	1.2	1.3	1.2	-3.5
Denmark	8.8	7.8	6.9	7.8	8.3	9.0	10.1	1.4
Finland	19.1	21.0	192	20.4	21.7	21.8	23.5	2.1
France	6.9	7.5	7.1	6.8	6.7	6.9	6.8	-0.2
Germany	1.6	1.9	1.9	2.2	2.4	2.3	2.6	4.9
Greece	5.1	5.6	5.7	5.4	5.0	5.3	5.0	-0.1
Ireland	1.6	2.0	1.6	1.6	2.0	1.8	1.8	1.0
Italy	3.7	4.3	4.6	4.7	4.8	5.1	5.2	3.5
Luxembourg	0.9	1.4	1.1	1.4	1.5	1.3	1.5	6.0
Netherlands	1.2	1.2	1.6	1.9	2.0	1.3	1.4	2.0
Portugal	15.7	13.0	15.9	14.6	13.4	10.9	12.7	-2.1
Spain	6.9	5.4	7.0	6.3	6.1	5.2	5.6	-2.0
Sweden	25.2	26.3	23.9	27.9	28.3	28.0	31.7	2.3
United Kingdom	0.5	0.8	0.8	0.9	0.9	1.0	1.1	7.6
Other western Europe								
Iceland	62.5	64.4	61.8	63.6	66.3	71.7	72.6	1.1
Norway	53.4	49.3	43.7	43.9	44.1	44.9	52.8	-0.1
Switzerland	13.0	15.9	13.6	14.8	14.7	16.7	15.9	2.0
North America	**6.3**	**6.3**	**6.5**	**6.3**	**6.2**	**6.2**	**6.0**	**-0.5**
Canada	16.1	16.7	17.0	16.7	16.3	16.9	16.8	0.4
United States	5.2	5.2	5.3	5.2	5.1	5.0	4.8	-0.9
Central Europe								
Czech Republic	0.3	1.4	1.3	1.5	1.6	1.8	1.4	18.0
Hungary	1.3	1.9	1.4	1.5	1.4	1.5	1.6	22.1
Poland	1.6	3.9	3.6	3.7	4.0	4.0	4.2	10.3
Slovakia	1.5	3.7	3.9	3.3	3.6	3.9	4.0	10.3
Baltic States								
Estonia	1.9	9.2	10.0	11.1	10.1	10.8	10.9	10.4
Latvia	29.4	32.1	28.6	30.5	30.3	29.1	30.9	1.2
Lithuania	1.9	5.6	5.6	6.0	6.4	7.7	8.7	8.3

South-East Europe								
Albania	9.5	27.2	32.3	28.7	28.3	28.9	24.7	2.5
Bulgaria	n.a.	n.a.	n.a.	0.4	0.4	0.4	0.4	0.0
Croatia	9.2	11.3	13.4	10.9	10.4	11.2	11.3	2.1
Romania	-	-	-	4.2	4.8	5.3	4.8	-
Serbia and Montenegro	8.0	15.0	14.4	14.0	15.0	16.9	17.0	_a/
Turkey	17.9	17.1	16.3	15.4	15.4	14.5	12.5	3.5

_a/ no representative, extremely unfavourable hydrological conditions in 1990
_*/ Source: IAE Renewable Information, 2002; and UNECE data collection
_**/Source: Renewables include hydro, geothermal, solar thermal, solar pv, wind, renewable municipal solid waste, solid biomass and gases from it.

Table 2*: Share of electricity production from renewable resources, by country (in %)

Country/region	1990	1995	1996	1997	1998	1999	2000	Annual change
European Union	**13.1**	**14.0**	**13.6**	**14.1**	**14.3**	**14.1**	**14.9**	**1.2**
Austria	66.0	70.5	66.9	67.8	69.6	71.1	72.3	0.9
Belgium	1.1	1.3	1.1	1.1	1.3	1.4	1.2	1.2
Denmark	3.2	5.5	4.2	7.1	10.1	12.0	16.8	18.0
Finland	28.6	30.6	25.6	29.1	34.8	30.5	33.3	1.5
France	13.3	15.4	13.4	13.4	12.9	14.6	13.2	-0.1
Germany	3.7	5.1	5.1	4.5	4.8	5.2	6.3	5.3
Greece	5.1	8.6	10.3	9.1	8.2	9.6	7.8	4.3
Ireland	4.9	4.1	4.0	4.1	5.6	5.2	5.0	0.2
Italy	16.4	17.5	19.4	18.8	18.4	19.9	18.9	1.5
Luxembourg	16.7	29.0	23.2	32.5	47.5	43.0	46.9	10.9
Netherlands	1.5	2.4	3.1	4.1	4.3	2.5	3.1	7.7
Portugal	34.7	28.3	45.9	41.7	36.4	20.3	30.3	-1.4
Spain	17.2	14.9	23.9	19.7	19.3	13.5	16.1	-0.7
Sweden	50.9	47.6	38.5	48.3	49.1	48.1	57.1	1.1
United Kingdom	2.1	2.4	1.7	2.1	2.4	2.7	2.7	2.6
Other western Europe								
Iceland	99.5	99.8	99.9	99.9	99.9	99.9	99.9	0.0
Norway	99.8	99.7	99.5	99.6	99.6	99.6	99.7	0.0
Switzerland	55.2	57.4	52.5	56.3	55.3	59.6	57.2	0.4
North America	**17.5**	**17.8**	**18.8**	**18.8**	**17.0**	**16.3**	**15.1**	**-0.5**
Canada	62.4	61.0	63.1	62.2	60.3	61.0	60.5	-0.3
United States	10.8	11.0	11.8	12.0	10.6	9.7	8.3	-1.1
Central Europe								
Czech Republic	2.3	4.0	3.5	3.4	3.1	3.7	3.1	3.1
Hungary	0.6	0.5	0.6	0.6	0.7	0.8	0.8	2.7
Poland	1.1	1.4	1.5	1.5	1.8	1.7	1.6	4.0
Slovakia	8.0	18.4	20.0	17.6	17.9	17.5	16.6	7.6

Baltic States								
Estonia	0.0	0.03	0.02	0.03	0.06	0.06	0.07	0.1
Latvia	67.7	78.7	65.2	68.1	76.9	67.2	68.3	0.1
Lithuania	1.4	2.7	1.9	2.0	2.4	3.1	3.0	2.2
South-East Europe								
Albania	9.9	96.2	96.4	96.9	98.4	97.9	98.5	1.4
Bulgaria	n.a.	6.0	7.0	6.8	7.9	7.8	7.2	n.a.
Croatia	43.2	59.4	68.6	54.7	50.2	53.9	55.1	2.5
Romania	n.a.	28.2	25.7	30.6	35.3	36.1	28.5	0.0
Serbia and Montenegro	25.8	35.1	40.9	33.9	34.1	39.8	37.5	4.4
Turkey	40.4	41.6	42.9	38.9	38.3	30.0	24.9	-4.7

*/ Source: IEA Renewables Information, 2002; and UNECE data collection

Table 3*: Share of electricity from renewable sources, excluding hydro, by country

Country/region	1990	1995	1996	1997	1998	1999	2000	Annual change
European Union	**1.0**	**1.4**	**1.4**	**1.7**	**2.0**	**2.0**	**2.5**	**9.5**
Austria	2.3	3.3	2.9	3.0	3.0	2.8	2.7	1.9
Belgium	0.7	0.8	0.8	0.7	0.8	1.0	0.7	-0.6
Denmark	3.1	5.4	4.2	7.1	10.0	11.9	16.7	18.4
Finland	8.6	10.4	8.5	11.4	13.3	12.1	12.3	3.7
France	0.5	0.6	0.6	0.7	0.7	0.7	0.7	3.1
Germany	0.6	1.0	1.1	1.3	1.7	1.7	2.5	16.0
Greece	0.0	0.1	0.1	0.1	0.2	0.3	0.8	64.7
Ireland	-	0.1	0.2	0.7	1.2	1.3	1.4	-
Italy	1.6	1.6	1.8	1.9	2.2	2.4	2.5	5.1
Luxemburg	5.4	10.9	9.5	12.1	15.6	19.3	19.2	13.4
Netherlands	1.4	2.3	3.0	4.0	4.1	2.4	3.0	8.1
Portugal	2.5	3.2	3.0	3.3	3.0	3.4	4.2	5.4
Spain	0.4	0.9	1.0	1.4	1.7	2.4	3.3	22.7
Sweden	1.3	1.7	1.7	2.0	1.9	1.9	3.0	8.7
United Kingdom	0.4	0.9	0.8	0.9	1.0	1.2	1.3	11.6
Other western Europe								
Iceland	6.3	5.8	6.8	6.7	10.4	15.8	17.2	10.6
Norway	0.2	0.3	0.3	0.2	0.3	0.3	0.3	2.5
Switzerland	0.7	0.9	1.2	1.1	1.1	1.2	1.4	7.4

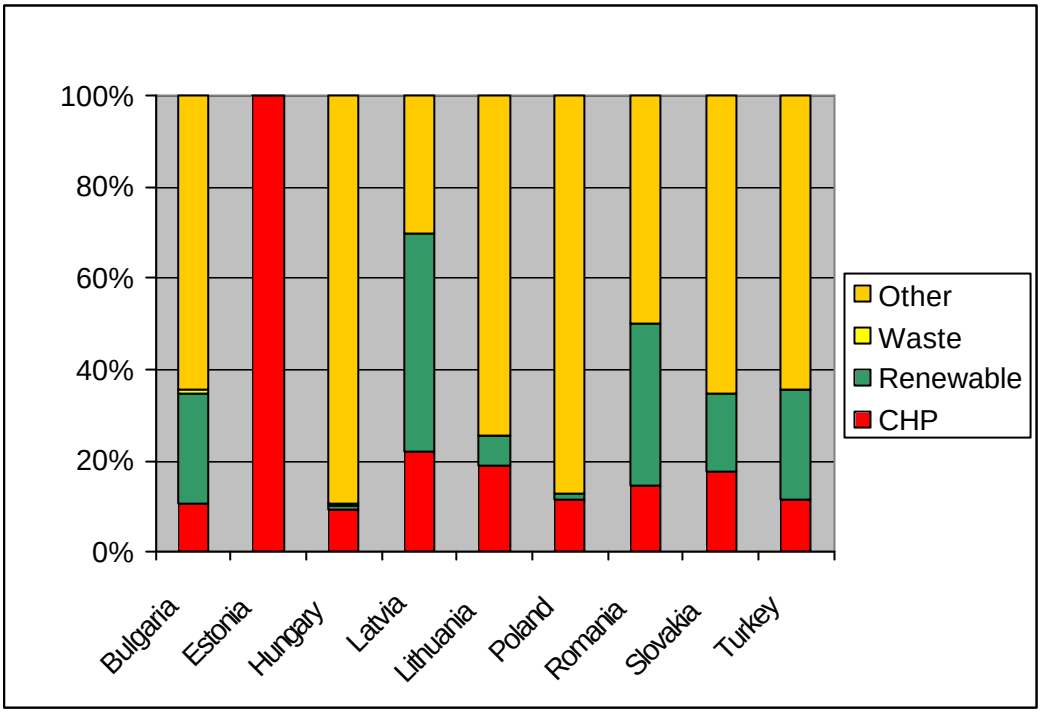
North America	**1.9**	**2.0**	**2.0**	**2.0**	**1.9**	**2.0**	**2.0**	**0.4**
Canada	0.8	1.0	1.0	1.1	1.2	1.3	1.3	4.6
United States	2.1	2.2	2.2	2.1	2.0	2.1	2.1	0.1
Central Europe								
Czech Republic	-	0.7	0.5	0.8	0.9	1.1	0.7	-
Hungary	-	-	-	-	0.3	0.3	0.3	-
Poland	0.0	0.0	0.1	0.1	0.2	0.1	0.2	14.4
Slovakia.	0.0	0.0	0.0	0.0	0.1	0.1	0.2	41.0
Baltic States								
Estonia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Latvia	0.05	0.05	0.05	0.05	0.05	0.1	0.1	5.2
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Europe								
Albania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Croatia	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0
Romania	0.0	0.0	0.0	0.03	0.02	0.04	0.02	0.0
Serbia and Montenegro	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turkey	0.1	0.4	0.3	0.4	0.3	0.2	0.2	4.7

_*/ Source: IEA Renewables Information, 2002; and UNECE data collection from countries

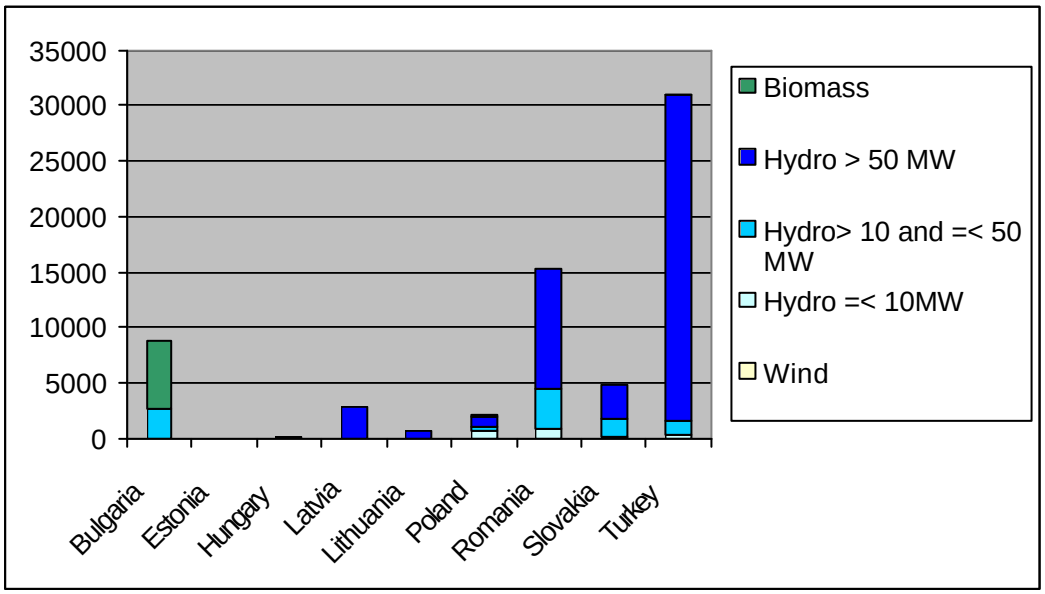
ANNEX III

Statistical data for a number of countries from Central and South-East Europe, provided by the Energy Regulators Regional Association (ERRA), Budapest.

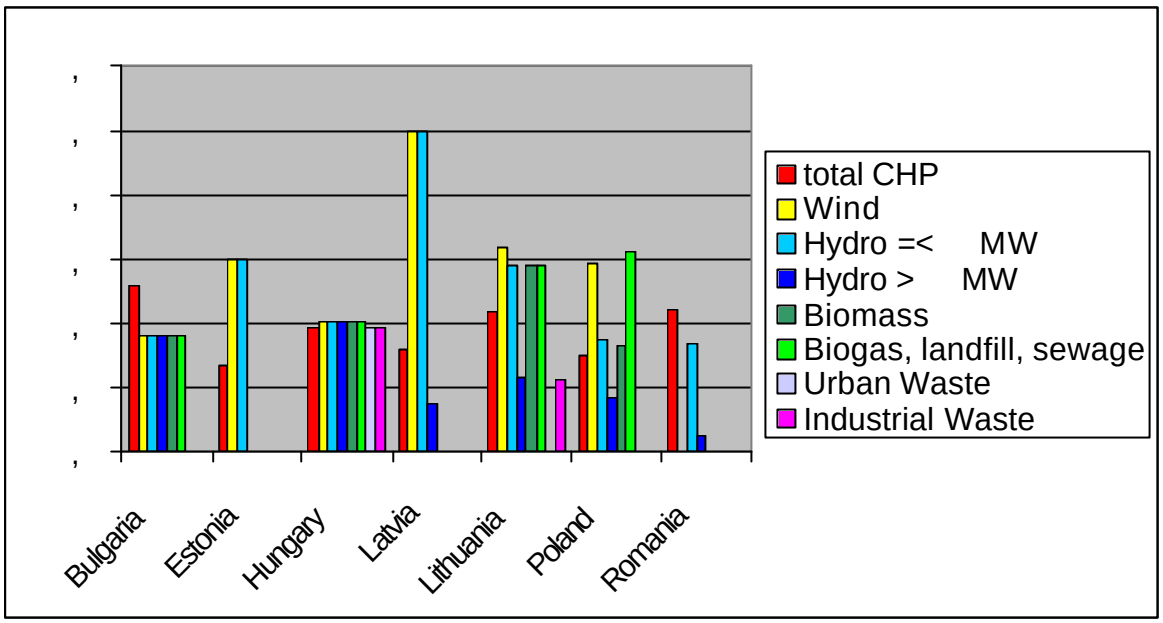
Share of RES-E and CHP in gross domestic electricity consumption (2000)



Renewable electricity by country and technology (GWh, 2000)



Regulated price of RES-E and CHP (EUR/MWh, 2000)



RES-E capacities in ERRA region