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Renewable Electricity and Transatlantic Relations:
Exploring the Issues

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ABSTRACT

The purpose of this paper is to examine the potential consequences of the interaction of two particular trends – namely, increasing transatlantic interdependence and the 'greening' (that is, the increasing use of renewable resources) of electricity supply systems. The paper begins by comparing and contrasting the generation capacity and renewable energy strategies of the members of the European Union and the North American Free Trade Agreement. After highlighting the increasing internationalisation of electricity issues, in a broad and general sense, the focus again returns to the transatlantic relationship. More specifically, it is shown how transatlantic differences in the ways in which renewable electricity is supplied and supported could lead to disputes between the European Union and North America. Given the potential economic impacts of such disputes (in addition to the associated environmental, social and political consequences), multisectoral dialogue is encouraged in order to anticipate such disputes. Small actions now could serve to avoid larger conflicts in the future.

INTRODUCTION [1]

Two trends – neither of which is primarily "environmental" – have, when combined, potentially great consequences for the quality of the global environment. The first is increasing global economic interdependence, particularly between the European Union and North America.[1] The second is the changing structure of electricity supply systems around the world. Before introducing the purpose of this paper – which follows from this intersection of these two trends – I briefly expand with details of these two trends.

During the 1990s, "globalisation" became a commonly used word to describe the ever-closer ties – not least of all, economic ties – among the world's nations and peoples. Indeed, during that decade, global trade increased at a much greater rate than global production as a whole (Quinlan, 2003, 11). Moreover, the value of foreign direct investment, worldwide, also grew dramatically: from US$1.9 trillion in 1991 to US$6.3 trillion in 2001 (Quinlan, 2003, 11). Particularly important in this deepening global economic interdependence is the relationship between North America and the European Union. In 2001, for example, the value of exports from EU countries to NAFTA countries was US$249 billion, while imports amounted to US$204 billion (IMF, 2002). Excluding intra-EU and intra-NAFTA trade, "the EU and NAFTA between them account for 35% of world exports and over 40% of world imports" (DTI, 2002). Indeed, the growth in trade during the 1990s helped these two continents become, according to Quinlan (2003, 2), "economically fused". Growing foreign direct investment (FDI) across the Atlantic Ocean also played its role. Quinlan (2003, 14) argues that the 1990s "was a time when the transatlantic economy became even more intertwined and interdependent through expanding FDI linkage".

The way in which electricity is being supplied, globally, also continues to change. For one, many electricity systems are being "restructured", replacing what were traditionally monopolistic, vertically-integrated (often publicly-owned) businesses with competition among many players, and across many interconnected systems. (For more general information on electricity restructuring, see, for example, Gilbert and Kahn, 1996.) Moreover, for a variety of reasons – technical, economic, political, social and/or environmental – different resources are used to generate electricity. Table 1 provides information about the relative role of different resources in generating electricity, worldwide. While coal continues to be dominant (meeting about 40 per cent of total demand), the relative shares of nuclear and natural gas have risen during the past three decades – the former primarily during the 1970s and 1980s, and the latter primarily during the 1990s. The relative importance of oil has fallen significantly, while that of hydropower has decreased somewhat. Overall, world electricity generation grew from 5.2 PWhr to 15.4 PWhr between 1971 and 2000 – an average annual growth rate of 3.8 per cent (IEA, 2002c).

Table 1 – Worldwide electricity generation, by resource (percentage share), selected years between 1971 and 2000

	1971	1973	1978	1986	1990	1995	2000
Coal	40	38	36	39	38	38	39
Oil	21	25	23	12	11	9	8
Natural Gas	13	12	12	13	14	15	17
Nuclear	2	3	8	16	17	18	17
Hydropower	23	21	21	20	18	19	17
Total Generation (PWhr)	5.2	6.1	7.7	10.0	11.8	13.2	15.4

Source: IEA (2002c).

Many believe that future resource changes – catalysed, in part, by the aforementioned "electricity industry restructuring" and growing environmental concerns – will see greater use of renewable resources. Indeed, such a trend may already be evident. Installed generating capacity of wind power globally, for example, grew – annually – by an average rate of 32 per cent between 1998 and 2002 (AWEA, 2003). In 2002, moreover, 436 MW of solar photovoltaic panels were installed worldwide – an increase of 26 per cent on the previous year (Solarbuzz, 2003). As these technologies develop, some estimate that they could come to play a much more important role in the world's electricity supply profiles during the coming years. One scenario recently developed by Shell International, for example, has "a wide variety of renewable sources … supplying a fifth of electricity in many OECD markets" by 2020 (Shell International, 2001, 36). Moreover, the International Energy Agency has developed an "Alternative Policy Scenario", in which 14 per cent of the world's electricity is supplied by non-hydropower renewables in 2030 (as opposed to 2 per cent at present) (IEA, 2002a). Of course, other scenarios developed by these groups – let alone investigations by other organisations altogether – put the contribution of renewables at much lower levels.

[1] An earlier version of this paper was presented at a Luncheon Seminar of the Robert Schuman Centre for Advanced Studies on 15 May 2003. The author would like to thank the participants there for helpful comments received.

The purpose of this paper is to examine the potential consequences of the interaction of these two trends – namely, increasing transatlantic economic interdependence and the greening of growing electricity supply systems. Put most bluntly, are these two trends on a collision course or not? In other words, could changing patterns of electricity supply in these two continents (particularly their relative "greening") give rise to economic conflicts (and consequential economic, social and environmental costs) between North America and the European Union?

Although this issue – renewable electricity and transatlantic relations – is not currently high on the international agenda, it is important to explore the issue, in order to anticipate what could be a significant challenge during years to come. By giving due "early warning" (European Commission, nd; Aaron, 2000; Cowles, 2001, 227-28; Brittan, 2000, 18) in this way, perhaps the possible costs of transatlantic conflict on renewable electricity could be minimised or avoided altogether and the potential benefits of transatlantic cooperation maximised. Let me elaborate on each of these.

The issue of renewable electricity could be yet another irritant in transatlantic relations. Like other such irritants – for example, the presence of hormones in beef, the use of genetically-modified organisms or the deployment of leg-hold traps (see, for example, Princen, 2002) – this single issue forms, even potentially, a relatively small part of the transatlantic economic picture. Nevertheless, like these others (particularly when added to them), economic conflict on the issue of renewable electricity could lead to retaliatory counter-measures and thus affect broader economic relations between the two continents – indeed, among all countries of the world (compare with Sutherland, 2001, 1).

Additionally, a deterioration in economic relations between the European Union and North America (exacerbated by the issue of renewable electricity) could undermine much-needed bilateral cooperation on a range of non-economic issues. Though somewhat cliched, it is certainly the case that the world requires effective multilateral action on a range of issues now – the Middle East, global climate change, development assistance and so on. A strained transatlantic relationship can only hinder the prospects of such action.

Benefits could also result from greater transatlantic cooperation on the issue of renewable electricity. Were this issue to be handled effectively, it might prove to be a model for other potential conflicts between North America and the European Union. It is important to recognise that the issue of renewable electricity is yet one more example of a new kind of economic issue requiring transatlantic diplomacy. Egan (2001, 179) describes this broader set of issues: "As barriers to trade are increasingly the result of national standards and

regulations, these domestic policies, once treated as a sovereign preserve, are now subject to intense scrutiny, since disparities in governance can hinder market access and restrict competition." Holmes and Young (2001, 203) agree, highlighting the potential significance of such "beyond-the-border issues".[2] Brittan (2000, 17) also echoes these views, arguing that future difficulties are likely "to arise from the more intangible, complex, and politically sensitive issues such as genetic modification, food safety, data privacy, and consumer and environmental protection". Thus, success in one area (i.e., renewable electricity) may be able to be replicated elsewhere.

But perhaps most importantly, the environmental – and sustainability – impacts of the world's present generation and use of electricity are significant, with the challenges associated with air pollution and the disposal of radioactive waste being but two of the better-known examples. Hence, a better understanding of how these countries (which together accounted for 47.3 per cent of the world's electricity generation in 2001 (BP, 2002)) are working, individually and collectively, to improve the sustainability of their respective electricity systems is critical.

The paper proceeds in five parts. After this introduction, the context is set by briefly reviewing the "greening" of North American and European Union electricity supply systems. For each, the emphasis is on two distinct areas: one, the respective definitions of "renewable" used in each jurisdiction, and two, the "support mechanisms" – that is, the policy means introduced to promote renewable electricity – used in each jurisdiction. In the third section, I highlight the increasing internationalisation of electricity supply, showing how that, in spite of the fact that it has traditionally been thought to be a "regional commodity", technologies and markets are serving to give electricity more and more international, and potentially global, dimensions.

That increasing internationalisation leads me to speculate about – and indeed, to sketch out – conceivable economic disputes between North America and the European Union associated with the greening of electricity supply systems. This I do in the fourth section. Given the significant impact that such disputes could have, the fifth section presents a proposal to anticipate any such conflicts. Drawing upon experiences from other transatlantic economic issues and suggestions from various sources, I encourage multisectoral dialogue to anticipate this issue. Finally, the sixth section offers a summary of the argument and presents the main conclusions.

SETTING THE CONTEXT: THE GREENING OF NORTH AMERICAN AND EUROPEAN UNION ELECTRICITY SUPPLY SYSTEMS

In this section, I explore the greening of the electricity supply systems in North America and the European Union. While space restrictions do not permit an exhaustive examination, I focus upon the respective definitions of "renewable" used in each jurisdiction, as well as the main "support schemes" introduced.

North America

Electricity in North America is provided by a number of distinct systems, with relatively limited interconnections (North American Energy Working Group, 2002). Thus, while here I present some information about "electricity in North America", the reader should be aware that different systems can have distinct characteristics. Electricity generation in the mid-western section of the United States, for example, is dominated by coal-fired power stations, while in some Canadian provinces (like Quebec and Manitoba), hydropower is the source for the vast majority of electricity. Notwithstanding these reservations, Table 2 presents some information about the three countries' respective electricity generation systems, as well as a continental average. In this, that which is often called "renewable electricity" can be found in the last two columns. Separating out "large-scale" hydropower, which accounts for most "renewable electricity" in the world today, the share of "alternative" renewable electricity in the continent's total electricity supply is about 2.5 per cent.[3] The main contributors are biomass, geothermal and small-scale hydro (after IEA, 2002b and IASH, 2003a). Although various subnational commitments exist to increase the share of renewables in overall electricity supply, none of the three countries has adopted a national target.

Table 2 – Electricity generation profiles for Canada, Mexico, the United States and North America as a whole (by resource), 1999

	Electricity generation, TWhr	Coal (per cent share)	Oil (per cent share)	Natural Gas (per cent share)	Nuclear (per cent share)	Hydro (per cent share)	Others (per cent share)
Canada	577	19	3	5	13	60	1
Mexico	194	10	68		5	14	3
United States	3910	52	3	16	20	7	2
North America	**4681**	**47**	**5**	**14**	**18**	**14**	**2**

Sources: for Canada and the United States, IEA (2001); for Mexico, CIA (2002), CEC (2001, 2); for North America, CEC (2002, 14).

Within North America at present, there exists no single definition of "green electricity".[4] Instead, local groups and state/provincial-level governments have taken the lead in developing visions for their own use. The result is a relative patchwork quilt of definitions across the continent (Rowlands, 2002). Nonetheless, there is some evidence that agreement surrounding "what is green" is growing in North America. Both Canada and the United States have "green power" labelling schemes that have attracted considerable support within each country (see Patterson and Rowlands, 2002). Moreover, the US Senate has passed a bill for a "Renewable Portfolio Standard", and the US Congress is presently considering the same. In each, there exists a definition of what would qualify as renewable. Although differences exist even among these, some tentative trends can be identified.

When compared to what is classified as "renewable" in, for example, the definition used by the International Energy Agency (IEA) in its statistical work (IEA, 2002b, 8), "green" is defined more restrictedly in North America in two key ways. First, with respect to hydropower, while the IEA classifies all hydropower resources as "renewable", the two most significant "green power" certification schemes in North America – namely, "Green-e" in the United States and "EcoLogo" in Canada – include only "small-scale hydropower". What, in turn, is "small-scale" is determined not by the rated capacity of the installed turbines, but instead by the environmental and social impacts of the station's operation (Patterson and Rowlands, 2002). And second, with respect to biomass, North America is also more restrictive. Not only is "renewable

municipal solid waste" usually not included (as it is in the case of the IEA), but biomass generators must also adhere to strict emission limits (Patterson and Rowlands, 2002) – something that is missing in the IEA definition.

Turning to support schemes – that is, strategies to support renewable electricity – there is equally no singular approach used throughout North America. Instead, two means of increasing the share of renewable electricity in communities' electricity supply systems seem to be particularly popular. One is the "renewable portfolio standard", which is a requirement "that a certain percentage of a utility's overall or new generating capacity or energy sales must be derived from renewable resources" (DSIRE, 2003). The other is "systems benefits charge" (or "public benefit funds"), which consists of "a charge to all customers on electricity consumption, e.g., 0.2 cents/kWh, [which is then used for] funding for renewable energy [research and development]; and development of renewable energy education programs" (DSIRE, 2003). These two mechanisms are identified by many (for example, UCS, 2002) as the support schemes used most often at the US-state level (and thus, by extension, used most often in North America as a whole[5]).

European Union

Moving across the Atlantic Ocean, I first present information about the European Union's 15 member-states' electricity supply, as well as information about the Union as a whole. As noted in the presentation of North American data, however, the reader should recognise that there are a number of distinct electricity systems in Europe. Nevertheless, from Table 3, it is evident that there are variations in electricity generation profiles across the European Union. Indeed, four different resources provide over half of the electricity generated in at least one member state: coal in Denmark, Germany and Greece; natural gas in Luxembourg and the Netherlands; nuclear power in Belgium and France; and hydropower in Austria. And, again, when large-scale hydro is removed from consideration of "renewable", the total share of the Union's electricity generation that is derived from "alternative" renewable resources is about 3 per cent. Small-scale hydropower, biomass and wind are the largest contributors (Haas, 2001, 8). By means of their 2001 Directive on renewable electricity, European Union countries have indicated their commitment to try to ensure that 22 per cent of their collective electricity needs are met by renewable electricity by the year 2010 (European Commission, 2001; for a further discussion, see Rowlands, 2003).

Table 3 – Electricity generation profiles for the European Union's 15 member states, as well as for the EU as a whole (by resource), 1999

	Electricity generation, TWhr	Coal (per cent share)	Oil (per cent share)	Natural Gas (per cent share)	Nuclear (per cent share)	Hydro (per cent share)	Others (per cent share)
Austria	59	9	5	15	0	68	3
Belgium	83	15	1	23	59	0	1
Denmark	39	52	13	24	0	0	12
Finland	69	14	1	14	33	18	20
France	520	6	2	1	76	14	1
Germany	551	52	1	10	31	4	3
Greece	49	66	17	8	0	9	1
Ireland	22	27	28	32	0	4	9
Italy	259	11	35	34	0	18	3
Luxembourg	0.4	0	0	57	0	24	19
Netherlands	87	26	8	57	4	0	6
Portugal	43	35	26	19	0	17	3
Spain	206	37	12	9	29	11	3
Sweden	155	2	2	0	47	46	2
United Kingdom	364	29	2	39	27	2	2
EU TOTAL	**2508**	**26**	**7**	**17**	**35**	**12**	**3**

Source: IEA (2001).

Europe is relatively more advanced than North America, in its efforts to develop a single definition of renewable electricity. Although there remains much debate within the Union (Rowlands, 2003), the 2001 Directive on Renewable Electricity defined "renewable energy sources" as "wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases" (European Commission, 2001). This definition largely mirrors the aforementioned IEA definition (IEA, 2002b, 8). It is, however, important to note that biomass is more broadly defined in the European Directive: not only is the "biodegradable fraction" of municipal waste included (as it is in the IEA definition), but so too is the "biodegradable fraction" of industrial waste defined as renewable; this is not the case with the IEA definition.

There is more ambiguity in the Directive with respect to support schemes. While so-called "tendering schemes" had their place in the past (the United Kingdom and France, for example),[6] the two most popular means of promoting renewable electricity now seem to be "feed-in tariffs" and "tradeable certificates". The former (also called "fixed price schemes") consists of an obligation for utilities to purchase, at a set price, the electricity generated by any renewable energy resources. Often, the price is a function of the particular technology used to generate the electricity (lower prices for more "cost-competitive" resources). There is no limit as to the quantity of electricity that can qualify for such a payment. The latter, meanwhile, is virtually identical to the aforementioned "renewable portfolio standard". In a "tradeable certificates" model, all utilities are under an obligation to ensure that a certain percentage of the electricity they generate is from renewable resources. They can either generate that electricity themselves or purchase "green certificates" from those who have used renewables to generate electricity.

THE INTERNATIONALISATION OF ELECTRICITY SUPPLY

Electricity is often thought to be a commodity characterised by a – at most – continental-level market. This is because relatively large losses occur when electricity is transmitted over long distances. This therefore discourages long-distance trade in electricity; hence, grids have traditionally been "local", which thus further helps to ensure that the "good" (that is, electricity) is not traded directly. (Moreover, as mentioned in the first section of this paper, electric utilities were often monopolies and nationally-owned, which could thus further serve to discourage any "internationalisation".) It is increasingly being recognised, however, that electricity can still have international dimensions. Here, I present five ways in which the internationalisation of electricity supply is growing, and could continue to grow.

First, investment decisions in electricity are often international. Recognise, of course, that electricity is a big business. The electricity industry "today on a global scale … consumes for its expansion approximately one-fourth of all development capital" (Lovins et al, 2002, 2). With traditional electricity monopolies being dissolved, there are numerous instances in which businesses from one country are investing in the electricity system in another country. For example, "roughly one-third of the generating capacity in [England and Wales] is now owned by non-UK entities" (Mizuho International plc, 2002, 1). Indeed, Electricité de France – one of the world's largest businesses of any kind (let alone an electricity business) – claims that it has customers in 24 countries throughout the world (EdF, 2002).[7]

Second, it is conceivable that the kind of electricity used to "make" products could be used in the marketing of those same products. Note that there is electricity "embedded in" a product – a product that could then be traded internationally. Given this, the source of the electricity that was used to make a particular good could become an international issue. Indeed, under the terms of Australia's green power labelling system, products that are "made with" renewable electricity can quality for a "green power label" (SEDA, nd).

Third, the promising prospects for hydrogen fuel cells in power generation suggest that it might soon be economically-practical to effectively "store" electricity and to move it over long distances. In a so-called fuel cell, hydrogen is fed to one electrode, and oxygen to the other. The results are electricity, heat and water. Given that not only is a highly-desirable fuel (electricity) produced, but also that no harmful emissions result, fuel cells are attracting considerable attention. One challenge, however, concerns how to create the hydrogen in the first place (a process which can require a large input of energy). In any case, a "hydrogen economy" would raise additional international questions.

Fourth, the environmental impacts of electricity supply and use can be international, or even global. Concerns about acid precipitation in the 1980s were, in large part, generated by the use of fossil-fuels in power stations. The cross-border transport of smog precursors is but another example of international issues arising from electricity generation (VanNijnatten and Lambright, 2001). Finally, it is estimated that approximately 42 per cent of the world's industrial-related carbon dioxide emissions come from electricity generation (Pew Center for Global Climate Change, nd). Thus, the link to global climate change – perhaps the world's foremost environmental challenge – is evident.

And fifth, some electricity businesses are working together as a transnational force. The "E7", for example, is a collection of eight of the world's largest electric utilities. It tries to lobby decision-makers on issues of consequence to its member companies (E7, nd). Equally, there are transnational coalitions of alternative electricity producers, like the European Business Council for a Sustainable Energy Future. This group brings together an eclectic mix of renewable energy, energy-efficiency and other self-proclaimed "responsible businesses, who have realised the necessity of long term and efficient usage of our natural resources, particularly energy, in order to obtain a competitive economy" (E5, nd). Thus, not only are individual business's activities and consequences transnational, but so too are the more "political" linkages among businesses within the electricity sector.

ENVISAGING TRANSATLANTIC ECONOMIC DISPUTES

In this section, I reflect upon the previous two sections, and see how they could "come together" and result in economic disputes. At this point, I am being speculative (for there has not been, to date, a dispute between the European Union and North America regarding renewable electricity), but I develop what I perceive to be distinct possibilities. More specifically, I elaborate two sets of examples.

Differences in Defining "Renewable Electricity"

First, disputes could arise as a result of differences in the definition of "renewable electricity" (or "green power"). Electricity is not usually distinctly identified because of the characteristics of the "good" itself (that is, the electrons). Rather, particular kinds of electricity are demanded because of the manner in which these same electrons were "created". In the case under investigation in this paper, more specifically, "renewable electricity" comes from power plants that are deemed (by whomever) to use "renewable resources". As such, what makes the good different is not its physical attributes, but instead its "non-product-related processes and production methods".

To give substance to my claim that differences in the definition of renewable electricity could lead to transatlantic economic disputes, let me lay out a specific example. First, imagine that a company in jurisdiction A – on one side of the Atlantic – is producing electricity from large-scale hydropower facilities. These facilities are deemed "green" or "renewable" under the terms of that jurisdiction's renewable electricity strategy. The company uses the electricity to produce hydrogen, which it then ships across the Atlantic, to a subsidiary in jurisdiction B. There, the hydrogen is recombined with oxygen to generate electricity. With no harmful emissions of any kind, the subsidiary wants to market the electricity as "green". Others, however, argue that because the electron's entire "life-cycle" includes large-scale hydropower – something that does not qualify as "green" or "renewable" under jurisdiction B's renewable electricity strategy – the electricity should not be able to compete in any protected "green power" or "renewable electricity" market in jurisdiction B.

If policy-makers in jurisdiction B agreed, and excluded those electrons from part of the domestic market, then we could envisage policy-makers in jurisdiction A launching a trade challenge at the World Trade Organisation. They may well argue that the respective "products" – that is, "their" electrons generated by the oxidisation of hydrogen and the "other" electrons generated by what are deemed to be "green" or "renewable" processes in jurisdiction B – are alike. They might further support their claim by saying that there is nothing in

the entire lifecycle that justifies any restriction upon their importation. In other words, they are just as "environmentally-friendly" as those various resources that qualify as part of jurisdiction B's renewable electricity strategy. They would thus maintain that policy-makers in jurisdiction B could not use GATT's Article XX (b) and (g) exceptions to justify the trade restriction.[8]

For their part, policy-makers in jurisdiction B may counter that recent WTO Appelate Panel rulings – particularly the famous "shrimp-turtle case" – give support to their claim that "a measure in which products are distinguished based on non-product-related processes and production methods ('NPR-PPMs') could satisfy the requirements of Article XX (g)" (Appleton, 1999, 492). In that case, the WTO's Appelate Body "was called upon to assess the legality (under WTO law) of the import prohibition imposed by the United States on certain shrimp and shrimp products from India, Malaysia, Pakistan and Thailand. The prohibition had been adopted on the grounds that the shrimp were being harvested in a manner which caused harm to endangered sea turtles" (Sands, 2000, 296). Even though the turtles were not in the United States's jurisdiction, the US trade restrictions were deemed potentially acceptable, for they were working to preserve an "exhaustible resource". (The WTO Appelate Body, however, had problems with the United States's lack of efforts at multilateral agreements with the other Parties, and that alternative regulatory regimes to protect sea turtles were not given sufficient consideration by the United States.) Nevertheless, many observers called the Appelate Body's ruling extremely progressive, for it opened the door to the possibility of trade restrictions on the basis of NPR-PPMs. If we consider the global climate an "exhaustible resource", conceivably restrictions upon large-scale hydropower (with its potential global climate change consequences[9]) could survive trade challenges on the basis of Article XX (g). Of course, countries home to large-scale hydropower – like the government in jurisdiction A – may well take different positions.

At this point, of course, it remains entirely academic, for there is "no GATT/WTO case law on trade in electricity" (Horlick et al, 2002, 8). And it is not my purpose here to resolve this issue. Instead, the point is to show how trade disputes could arise from disparate definitions of renewable electricity. Indeed, a host of such transatlantic conflicts are certainly conceivable.[10]

Instead of using hydrogen as the "electricity carrier", a long-distance cable could be laid. This would be more likely were the price of electricity on one side of the Atlantic to increase to such an extent that low-cost electricity production on the other side made long-distance transmission economically feasible. Alternatively, it may be that the goods are the subject of the trade debate – aluminum beer cans smelted with cheap electricity from large-scale

hydropower dams, for example, that carry a "green power" label are transferred from one jurisdiction (where large-scale hydropower is "green") to another (where it is not). Finally, in addition to trade disputes, one could also envisage investment conflicts. Perhaps a subsidiary of a company from jurisdiction A established a landfill gas facility in jurisdiction B, in order to reap benefits from its renewable electricity strategy (which deemed landfill gas as "green"). Policy-makers in jurisdiction B then decided to "tighten" the definition, calling only solar and wind "green". One could certainly conceive of policy-makers in jurisdiction A taking issue with their transatlantic counterparts on this issue.[11]

As noted above, in the second section of this paper, there appear to be differences in definition for renewable electricity, transatlantically. Perhaps most significantly, there are more nuanced and often tighter restrictions upon biomass and hydropower in North America (as compared to the European Union). Qualification of biomass in North America focuses upon quantitative emission limits and restrictions upon the use of hydropower in North America take a wider range of factors into consideration. Indeed, I can now identify resources that would be classified as "renewable" in the European Union, but not in most of North America (for example, electricity from waste incineration and large-scale hydropower). Thus, disputes of the kind laid out above are already foreseeable.[12]

Moreover, two factors lead me to suggest that transatlantic differences in the way in which "renewable" is defined may grow in the future. First, if the definition of "renewable" follows broader risk management and regulatory trends on each continent, then methodologies for determining what is "green" might continue to diverge. Let me elaborate.

In the context of recent transatlantic disputes, particularly on food safety issues, there has been much analysis of the continents' respective regulatory methods. Many have concluded that while the United States tends to base its risk assessments on "scientific factors", Europe has been more apt to use the "precautionary principle" and to include "social factors" in its deliberations (compare with, for example, Kramer, 2002, 16-17; Young, 2001, 14, adapted from McGarity and Hansen, 2001; Pollack and Shaffer, 2001; though, for a dissenting view, see Weiner and Rogers, 2002). Vogel (2001, 29), for example, argues that the "spread of the precautionary principle within Europe … serves to both promote and legitimate the politicization of regulatory decision-making, privileging the responsiveness of policymakers to public opinion". Hennis (2002, 26), moreover, highlights explicitly the fact that, in Europe, many regulatory decisions are taken by politically-accountable bodies, while, in the United States, "decisions are basically 'science-driven' and socio-political considerations are supposed to have no standing". De Jonquières (2001, 39),

meanwhile, maintains: "Championed in Europe as a safety-first measure, the [precautionary principle] is viewed by many US policy makers as a figleaf for lack of regulatory rigour and protectionism."

Such differences in the way in which risk management challenges are approached could certainly lead to differences in ideas about how to judge what is renewable or green electricity (or, put more broadly, what is the "safest" electricity). Indeed, on at least one side of the Atlantic, there is some evidence that the regulatory route is following this well-worn path. More specifically, in North America, "objective"/"scientific" methods of analysing the "greenness" of electricity resources are increasing in popularity. For example, Scientific Certification Systems – a self-proclaimed independent and credible third-party certifier – is developing a system for certifying "environmentally preferable electricity" based upon life-cycle assessment (itself being "objectively-developed" by the International Organisation for Standardisation), which is attracting considerable attention (SCS, 2003). Similarly, the Power Scorecard, established by a range of US organisations, has developed quantifiable indicators of different electricity technologies' resource impacts (Power Scorecard, 2002). This kind of approach could conflict with a European one that may be based upon "public feelings", in which case even the "greenest" of resources could find it hard to gain input (e.g., the experience of wind energy, to date, in the United Kingdom (see, for example, Toke, 2002)), while other, "browner", ones could make progress.[13]

Another factor that could serve to ensure that respective definitions of "renewable", across the Atlantic, diverge instead of converge, relates to economic interests. There are those who argue that the competitiveness of export industries plays a key part in regulatory decisions (for related explorations, see Vogel, 2001, 13-16). The hypothesis is that countries support regulatory approaches, at the international level, that will best assist their national industries and thus improve their economic position. The conclusions that Pollack and Shaffer (2001, 155) reach with respect to food safety are relevant here: "As with other areas of regulation, the potential for international disputes arises not because of the existence of food safety regulations, but rather because of the impact of differences in these regulations across jurisdictions on each other's producers and consumers."[14] Implicit in this statement is that the competitiveness consequences matter. (For related work, see Golub (1998).)

If this holds true, then we could well expect North America to have an interest in a "looser" (or "wider") definition of green electricity and the European Union to have an interest in a "tighter" (or "narrower") definition of green electricity. Let me elaborate with specific comparisons across resources.[15]

North America appears to have a competitive advantage in those resources that have sometimes been called the "browner greens" – that is, those resources that are perhaps "on the boundary" between "renewable" (or at least, "environmentally-preferable") and not. With respect to large-scale hydropower, for example, North America is not only home to the two countries with the greatest hydropower capacity in the world (Canada ranks first and the United States second), but it also has more hydropower potential than the countries of the European Union. NAFTA countries generated 573.3 TWhr of electricity from hydropower in 2001, while for EU countries, the corresponding figure was 373.2 TWhr (BP, 2002). All else being equal, greater experience at developing large-scale hydropower suggests a competitively-superior position. Moreover, while accompanying the debate in Europe is often mention of the fact that there remain few sites suitable for the further development of large-scale hydropower (e.g., European Commission, 1997, 11), North America has many locations that are currently unexploited (Moomaw and Moreira, 2001, 242-43).

Biomass resources are the others that are most often considered to be "on the boundary". Here, too, North America seems to presently have an advantage over Europe. In 1999, capacity stood at 16 GW, with generation of 76 TWhr in Canada, Mexico and the United States. This was almost twice as much as the European Union's corresponding figures (8 GW and 46 TWhr, respectively) (IEA, 2002a). Indeed, the International Energy Agency has recognised the United States's lead among OECD countries in this regard, noting that 50 per cent of the Organisation's electricity from solid biomass is generated there (IEA, 2002a, 4).

By contrast, the European Union's advantage appears to be in those resources that are "greener" – that is, those that are usually considered to be, unequivocally, either "renewable" or "environmentally-friendly". First, in terms of smallscale hydropower, Western Europe not only has more capacity (9,740 MW versus 4,400 MW in North America) and more production (40,000 GWhr versus 18,000 GWhr for North America, both in 1995), but also more potential (an additional 10,000 GWhr in Europe by 2010, while only an additional 7,000 GWhr in North America) (IASH, 2003a and IASH, 2003b).[16]

Even more significant is the European Union's advantage in terms of windpower. Almost three-quarters of the world's windpower capacity is presently in Europe (only 16 per cent in North America) (AWEA, 2003), and "90 percent of the world's wind turbine manufacturers are based in Europe" (Asmus, 2002). Countries of the European Union are clearly the world's leaders in windpower.

Given these differences in competitive position, I can envisage ways in which each continent could promote a particular definition of "renewable electricity" in order to support those industries in which it perceives itself having a competitive advantage. This could ensure that not only is that continent's own domestic market for renewables "reserved" for its own companies, but it may be able to penetrate the other continent's renewable electricity market more readily. This would, of course, bring national economic advantages. Moreover, given the way in which the industries appear to be arranged, transatlantically, North America might be expected to want a "broad" definition of renewable (so as to capture all kinds of hydropower and biomass), while the European Union might want a "narrow" definition, so as to prevent hydropower and biomass from penetrating the European market and reserving more of it (and North America's, as well) for small-scale hydropower and windpower.[17]

Clearly, the stakes are high. This makes economic disputes all the more likely. Given that many foresee wind and biomass as meeting most of the short- and medium-term demand for renewable electricity,[18] it will make a huge economic difference as to whether only one or both of these resources could meet this demand. Let me illustrate with a numerical example.

Imagine that a relatively narrow definition of renewables is used. Imagine, moreover, that it is desired to have 30 per cent of North America's electricity supply to be met by renewables by the year 2030. Also consider that two-thirds of this will be met by windpower (which would mean 20 per cent of total electricity supply, a figure that is often cited as one that is reasonable and achievable (for example, CANWEA (nd)). Citing the figure from Table 2 of 4,681 TWhr of electricity production in North America,[19] I suggest that this would translate into a wind turbine "fleet" of 1,780,000 MW (assuming 30 per cent capacity[20]). This compares with the present installed capacity in North America of 4,923 MW (AWEA, 2003). Given an estimated capital cost of US$1,000 per installed kW of capacity (following AWEA (2000), Danish Wind Energy Association (2002), National Wind Coordinating Committee (1997) and AWEA (2002b)), in terms of present value, this represents expenditures of approximately US$1,780 billion. Given the 30 year time period, the annual level of "capital" economic activity (construction of wind turbines, primarily) would be US$59.3 billion. If three-quarters of this were provided by European manufacturers,[21] then these companies would generate economic activity totalling almost US $45 billion annually.

If, by contrast, a broader definition of "renewables" were used, windpower's dominance would be eroded by biomass. As a consequence, a much greater share of the multibillion dollar annual demand for renewable electricity technologies would be met by North American companies. (Indeed,

these same North American companies would also meet some of the European demand.) The point is simply that the transatlantic flow of billions of dollars' worth of revenues and profits can be increased, stopped or reversed altogether with a simple change in the definition of "renewable electricity". As a result, it could lead to transatlantic disputes.

Differences in Support Schemes for Renewable Electricity

My second set of examples regarding transatlantic economic disputes follows from the different ways in which renewable electricity is supported in each continent. Because of the widely-perceived positive impacts of increased use of renewable electricity (for example, environmental benefits in the form of better air quality and economic advantages in the form of local employment), this oft-described "public good" has usually been supported by governments, at least nominally. Procurement programs and education campaigns are but two kinds of support for renewable electricity that have been provided by policy-makers around the world. Here, I focus upon the ways in which differences in how public money has been used to support renewable electricity could lead to transatlantic disputes.

To give substance to this claim, I lay out a specific example. Recall the example from the previous section of this paper – in which large-scale hydropower in jurisdiction A was used to produce hydrogen, which was then shipped and sold in electricity markets in jurisdiction B. Take the same example, but add one additional detail – namely, that the large-scale hydropower in jurisdiction A has secured public money in order to promote its development. More specifically, the large-scale hydropower facility (and, indeed, all renewable electricity facilities in jurisdiction A) received financial incentives in the form of "guaranteed prices" – in other words, if a renewable resource had been used to generate electricity, then the government agreed to purchase it at a particular price. It is with this "history" that the hydrogen produced with the help of the large-scale hydropower is then shipped to jurisdiction B.

In addition to the complaints potentially voiced by renewable electricity entrepreneurs in jurisdiction B concerning the relative "greenness" or "renewability" of large-scale hydropower (see the discussion above), these same entrepreneurs might also be concerned by the government support that the hydrogen has received. After all, they have not operated in an environment of such government support. This could lead them to maintain that their overseas competitors – now moving in on their domestic market – have received unfair advantages. They could well pressure their government to launch a challenge – multilaterally, bilaterally or unilaterally – claiming unfair subsidies. A transatlantic economic dispute could thus result.

Within the international economic system today, the issue of subsidies is, of course, often quite contentious. It is certainly conceivable that the two governments – those of jurisdictions A and B – could have differences of opinion with respect to whether the guaranteed prices paid to renewable electricity entrepreneurs in jurisdiction A were legal under the terms of international economic law. Again, while it is impossible to anticipate how a dispute would be resolved, the point is primarily to flag that the prospects for an economic conflict exist.[22]

Moving from the hypothetical to the actual, I note that – as already outlined previously in this paper – that differences already exist with respect to the ways in which renewable electricity has been supported, on either side of the Atlantic Ocean. To recap, the predominant method of support in North America has been by means of a "renewable portfolio standard" and a "system benefits charge". By contrast, in the European Union, there has been relatively more activity in "feed-in tariffs". Consequently, my hypothetical conflict above could arise, with "jurisdiction A" being the European Union and "jurisdiction B" being North America. Let me elaborate with more details.

Feed-in tariffs in a number of European Union countries have provided significant resources to renewable energy producers. Germany's and Denmark's are perhaps the best-known. Germany's original law was introduced in 1991 and subsequently revised in 2000. It obliged the grid companies to purchase renewable electricity from eligible resources and to pay those producers an annually fixed feed-in tariff. Denmark's was similar, with even more direct government involvement. Spain also has a relatively long-standing and significant interest in feed-in tariffs, and France has more recently introduced such a system. (For reviews of the support for renewables at the national level in Europe, see, for example, Haas (2001) and Meyer (2003).)

My focus on Europe's "feed-in tariff" support for its renewable electricity producers, however, should not lead to the conclusion that there has not been similar kinds of support in North America – in addition, that is, to the introduction of new renewable portfolio standards. There certainly has. The United States, for example, has a wind energy tax credit in place (AWEA, 2002a) and Canada has a wind power production incentive (Government of Canada 2003b).[23] However, both the kind of support and the level of support have been different, transatlantically.

With regard to kind, the support in North America has usually been a "premium", rather than a fixed price (as is often, though not always, the case in Europe). As a consequence, North American renewable electricity entrepreneurs have still been dependent upon the market price for electricity as a whole. In

other words, their revenue stream was primarily a function of the market price of electricity, which, in restructured markets, may vary minute-by-minute. Many Europeans, by contrast, knew, in advance, what price they would be paid for every unit of electricity they generated – today, and up to 20 years into the future. Although new variations of the feed-in tariffs in Europe are often characterised by "sliding scales", with guaranteed prices falling over time (in response to, for example, technological developments), they are still a different "kind" of support than that which North Americans receive. Moreover, the feed-in rates in Europe are much higher than the tax credits in North America. Wind power in Germany, for example, receives between 6.2 and 9.1 Eurocents per kWhr (Sijm, 2002, 10). With the avoided costs of electricity (that is, the savings associated with not having to produce extra units of electricity) claimed to be only about 2 Eurocents per kWhr (quoted in Sijm, 2002, 8), this is a substantial premium. By contrast, the production tax credit in the United States is 1.5 cents per kWhr (AWEA, 2002a) and the incentive in Canada starts at 1.2 Canadian cents per kWhr, falling to 0.8 cents (Government of Canada, 2003b).

Moving from the "per kWhr"-level, to the system level, these subsidies add up. In Denmark, for example, concerns about the increasing amount being paid to support feed-in tariffs led to that country's re-examination of the system. In Germany, meanwhile, the policy "requires very high cross-subsidies, estimated at around 200 million euros in Germany in 2000" (Menanteau et al, 2003, 807). Moreover, critics maintain that the levels could sore in the future. One estimate for Germany's support of wind power puts the figure at up to Euro 8.2 billion over the next 20 years (Goethe-Institute Inter Nationes, nd). These quantities are probably more than enough to raise concerns among North American policy-makers.

Moreover, recent events suggest that transatlantic differences in the way in which renewable electricity is supported may continue to grow during the coming years. In the European Union, what some had thought would be a smooth Commission-led transition to a harmonised system of tradable green certificates met considerable barriers during the development of the 2001 Directive on Renewable Electricity (Rowlands, 2003). Indeed, if anything, feed-in tariffs seemed to gain in political stature during the development of the Directive, with more countries deciding to adopt them (in particular, France) and other countries that had appeared to commit themselves to green certificates apparently having second thoughts (in particular, Denmark). Thus, although a range of systems continues to be used in Europe today, feed-in tariffs do not appear to be on their proverbial last legs. In North America, by contrast, renewable portfolio standards continue to attract support and seem to be dominating the policy discourse at this time.[24] Therefore, given these

differences, the prospects for transatlantic economic disputes on renewable electricity may continue to grow.

EFFECTIVELY ANTICIPATING TRANSATLANTIC DISPUTES

The argument in this paper, to this point, has been that there are the prospects for transatlantic disputes over renewable electricity, and that these disputes could have potentially significant consequences. If this argument is convincing, then the question that follows is how should these disputes be effectively anticipated and resolved or avoided altogether? In this section, I advance some ideas in response.

By focusing, however, upon transatlantic relations on renewable electricity, I do not mean to suggest that this set of issues should be given a higher priority over other issues. Indeed, let alone issues in other sectors, there are many challenges associated with international renewable electricity issues – not least of which are potential economic disputes within the European Union and North America. (Many of the possible disputes I have described "transatlantically" in this paper, equally apply within each continent.) Nevertheless, I still maintain that a small measure of attention to the transatlantic agenda on renewable electricity now could generate large payoffs (in terms of both avoided costs and tangible benefits) in the future. It is in this spirit that I make the recommendations contained within this section.

To date, a number of global organisations have concerned themselves with issues related to green electricity. In a broad sense, leaders at the World Summit on Sustainable Development called for – in September 2002 – increased use of renewable energy through, among other things, "joint actions" (WSSD, 2002, 3-4). More recently, the G8's environment ministers reaffirmed the importance of implementing the WSSD's commitments "concerning a sustainable energy future" (G8, 2003, 3). Much rarer, however, are examples of such organisations that move beyond broad statements of intention regarding sustainable energy to identify explicitly the need to examine potentially contentious issues related to renewable electricity. One such exception is the Transatlantic Environment Dialogue (TAED). In 2000, its Climate Change, Clean Air and Energy Working Group called for the definition of renewable energy to be made "explicit" and argued that it must not include "waste and large hydropower" (TAED, 2000). The TAED was not able to formally pursue this issue, however, for it has since dissolved.

For the best possible outcomes, however, it may not be appropriate for any of these organisations to take the lead on addressing international (particularly transatlantic) challenges on renewable electricity. Much experience

at the national level suggests that it is only when multi-stakeholder groups, with broad representation, work together to tackle green electricity challenges that the most sustainable results ensue (Patterson and Rowlands, 2002). Given the ways in which electricity impinges upon everyone's lives, and thus the keen interests that many have in the issue, governments, businesses and civil society all require a "seat at the table" when exploring the international elements of this issue. Accordingly, it should not be solely government ministers or civil servants or businesspeople or representatives of environmental groups exploring this issue. Instead, a dialogue of representatives from across these sectors is needed.[25]

If this is indeed the case,[26] then two questions immediately follow: what geographical scope should be adopted, and what institutional forum should be used to explore international issues of renewable electricity across sectors? With respect to the first question, it would appear that the transatlantic member states should be involved, at a minimum – for the reasons articulated in this paper. At the same time, however, others who want to be involved should not necessarily be excluded. For the reasons outlined in the second section of this paper, this issue can be global in scope, affecting all countries of the world. Moreover, there are important players in renewable electricity that are not members of either NAFTA or the EU – Japan, the world's leading solar energy power, and India, the world's fifth largest user of wind energy, are but two such examples. Moreover, the anger expressed by countries of southeast Asia, following Austria's ban of "unsustainable timber", further shows how restricted decision-making procedures can have counterproductive results (Sucharipa-Behrmann, 1994).

Turning to the second question, those existing institutional fora that might be candidates to launch such an endeavour have had their problems. As noted above, the Transatlantic Environment Dialogue was forced to suspend operations. Murphy (2003) argues that it was "never supported at the official levels and had no influence". Lankowski (2001, 11), for his part, maintains that the TAED was "an insider's game, dominated from the start by part of the narrow segment of the NGO community concerned with managing international campaigns. As such, it was far removed from the vision of a transatlantic learning community revolving around sharing local experiences drawn from different settings." Pollack (2002, 16) also notes that the New Transatlantic Agenda "has not been a significant forum for US/EU negotiation on bilateral or global environmental issues". And Philippart (2002, 36) argues that environmental ambitions in EU-US summit declarations have not effectively been turned into actions or commitments. All of this would suggest that perhaps a "fresh start" (that is, a "new" venue) might have a better chance of achieving success. It should be recognised, however, that there are costs (both tangible and intangible) associated with building something from scratch.

There are, of course, many existing institutions that might be appropriate catalysts for this task. To take but one example, consider the Global Ecolabelling Network (GEN). "The Global Ecolabelling Network (GEN) is a non-profit association of third-party, environmental performance labelling organizations founded in 1994 to improve, promote, and develop the 'ecolabelling' of products and services." (GEN, nd) Its membership includes representatives from two of NAFTA's three countries, seven of the EU's 15 member-states and the European Commission itself. With its technical expertise in lifecycle analysis and trade issues, as well as its procedural experience in international collaboration, it may be well placed to move this agenda forward.

Alternatively, perhaps some of the institutional infrastructure that will inevitably arise in association with the preparations for the World Renewable Energy Conference (to be held in Bonn in early June 2004, and to be hosted by the German government) will be helpful on this issue. Given that this meeting is to be "open to governments, businesses and non-governmental organisations (NGOs) and will be preceded by regional conferences in Europe, Asia, Africa and Latin America" (Agence France-Presse 2003), this venue may be appropriate. In any case, it will be important to have some sort of institutional structure with broad participation to pursue investigation of these issues.

CONCLUSIONS

The purpose of this paper has been to investigate the relationship between increasing transatlantic interdependence and "greening" electricity supply systems. More specifically, the paper examined the ways in which these two phenomena could collide. Although disputes between North America and the European Union are not necessarily "inevitable", as a result of closer economic ties and the desire for greater use of renewables in their respective power systems, there are clear signals that conflict could arise. More specifically, differing definitions of "renewable electricity" or "green power" and alternative ways of supporting renewables (through legislative and other means) could spark annoyance and/or anger on one side of the ocean over the actions of partners on the other.

In light of this, it would be extremely prudent to take some action now. Multi-stakeholder groups from either side of the Atlantic should meet to explore these and other, related issues. Small efforts now could pay large dividends, both in the short-term and the long-term. Not only would costs be avoided – both the economic and environmental harm, as well as the associated "spillover" damage in social, security and other areas – but gains would be forthcoming. A sustainable energy path could help to bring a range of benefits, broadly, and the "learning" – in managing these "new kinds" of transatlantic disputes – could

prove valuable in a range of other issues. Thus, given the potential stakes, further investigation into renewable electricity and transatlantic relations is certainly warranted.

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ENDNOTES

[1] For the purposes of this paper, transatlantic relations are taken to be the connections between the members of the European Union and the members of the North American Free Trade Agreement (i.e., Canada, Mexico and the United States). Although NAFTA is, of course, not as institutionally-advanced as the EU, there is evidence that electricity issues in general, and renewable electricity issues in particular, will soon be considered more actively at the continental level. See, for example, CEC (2002).

[2] See, also, Hennis (2002, 22).

[3] Of course, implicit within this statement are assumptions about how "renewable electricity" should be defined. I recognise that definitions are contested and I return to this point in the subsequent sections of this paper.

[4] Note that the term "green electricity" (or, alternatively, "green power") is used more frequently than "renewable electricity" in North America. Of course, this introduces a new set of "contested" terms.

[5] The vast majority of activity on promoting renewable electricity in North America is taking place in the United States.

[6] A "tendering system" involves occasional competitions for set quantities of electricity to be provided by particular renewable energy technologies. Classified within identified "technology bands", long-term contracts are then awarded to those renewable energy producers that offer the lowest bids.

[7] Of course, electricity industry restructuring has played an important role, for it has often allowed private (international) players to participate in electricity supply. Much of this restructuring, moreover, has had continental dimensions. In the European Union, for example, member states agreed, in 1996, to liberalise electricity markets. (See, for example, Eising (2002) and Marquis (2001).)

[8] Article XX is entitled "General Exceptions" and paragraph (b) considers measures "necessary to protect human, animal or plant life or health"; and (g) measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption". See the full text of the 1947 GATT Agreement for the entire context.

[9] For more about the debate regarding the climate change impacts of hydropower, see, for example, World Commission on Dams (2000, 77-79).

[10] Indeed, some already envisage, for example, using Quebec's vast reserves of large-scale hydropower to generate hydrogen for small-scale electricity generators in Germany (e.g., Bahbout et al, 2000). Such could be the precursor to the hypothetical dispute laid out above.

[11] As an aside, imagine such a hypothetical conflict involving any two of the three NAFTA countries. In such an example, landfill gas interests in jurisdiction A would not need the support of their "home government" to take up their case. They could proceed unilaterally with a "Chapter 11" challenge against the government of jurisdiction B. See Rowlands (2002).

[12] Recognise, of course, that tensions exist within each of the two areas I am investigating with respect to how "green" or "renewable" electricity should be defined. For a broader discussion of the European debates, see Rowlands (2003). While in the North American

example, note that Canadians have been watching, often anxiously, the development of renewable electricity legislation in the United States. "Excluding hydropower [from United States's Renewable Portfolio Standards legislation] would have wide economic consequences for Canada and would violate international trade rules, according to a statement released by the Canadian embassy [in Washington, DC]." (Knight, 2002) Moreover, in its 2003 review of international trade priorities, the Canadian government noted that "Canada remains concerned over proposals in recent U.S. federal and state legislation to exclude Canadian-origin renewable energy resources and hydroelectric power from U.S. renewable energy programs. Canadian advocacy in this sector has raised U.S. awareness of a North American electricity market and the impact that discriminatory measures could have on this market." (Government of Canada, 2003a, 40)

[13] Another difference stems from the fact that a prevailing trend in definitions in North America is to judge whether a resource is "green" or not by comparing it to the system average (e.g., Scientific Certification Systems and Green-e). Hence, what is "green" in a coal-dominated jurisdiction may not be "green" in a hydro-dominated one. This may serve to add another layer of complexity to the transatlantic discussions about definitions.

[14] In a related vein, Austin and Milner (2001, 412) argue that "less internationally competitive firms which desire protection from more competitive rivals (and cannot get protection through other means) will seek standards that are incompatible with those used by their competitors".

[15] The one major "renewable" resource that I do not review here is photovoltaics. The reason for this is that European and North American countries have approximately the same share of the global market. Indeed, while North America slightly edged Europe in terms of global share of solar cell production (24 per cent to 22 per cent), Europe's manufacturing activity was concentrated more. Two of its companies (BP Solar and Shell Solar) are ranked third- and fourth-largest in the world, with only one of North America's (Astropower, in fifth) places in the top five (Solarbuzz, 2002).

[16] Although the figures here are for "Western Europe" (rather than the European Union, which means that Norway is also included, among others), I assume that they are sufficiently comparable to make the point.

[17] This, of course, is the exact opposite of what appears to be happening right now.

[18] The IEA, for example, anticipates that "wind and biomass will account for most of the projected growth in renewables-based power production. Wind power is projected to increase by 10% a year over the 30-year projection period, to reach 539 TWhr in 2030, more than 80% of that amount in OECD countries. … Biomass is projected to increase by 4.2% per year to reach 568 TWhr in 2030" (IEA, 2002a, 129). By contrast, solar is expected to be at 92 TWhr in 2030 (IEA, 2002a, 129). Moreover, Menanteau et al (2003, 805) argue that: "Wind energy, and to a lesser extent biomass technologies, should be able provide most of the extra renewable energy required to reach the objectives set by the European Commission."

[19] Of course, by assuming zero growth in electricity demand, I am underestimating the total contribution of renewables, and thus the total economic stake.

[20] Compare with figures from National Wind Coordinating Committee (1997) (28 per cent) and AWEA (2002b) (35 per cent).

[21] In 1985, 67 percent of the wind turbines installed in California were manufactured in the US. By 1999, these percentages had reversed themselves as 65 percent of the wind turbines

operating in California were manufactured overseas. (Asmus, 2002). Moreover, note the figure above about 90 per cent of manufacturing activity existing in Europe.

[22] Indeed, as I note below, this situation has "come true" within the European Union itself, where the German grid companies challenged the legality of the German feed-in tariff legislation, arguing that it was incompatible with the European Communities' "state aid" rules. Although the European Court of Justice found that the German law was, in fact, compatible with EC law, the debate continues, with some commentators questioning the judgement (e.g., Bronckers and van der Vlies, 2001).

[23] Asmus (2002) reminds us that approximately US$1 billion in federal and state tax credits were granted to wind farms in California between 1981 and 1985.

[24] IEA, 2002a, for example, sees in its "alternative policy scenario" (as opposed to its "reference scenario"), RPS adopted in US and Canada.

[25] This approach would appear to be consistent with Brittan's (2000, 18) recommendations: "The best approach to dealing with the problem [of transatlantic regulatory differences] is to find ways of preventing disputes from arising in the first place. Early preventative dialogue – between scientists, between consumer groups, between politicians, between businessmen, between regulators – is fundamental. Timely dialogue allows us to foresee problems, to reach agreement on their nature and scope, and either to develop common approaches to dealing with them or, failing that, to settle on approaches that are as compatible with one another as possible. Disputatious litigation is not the solution."

[26] My comments should not necessarily be equated with a call for any kind of transatlantic harmonisation on renewable electricity issues. There are powerful arguments for subsidiarity (Rowlands, 2002). Instead, some kind of transatlantic cooperation may involve agreement to have different approaches on each side of the Atlantic Ocean.