Renewable Portfolio Standard (RPS)
& Other Incentives

Harmonization Opportunities in Canada

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Executive Summary

A Renewable portfolio Standard (RPS) is an obligation to have a set amount of electricity production from renewable sources. RPS is only one of several policy options to achieve renewable targets. Other mechanisms include: feed-in-tariffs (guaranteed prices or premiums), capital grants, tax credits, accelerated tax depreciation, green power procurement, and eco labeling. Standards for renewable energy can go beyond electricity to include thermal energy and renewable fuels such as ethanol and biodiesel.

Provinces are endowed with different resource bases. Ontario, BC and Quebec have considerable biomass. Alberta, which derives much of its energy from its fossil fuel resources, has significant wind potential, as does Nova Scotia and PEI. Renewable energy is being developed rapidly in Canada, though by far the greatest recent growth has been in wind power, irrespective of the resources available. As wind is not a constant energy source, this may not be a good thing.

Electricity generation and distribution is a provincial jurisdiction, and many standards and policies have been developed at the provincial level. Several provinces have RPS including BC, Alberta, Ontario and Nova Scotia, though Quebec has mandatory targets for specific sources. RPS is anticipated in New Brunswick and PEI. Some RPS are mandatory, others are voluntary. The EU mandated renewable targets for each member country, but only 6 of 25 member countries have established an RPS as a national policy. It is still early days, and there is no track record of success for RPS. RPS has been implemented in the US, successfully in some States, unsuccessfully in others. Experience shows that it is critical to set RPS correctly, to be demanding yet achievable, otherwise RPS has either no effect or it becomes too costly to achieve. RPS is most effective if accompanied by complementary policies, in particular feed-in-tariffs and capital grants.

In many foreign jurisdictions, for example Texas and the UK, a combination of RPS and other incentives have led to considerable development in renewable energy, however it was almost all in wind power, already evident in Canada. Experts agree that increasing diversity in renewable energy should be a policy priority.

US analysts have contemplated a national RPS and harmonizing policies, however with 50 states it is felt to be impossible to achieve any consensus, in partly due to differing resource circumstances, and partly to politics. An ECN policy analysis suggests that the 25-member EU can save €5 billion, 17% of policy spending, by harmonizing policies and trading. While policies are different in Canada, it is likely that some harmonization may be achievable with only 12 provinces and territories, and that savings will occur.

Biomass is a key plank in the EU strategy to achieve Kyoto objectives, and a biomass strategy is being developed to maximize development. Though much of Canada's low-cost mill waste has been developed by the forest industry, considerable biomass remains. Yet policies and mechanisms, such as the current RFP approaches, are not attracting significant biomass development. A biomass strategy is recommended to resolve this.

Suggested options for harmonization of policies and complementary incentives include:

- Set a national RPS for electricity generation capacity, and a separate RPS for primary energy so that thermal energy can be reflected. To reduce jurisdictional issues, the RPS' should be non-mandatory, and meant as a guide for a national effort. They should be stretch goals, but achievable and consistent with any provincial RPS'.
- Set individual targets for several key renewable sources to promote diversity in energy supply. An example is biomass energy, which has a high capacity factor and is thus dispatchable, whereas wind power and solar power are not.
- Support RPS with long-term guaranteed feed-in-tariffs, in particular extend the wind power production incentives (WPPI) to other renewables such as biomass
- Weight feed-in-tariffs by technology to reinforce the development of diverse renewable energy sources
- Further support RPS with capital grants
- If the Large Final Emitter System and associated Credit Trading System can coexist with a green energy trading program, then harmonize definitions of green energy in order that green certificate programs can be fungible
- Develop a forest biomass strategy for Canada, as was done in Europe, to maximize utility of this resource
- Have forest slash Ecologo certified as a green fuel, both that burned at roadside and slash left at the stump
- Act to alter RFP processes to accommodate the length of time needed by biomass projects to get to the proposal stage
- Act to reduce provincial barriers to achieving renewable fuel standards

1. Scope:

This study is not meant to be a detailed description of all the policies and initiatives for renewable energy across all provinces. Summaries of policies have been prepared recently including "Green Power Programs in Canada- Sept 2004"- The Pembina Institute, and "Green Power in Canada Workshop Series- August 2004"- Pollution Probe, though these studies did not pursue the notion of harmonization.

This study updates where provinces stand on renewable energy and standards, focuses on biomass, and proposes options for Canada to pursue a more effective, lower-cost track to increased renewable energy by harmonizing renewable standards across provinces.

While a renewable portfolio standard (RPS) commonly encompasses only electricity production from renewables, this report touches on standards for fuels and heat energy.

2. RPS Introduction:

The term renewable energy can be applied to a number of energy sources, however there are varying definitions of what is renewable. Solar and wind power are considered renewable. Biomass may be considered renewable but only under certain definitions, usually associated with sustainably managed forests. Usually run-of-the river hydro is considered renewable, but not always. Some consider big-hydro as green power, others do not. It is clear that any attempt to harmonize standards will require a standard definition of what is renewable.

RPS is a requirement that obligates electricity producers or distributors to include a specified amount of electricity that is generated from renewable resources. A retailer can normally satisfy this obligation by

- Owning a renewable energy facility and producing renewable power
- Buying renewable power from another utility
- Purchasing tradable credits that demonstrate that someone else has generated the required amount of renewable electricity

Some policies set RPS directly, either as percentage of "incremental" energy production or a percentage of "total" power generation.

Renewable Portfolio Standards are just one of many policy instruments to stimulate the development of renewable energy. Instruments can be categorized as follows;

Incentives, to encourage renewable energy:

- Feed-in-Tariffs, either guaranteed prices or guaranteed premiums to be paid for renewable power. An example is the Wind Power Incentive (WPPI), which pays incentive payments for each kWh of power produced from wind power only.
- Capital grants for the development of renewable facilities
- Tax credits which reduce taxes on income from renewable energy production

- Accelerated tax depreciation on equipment used to develop renewable energy
- Carbon taxes which tax non-renewable energy sources, such as fossil fuel
- Procurement of green power or heat from renewables by governments

Rules and Regulations, which mandate a certain action:
- RPS that either require (mandatory) or target (voluntary) a certain minimum percentage of energy to come from renewable sources by a certain time
- Green power purchasing mechanisms
- Equipment certification
- Measures to support green energy markets, such as labeling

RPS policies define a goal for the amount of generation from renewable sources, and usually define target dates to achieve it. Targets may mandate utilities to produce, distributors to sell or consumers to buy. Renewable energy credits (REC) are central to an RPS system. RECs allow flexibility to purchase or supply power at lowest cost or to achieve certain time targets. Some RPS systems are voluntary. Some have mandatory targets and have stiff penalties for noncompliance.

3. RPS By Province

3.1. Energy Supply

Table 3.1-1 below summarizes renewable electricity capacity by province [i], which shows considerable differences between provinces. Chiefly due to concentration on hydropower, four of the provinces have over 90% of electricity supply from renewable sources: BC, Manitoba, Quebec, and Newfoundland & Labrador. Ontario has a high contribution from hydropower, but also has nuclear and fossil based power. Alberta's power is largely fossil fuel based. Power development reflects considerably different resource bases.

Table 3.1-1

Electrical Supply From Renewables*

	Installed Electrical Capacity (MW)	Renewable Electrical Capacity (MW)	% Renewable
BC	14,136	12,654	90%
Alberta	10,699	1,247	12%
Saskatchewan	3,515	924	26%
Manitoba	5,404	5,014	93%
Ontario	29,971	23,658	79%
Quebec	36,892	34,526	94%
New Brunswick	4,167	1,113	27%
Nova Scotia	2,317	505	22%
PEI	113	10	9%
Newfoundland	7,424	6,966	94%
Nunavut & NWT	188	59	31%
Yukon	125	78	62%
	114,951	86,754	75%

* CIEEDAC- Oct 2004

Total energy capacity includes electrical, thermal, and liquid fuels. In Canada 94% of renewable energy capacity is associated with electricity generation, 6% with thermal sources (biomass), less than 1% for all other sources: wind, biogas, municipal solid waste, solar, earth energy, biodiesel, ethanol and tidal sources[i]. As shown in Table 3.1-2[1], 78% of renewable energy capacity is from large hydro sources, 91% when small hydro is included. 8% of energy, which includes both thermal and electrical, is generated from biomass, and is mostly produced at pulp and paper mills and sawmills from waste wood residues. Although wind power capacity had increased to 321 MW by 2003, many new projects in Alberta, Saskatchewan, Quebec, Nova Scotia, and PEI are increasing wind power capacity considerably.

Table 3.1-2
Renewable Energy Capacity- Canada- 2003
(MW)

	Large Hydro	Small Hydro	Biomass	Wind	Solar, Tidal & Earth	Biogas	Ethanol	Municipal Solid Waste	Total
BC	11,870	104	3,848		1	13			15,835
Alberta	824	50	503	169	0				1,546
Saskatchewan	836		537	22			10		1,405
Manitoba	4,992		23		0		7		5,022
Ontario	22,839	307	2,108	15	3	10		21	25,303
Quebec	22,585	11,553	255	104	1	31			34,528
New Brunswick	927	3	395		0				1,325
Nova Scotia	396	4	165	1	20				586
PEI			1	8				1	10
Newfdld & Labr	6,899	44	23						6,966
Nunavut & NWT	59			0					59
Yukon	77		0	1					78
Canada	72,303	12,064	7,858	321	25	54	17	22	92,664
	78%	13%	8%	0.3%	0.0%	0.1%	0.0%	0.0%	

CIEEDAC- Oct 2004

As shown on Table 3.1-3 below, only four provinces have a bone fide RPS; BC, Alberta, Ontario and Nova Scotia. Quebec has mandated a capacity increase for wind power and biomass power, similar to an RPS. New Brunswick and PEI anticipate implementing an RPS.

Table 3.1-3
RPS In Canada- Feb 2005

Has RPS	Like RPS	Pending RPS	No RPS
BC	Quebec	New Brunswick	Saskatchewan
Alberta		PEI	Manitoba
Ontario			Nfld & Labr.
Nova Scotia			Yukon
			Nunavut
			NW Territories

[1] Table 3.1-1 varies slightly from Table 3.1-2, which contains thermal energy.

3.2. BC

BC produced 14,136 MW of electricity in 2003, 12,654 MW (90%) from renewable sources, mostly large hydro.

In 2000, BC Hydro adopted a voluntary RPS, committing to meet 10% of increased demand for electricity through green sources through 2010. As of 2004, the utility has achieved that commitment. In November 2002 the BC Government released its Energy Plan, which assigned independent power producers the task of developing new electricity generation while limiting BC Hydro to efficiency improvements at existing plants[ii]. The plan set a voluntary goal, essentially an RPS, for electricity distributors to acquire 50% of new supply from BC Clean Electricity[2]. BC Hydro interprets this as a much broader category than "green power" and could include large hydro.

After two calls for tenders for renewable power from independent producers in 2001-03, several contracts were offered, and by the end of 2003 many were producing power including: 94 MW of small hydro, 7 MW of landfill gas, and 20 MW of wood waste capacity. BC is examining wind power options, although its mountainous terrain and lack of flat land with low vegetation reduce wind potential.

Over 600 MW of power is already produced by the pulp and paper industry for its own use[iii]. In 2002, independent (non pulp and paper) power producers had 55 MW generation capacity using biomass, only 0.5% of BC Hydro capacity. Strategis estimated that there is an excess of 2.3 million tons of surplus wood waste each year, which could generate another 200 MW. Tree mortality due to the infestation of mountain pine beetle is another potential source of fibre for bioenergy. The government is looking at alternative biomass technologies including pellet manufacturing, gasification, and pyrolysis.

The biomass issue will be part of a BC Alternative Energy Strategy anticipated in 2005.

3.3. Alberta

As of 2003, only 1247 MW, or 12%, of Alberta's electrical capacity was from renewable sources. The province did establish an RPS. The provincial government's action plan (October 2002) set a goal for increasing the renewable and alternative energy portion of total provincial energy capacity by 3.5%, from approximately 2% in 2002 to 5.5% by 2008. This is a voluntary target.

The Clean Air Strategic Alliance (CASA), a multi-stakeholder group, was to establish the framework for reaching the target, and in November 2003 the CASA Board of Directors agreed to establish the Renewable and Alternative Energy Implementation Team to refine mechanisms to achieve the target, and establish a target beyond 2008[ii]. CASA may not

[2] BC Clean Electricity is defined as alternative energy technologies that result in net environmental improvement relative to existing energy production.

recommend a future target[3]. Details on implementing the 2008 target will be in a report to the CASA Board in March 2005.

The 3.5% increase in renewable power equates to approximately 560 MW, and the government believes it is on track to achieve this target. 25 MW is anticipated from the large cogen facility at Grand Prairie. 170 MW of wind power has already been installed, as follows:

		MW	Developer
McBride	June 2003	75	Vision Quest/Enmax
McGrath	Sept 2004	30	Suncor/Enbridge
Summerview	Sept 2004	68	Vision Quest
Tallon	June 2004	1	Tallon

In the action plan, Alberta committed to the principles electricity deregulation and the need for a level playing field among all electricity generation sources. It does not support direct subsidy to the renewable or alternative energy sources, focusing instead on removing policy, regulatory or technical barriers, facilitating customer education and choice, and working with stakeholders to determine an appropriate minimum capacity of renewable and alternative energy[iv].

Although Alberta has some power generation from biomass, as shown in Table 3.3-1, clearly wind power is outstripping biomass in near term development. This is partly due to Alberta's wind resource, but is driven by the 1¢/kWh WPPI production incentive, and the relative simplicity of wind project development compared with biomass.

Table 3.3-1

Albert Generation Capacity*

	Existing	Planned Additions			
	Capacity (MW)	2004	2005	2006	2007+
Coal	5,519				
Gas and Oil	4,901				
Hydro	900				
Wind	202	287	160	222	150
Biomass	153	25	5	10	
Total	11,675				

* www.energy.gov.ab.ca as of Aug 2004

3.4. Saskatchewan:

As of 2004[ii], 70% of the electricity in the province was generated by fossil fuels, the remainder primarily from hydro. These energy assets are aging. At the moment, Saskatchewan has no renewable portfolio standard for power, but it does have a mandate for ethanol proportion in gasoline.

[3] Teresa Howland, Renewable and Alternative Energy Project Team (RAEPT), Chair CanWEA

SaskPower's Green Power program, launched in 2002, offered green power to residential customers from the 11.2 MW SunBridge wind power project (2001) and SaskPower's 5.9 MW Cypress wind power project (installed October 2002)[ii]. The Cypress facility was expanded to 10.6 MW in late 2003. By the end of 2003, 1000 of the utility's 312,000 residential customers were participating in the purchase of green power. The federal and provincial governments are major purchasers. SaskPower and Atco had planned a 150 MW wind farm at Rush Lake, and though Atco has now backed out of the arrangement SaskPower plans to proceed with full operation, projected for 2007.

SaskPower has adopted a strategy to meet new load growth over the next several years using Environmentally Preferred Power and intends to issue annual RFPs for up to 15 MW of power. The January 2004 RFP resulted in 12 bids including 25 MW for wind power, 5 MW from heat recovery, 3.5 MW from solar, and 0.6 MW from biomass. Three 5 MW projects were approved: two wind power and one gas cogen.

In biomass power, SaskPower has formed a partnership with a sawmill near La Ronge, which will be a gasifier-based power facility using sawmill residue to produce 0.6 MW. It is SaskPower's intention to test the facility and possibly build larger units in the future.

Saskatchewan is exploring the production of ethanol from wood residues, because of the poor economics for grain-based systems. The Town of Nipawin has raised $1.1 million to look at technology development for the gasification of ligno-cellulose into ethanol. There are a number of large residue piles that may form valuable sources for biomass.

The Saskatchewan government is developing both an energy strategy and a climate change strategy in 2005 and will contemplate implementing an RPS.

3.5. Manitoba

Most of Manitoba's power production is already from renewable sources. It is unlikely that the province wants or needs an RPS.

Manitoba currently generates 5000 MW of electricity, over 95% of which is hydro from the Nelson, Winnipeg and Saskatchewan Rivers and which reflects only half of Manitoba's hydro potential. The governments of Manitoba and Ontario are proceeding with a detailed technical study to develop a 1250 MW site for the purpose of selling renewable run-of-the-river power to Ontario.

In its annual report, Manitoba Hydro set a target of 250MW of wind power, seeing this source as complementing large hydro. In 2004, the Province indicated plans to develop 1000 MW of wind power over 10 years. The Province of Manitoba and Manitoba Hydro announced that Hélimaxe Énergie would be studying the potential for wind power at seven sites. A 100 MW $187 million wind farm is already under construction at St. Leon.

The utility is also studying the potential for biomass-based electricity from agricultural residues.

3.6. Ontario

Ontario generates 79% of its 29,971 MW electricity generation capacity from renewable sources. In April 2004 the new provincial government established vision (RPS) for the electricity sector of 5% of generating capacity (1350 MW) from renewables by 2007 from the current 1%, and 10% by 2010. This initiative coincided with a commitment to phase out all five of Ontario Power Generation's (OPG) coal-based power plants by 2007. In June 2004, the government introduced the Electricity Restructuring Act, which would authorize the government to establish mandatory targets for renewable energy.

In 2001, OPG adopted a target of increasing its supply of green power to 500 MW by 2005, however, in 2004 OPG withdrew from non-core businesses including wind power, solar, biomass, and small hydro to allow smaller private companies to enter these businesses.

In April 2004 the Ontario Ministry of Energy (MOE) issued an RFP for 300MW of renewable power. 90 private renewable-energy developers submitted expressions of interest totaling 4,400 MW. The Ontario Power Authority, a new provincial agency tasked with capacity planning, assessed these projects and in November the go-ahead was given to ten projects totaling 388 MW, of which 355 MW is wind power, 31 is hydro, and 3 is landfill gas. Little bidding has taken place in biomass. Part of the problem is that there is limited time to respond to traditional RFPs. Wind projects are comparatively simple and take little time to prepare, while biomass projects take considerably more effort to line up guaranteed biomass supply, financing, and environmental approvals. The Ontario government plans to meet forestry companies in February regarding biomass development. The government is also examining potential from forest floor biomass, in particular its potential for economic growth in Northern communities.

A second RFP was issued June 25, 2004 for 2,500 MW of renewable projects, with awards to be announced by February 1, 2005. Projects proposed under the 300 MW RFP are due online in 2006.

Under the regulated electricity sector emissions trading system, operating since 2002, a pool of emissions allowances is available for renewables that displace electricity from coal or oil fired plants. Only wind power, solar and run-of-the-river hydro power generation facilities are eligible. These allowances can be sold to OPG, to other facility owners or to parties who wish to retire them.[ii]

3.7. Quebec

Quebec generates 94% of its 36,892 MW power capacity from renewable sources. The provinces does not have a RPS stated as a percentage of overall generation capacity or consumption. However, in 2003 the province obliged Quebec Hydro by way of regulation to purchase an additional 1000 MW of wind power and 100 MW of biomass-based generation over the next 7-8 years[v], thus indirectly creating a renewable standard.

45% of Quebec's overall energy consumption is provided by renewable resources[v]. The use of biomass by industry, mainly in the forest sector, has reached 11% of total energy consumption, essentially tying up remaining mill residues. Forest floor residues are so far untouched. Although a thorough biomass inventory likely will be needed to uncover unutilized mill residues, it is likely that new biomass projects will require biomass from forest floor residues, old mill-residue piles, and agricultural crops.

Quebec has 57 small hydro plants with capacity of 257 MW, 25 MW of landfill-gas based power generation at Gazmont, and 100 MW of wind power in the Gaspé. At the end of 2002, Quebec had half of Canada's wind capacity.

The recent RFP for 1000 MW of wind power resulted in bids for 4000 MW [v] at an average price of 8.1¢/Kwh, while the April 2003 100 MW RFP for biomass resulted in bids for only 86 MW. Successful bids were forest biomass cogen plants by Boralex (34.5 MW), Bowater at Gatineau (20.4 MW), and Kruger at Sherbrooke (19 MW).

The Ministère des Ressources naturelles, de la Faune, et des Parcs, and the Ministère de l'Environnement are now developing a 15 year strategy on climate change, anticipated in 2005, which will look at all aspects of climate change and thus directly relate to energy supply, including biomass.

3.8. New Brunswick

Only 27% of New Brunswick electricity capacity is from renewable sources. After completing various analyses and reviewing the results with stakeholders, the province intends to bring a recommendation on an RPS to Cabinet in the spring of 2005, with a possible announcement in April or May.

The province, and in particular the forest industry, has been diligent in converting waste biomass to energy. For example the Fraser cogen facility in Edmunston uses 75% of the wood waste within a 75-mile radius of the plant to generate 45 MW of power, of which 38.5 MW is sold to NB Power. Although some forest floor slash is being retrieved and one company is mining old bark and sawdust piles, mill biomass is regarded to have limited additional potential. They are looking at municipal waste.

The government has been moving forward to develop a cogen policy, but there appears to be no rush.

3.9. Nova Scotia

In Nova Scotia 22% of power capacity is from renewables. In 2001 Nova Scotia Power agreed with the Provincial government to create a short-term voluntary target for new independent-power-producer renewable power generation of 2.5% of NS Power generation, or 50 MW, by 2005. The target was to be reviewed over a 3-year period and then a longer-term RPS established. A new Electricity Act was passed in the fall of 2004, giving the province the legislative power to enact a mandatory RPS. The Electrical

Market Place Committee will recommend an RPS in the spring of 2005, likely to exceed 5%, and it is anticipated it will be adopted in 2006.

In 2003 NS Power announced an agreement to purchase 30 MW of wind power from the Pubnico facility, completed in 2004. A new renewable generation program was launched in 2004 designed to bring 60 MW of power. Proposals were solicited under three categories. In the under-2 MW category, 17 projects totaling 28 MW have been accepted, almost entirely wind power. A second RFP for 30 MW of projects >2 MW closed Jan 22 2005. 28 MW has been accepted and they could get 90MW in the end. As reflected in other provinces, most submissions are wind power, though there are a couple of small hydro projects and a small biomass project.

Currently the Brooklyn Power Corporation owns a 28MW biomass-fuelled generation facility, which uses wood waste from the Bowater-Mersey Paper Company and several local sawmills. Brooklyn sells power to Nova Scotia Power.

3.10. PEI

Only 9% of PEI internal generation capacity is from renewable sources, though the province imports renewable power from New Brunswick. In June 2004 the government released its Energy Framework and Renewable Energy Strategy, which commits to aggressive wind power development. The strategy recommended implementing a RPS of 15% by 2010 and evaluating opportunities for 100% of electricity generating capacity by 2015. The Renewable Energy Act, introduced in November 2004, put in place several items in the energy action plan, with regulations to follow. A more extensive study of provincial energy options is expected in 2005. The 15% RPS will be achieved primarily through wind power, with an RFP for 30 MW of wind anticipated in the spring of 2005. An RPS for transportation fuels, such as ethanol and biodiesel, is being contemplated.

Maritime Electric, which distributes power in the province, purchases the output from the 5.2 MW North Cape wind farm, selling most of it to federal and provincial facilities. A small amount of green power was offered to the public, and it was fully subscribed. The utility wants to make sure its traditional forms of power generation are part of the picture. Due to the inconsistent nature of wind power, the company is seeking approval for a $35-million diesel-fired turbine capable of generating 50 megawatts of power.

The Renewable Energy Strategy encompasses biofuels, and a feasibility study is being undertaken to generate biogas from meat packing waste and biodiesel from energy crops. There is a possibility for four cogen facilities including district heating in Charlottetown and Summerside, and two large potato-processing plants. In spite of being predominantly an agricultural province, 45% of PEI's land area is forested. PEI has a small but active forest industry, and sustainable volumes of harvest residues and non-merchantable timber are potentially available for harvesting. The harvesting of forest biomass resumed in 2004 after a hiatus of six years.

3.11. Newfoundland & Labrador

Newfoundland and Labrador satisfies 90% of their power consumption with renewable hydro electricity, and exports large amounts of power through Quebec. There is no RPS.

Some cogeneration takes place, for example at Abitibi-Consolidated's Corner Brook pulp and paper mill.

3.12. Yukon, Nunavut, North West Territories:

In the Yukon the Whitehorse Haeckel Hill wind facility was expanded to 810 kW in 2000, however no further green power facilities have been installed or marketing program implemented[ii].

Nunavut Power Corporation made a voluntary commitment to produce wind power and two wind turbines were installed in Rankin inlet in 1996 and 2000, with a total capacity of 145 kW [ii].

In 2003, the government of the Northwest Territories released its Energy Strategy, whereby 10% of energy supplied to communities is intended to be from renewable sources by 2010, and 25% by 2025. No policies or programs have yet been established.

3.13. Provincial Summary:

Only four of the provinces and territories have RPS (BC, Alberta, Ontario, Nova Scotia), though Quebec has renewable targets, and two provinces are in varying stages of establishing an RPS (New Brunswick, PEI).

The provinces have very different resource bases and thus have very different strategies for energy development. Despite most provinces having considerable biomass resources, most electrical energy development has been in wind power, driven by the generous WPPI program, the short turnaround expectations of provincial RFPs, and the relative simplicity of wind power projects compared with biomass projects.

Electricity generation and forest resources are essentially provincial jurisdictions and over involvement by the federal government may lead to discord.

Several green credit programs have been established by or for utilities that are to operate within provinces. There is no common definition for what constitutes green power.

4. Foreign Jurisdictions

4.1. EU

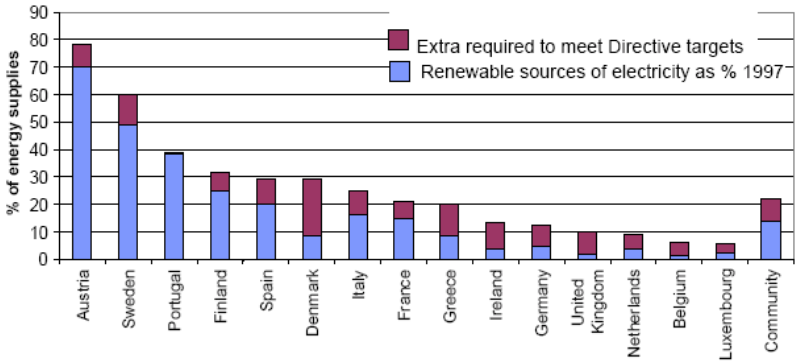
Table 4.1-1

EU Directive- Renewable Proportion of Energy

	Actual 1997	Directive 2010
Renewable Energy (RES)	6.0%	12.0%
Renewable Electricity (RES-E)	14.0%	22.1%

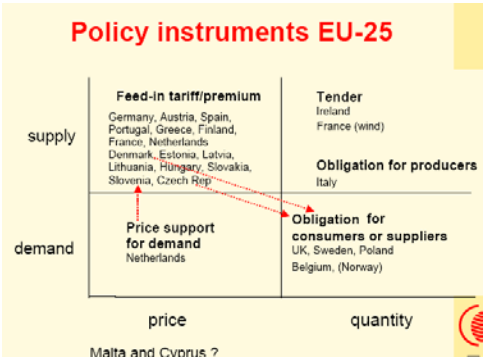
In 1997 the European Commission issued a White Paper setting targets to increase the renewable share of energy production from 5.3% in 1995 to 12% in 2010[vi]. As shown in Table 4.1-1, 12% of gross energy consumption has been translated to 22.1% of electricity consumption in 2010[viii]. The EU subsequently issued a Renewables Directive in 2001 with targets for each member state commensurate with their situation and capability. For example, in Chart 1, Austria already had considerable renewable production, but was given a stretch target of 78.1% of electricity from Renewable Energy Sources (RES-E). Germany was given 12.5%. Armed with constitutional authority, the targets issued by the EU are mandatory. Technically these targets are renewable standards for each country, however these standards do not obligate any specific producer to achieve them.

Chart 1: Country targets under EU Directive for Renewable Energy Production[vii]



National approaches to reach these targets are fragmented. For example, as shown in Chart 2, few of 25 EU members have an obligation policy (RPS). Italy has an obligation to producers, while the UK, Sweden, Poland, Belgium and Norway have obligations to achieve targets placed on consumers or power suppliers. Most EU members use feed-in tariffs (guaranteed price premiums) or other policy levers to achieve Directive targets.

Chart 2: Policy Instruments in the EU



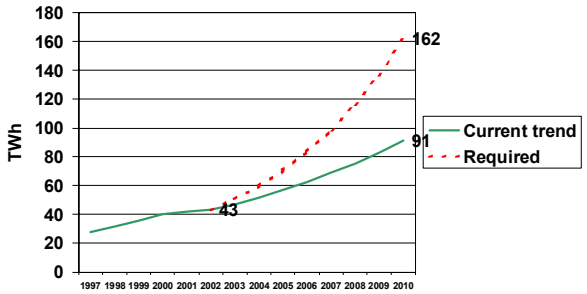
Feed-in-tariffs have been in place longer than renewable portfolio standards and have proven effective in achieving investment in energy. In the EU, RPS is still at an early stage of implementation and has no real track record. To-date, RPS initiatives can be characterized by little investment to date and small fragmented markets. Overly ambitious RPS targets and high penalties have led to high prices (eg UK), while undemanding targets have lead to low prices (Belgium, Italy). Both the RPS systems and Green Credit systems are fragmented. There is a recognized need for

- Long-term policy targets that are realistic but slightly demanding
- Penalties that are slightly above marginal cost
- Linked RPS systems through international trade that can increase the size of the market, and enhance liquidity

Comparing feed-in-tariffs and RPS, feed-in-tariffs provide price support giving certainty to investors and thus are effective in stimulating investment, but there is no certainty on achieving renewable targets. RPS sets the target, inducing cost minimization to achieve it, however costs may turn out to be very high if the RPS is set improperly. RPS is perceived as more complex. It is widely recommended that RPS be accompanied by supplementary support mechanisms such as feed-in-tariffs, which seem to be the most effective. In some jurisdictions, feed-in-tariffs have been set differently for different technologies to promote diversity of energy source.

According to policy studies by ECN, the Research Centre for the Netherlands, onshore wind and biomass are the main technologies to achieve EU renewable energy targets in the next decade[viii]. The EU will only reach its 2010 target of 22% of electricity from renewable sources with a major increase in biomass production, from the current 43 TWh to 162 TWh of energy by 2010, shown on Chart 3. This is a growth rate of 18% p.a. compared with a current trend of 7%.

Chart 3- Biomass Requirements to Achieve EU Directive

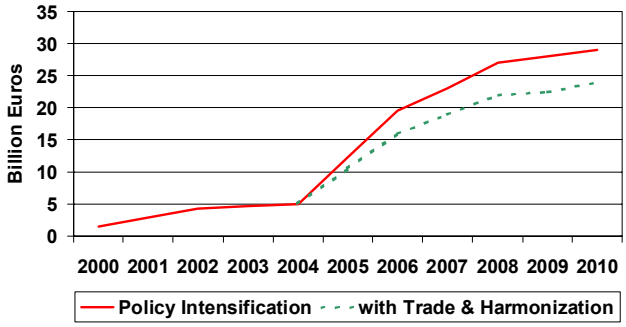


Current policies are projected to achieve only 18-19% renewable electricity by 2010. Enhanced policies will be required to increase biomass to the extent needed to achieve the 22% target. In May 2004, the European Commission announced the development of a coordinated "biomass plan" with clear approaches to securing adequate supplies through national and regional action. Biomass production was 56 Mtoe[4] in 2001. An additional 74 Mtoe will be needed by 2010 to achieve a 12% proportion of total energy (electricity- 32, heat-24, transport-18).

[4] Mtoe- million tonnes oil equivalent

A review of EU member countries shows that there is a widespread need for policy intensification to achieve the stated target. However achieving targets comes at high cost. Policy expenditures of €5 billion in 2004 for 100 TWh of renewable energy are expected to reach €25 billion for 5-600 TWh by 2010[viii]. It is recognized that fragmented national policy approaches drive up costs, and that trade in energy reduces costs. Trade encompasses purchasing both power and green credits across EU member borders, but also includes importing of biomass and liquid biofuels. To do so will require a common verification, registration and monitoring framework. ECN has recommended harmonizing RPS from day one, as transition to a harmonized market causes uncertainty and hampers investment. The research organization has estimated that the cost of policy intensification to achieve targets will reach €29 billion, shown in Chart 4, but that with trade and harmonization of national policies, this can be reduced by €5 billion, or 17%.

Chart 4: Harmonization of Policies Can Significantly Reduce Costs



Although the policy approaches in Canada and the EU are not the same, it can be safely concluded that Canada would benefit from harmonization of provincial policies and trade in green credits through reduced costs.

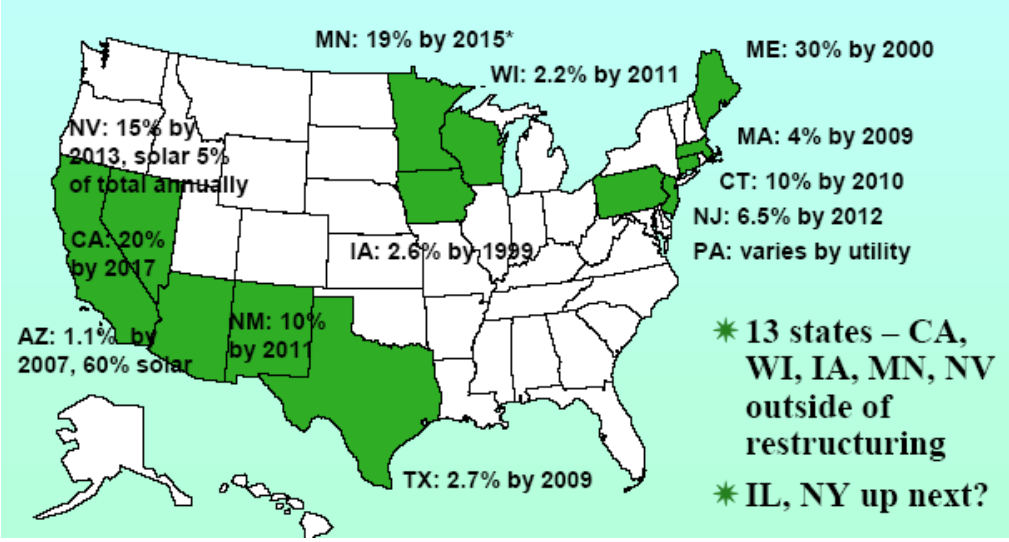
In order to achieve the 12% RES target the EU will have to step up development of biomass and accordingly the EU is developing a biomass strategy. The strategy includes importing biomass and biofuels from non-EU countries including Canada. IEA-Bioenergy has initiated a new task, Task 40-Biotrade, to examine options to increase trade in biomass and biofuels. Over 2005-06 the Task will examine biomass supply chains from various countries to the EU, and will also look at barriers to trade with the object of eliminating barriers. Canada recently joined Task 40. We have an opportunity to develop sufficient biomass for our own needs and potentially to participate in a lucrative EU market in biomass and biofuels.

To conclude the EU situation, feed-in tariffs are proven effective in achieving investment in renewable energy, while RPS in theory combines effectiveness and efficiency, but has no real track record. RPS should be used in combination with feed-in-tariffs or other supporting policies. Fragmented national policies have lead to high cost of compliance with EU targets, and these costs can be lowered through international renewable electricity trade and harmonization of the support framework.

4.2. United States

As shown in Fig 1, renewable portfolio standards have been implemented in 14 states[ix], though this figure varies by publication because of differing definitions and dates of publication. They are Arizona, California, Connecticut, Hawaii, Iowa, Maine, Maryland Massachusetts, Nevada, New Jersey, New Mexico, Rhode Island, Texas and Wisconsin. Three states have RPS-like standards, Illinois, Minnesota and Pennsylvania, and several other states are considering RPS, such as New York.

Fig 1-Renewable Electricity Standards- Union of Concerned Scientists, USA[x]



Iowa, Minnesota, and Texas have RPS policies that require generation of a fixed amount of electricity, while the majority of states set a percentage goal. 12 states specify a time line and target date. New Jersey has designed its RPS to be adjusted after a certain time, which is a good idea since improperly set RPS leads to either no activity or high costs.

A key question is "what resources are eligible?" States have different resources that are eligible to fulfill RPS, driven by both natural resources and politics. Similar to Canada, some states are endowed with wind, some with biomass etc. Of interest, Nevada and New Mexico use multipliers to encourage specific technologies, weighting benefits more heavily for technologies such as biomass, geo-thermal and fuel cell power.

An important classification of state RPS is type of credit trading. Some states have their own in-state credit trading, while other states allow credit trading within regional systems, such as the NEPOOL Generation Information System. The NEPOOL system operator allows trading between the states it serves: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Even though three of these states don't have an RPS, credits can be created in any of these states.

It is difficult to judge success of these RPS systems since many have been implemented such a short time and still have a long time before the target date. So far, Texas is

regarded as having the best-designed and most effective system [ix], however even with considerable development of green wind power, the lack of development of other technologies is now regarded as a shortcoming (see 5.2). Development of renewable energy in Texas occurred in cycles, peaking in windows when federal wind production tax credits were available, and collapsing when the tax credit ended. Iowa and Minnesota have also had success with RPS. In Iowa, the state ordered the utility to comply to a 2% RPS and subsequently 250 MW were installed. With the target reached the law no longer drives development, however a new voluntary target of 1000 MW is proving effective. RPS has also been effective in Minnesota, which has installed 425 MW of wind power and 125 MW of biomass generation. In Massachusetts, the 1% goal by 2003 was met primarily through landfill gas and biomass. In Wisconsin, sufficient development has already occurred to enable reaching a 2011 target of 2.2%, though interestingly much of the development has been out-of-state in Iowa.

Maine's RPS is regarded as a failure since the target for renewables had already been surpassed before passage of legislation, thus the RPS is having no effect. States that enacted an RPS that was either too aggressive or not aggressive enough seem to be amenable to adjustment.

A national RPS has been contemplated for the US. Energy security is one of the top priorities in the US, and various means are being discussed to achieve it. With only 14 states with RPS and a few more contemplating one, the question arises whether enough is being done to promote renewable energy nationwide. One key issue is that R&D and tax credits are not enough to make renewable energy competitive. Costs to produce renewable energy are still high. Many consumers are offered the chance to buy "green power" at a premium, but typically only a small percentage of consumers are willing to pay for the higher costs. The potential cost of implementing a national RPS, which may increase electricity prices, is also an issue. Since 1997 there have been numerous federal proposals for an RPS[ix] but none have been passed into law. The Bush Administration does not support an RPS, believing that these standards are best left to the states. Part of the problem is that there are 50 states and that finding an acceptable RPS and timeframe may be extremely difficult to negotiate. Also, since not all states have the same renewable generation capacity, under a federal plan not all states would benefit in the same way. Any federal RPS system would have to involve a system for trading credits.

A national RPS is supported by a number of organizations, usually environmental organizations, on the basis of its theoretical benefits and often without regard to its drawbacks. Support is not universal, obviously, as the federal administration feels the task of achieving it to be greater than the benefits. Citing another example, the Common Purpose Institute does not support a national RPS because it would lead to a portfolio mix dominated by wind projects developed in the Western US, and thus Southern Eastern utilities would end up buying credits from wind energy providers in Western states. They add that with a 10% RES half of the fossil fuels displaced would not be coal but natural gas, which produces only 10% of total CO_2 emissions.

5. Diversity of Renewable Energy Sources

5.1. UK

The bulk of renewable energy in the UK today was developed in 1990-98 under the Non Fossil Fuel Obligation (NFFO) policy, which led to 3600 MW in contracts awarded. A new industry was created and impressive projects were commissioned, but power was sold at auction taking prices below sustainable levels. The NFFO was abandoned in favour of RPS and capital grants.

Following the EU Directive, the UK set a target of 10% of electricity consumption from renewable sources by 2010, a huge jump from the 2% achieved in 2001. Aspirations are to double it by 2020. There are three tiers of policy support; R&D for technologies not yet fully commercialized (£19 million pa), capital grants for those almost commercial, and a renewables obligation (RPS) introduced April 2002. To show compliance, suppliers must redeem Renewable Output Certificates (1 ROC = 1 MWh) to the regulator. Suppliers can meet the obligation by contracting with other generators (buying electricity or ROCs), purchasing output from NFFO suppliers, trading ROCs, or paying a fine (£30/mWh). These policies led to an inordinate number of applications for capacity increases for wind power, shown in Fig 2 below. It shows that one-size-fits-all policies do not work. Measures to diversify renewable sources are now regarded as essential.

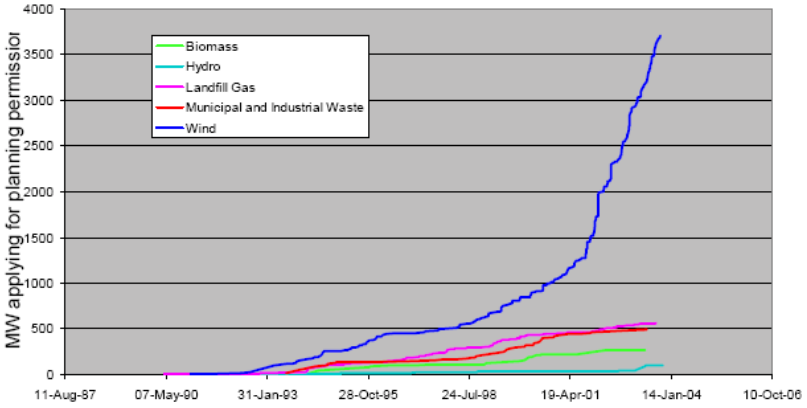
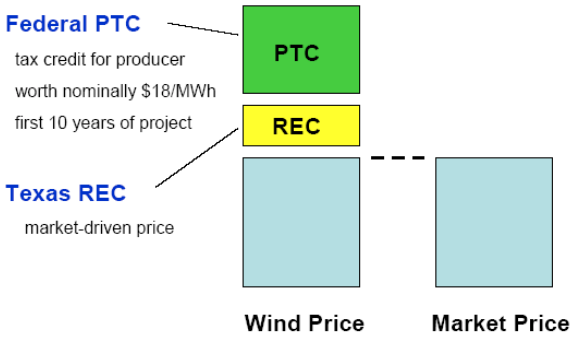


Fig 2: Renewable Development Applications- UK[vii]

5.2. Texas

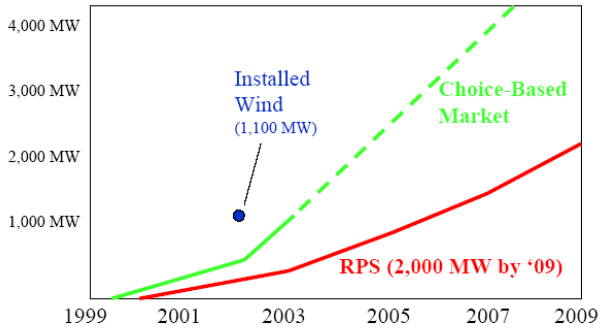
To promote renewable energy, Texas integrated federal and state policies, which led to a marked increase in renewable energy. Policies included: REC (renewable energy credits), PTC (production tax credits), and RPS (mandated). As illustrated in Fig 3, a REC is given for the added cost of renewables above the commodity market price for electricity, and a production tax credit of $18/MWh is given to the producer for the first 10 years of the project.

Fig 3: Texas- RECs and Credit Premiums to Wind Power Price



State policies (REC program) plus short term US federal wind subsidies (PTC) resulted in a surge in wind development each time federal subsidies were active, and a sharp decline when of the subsidy was removed. As shown on Fig 4, 912 MW from wind was developed before the Dec 2001 subsidy deadline, very little after. According to Virtus Energy Research Associates (VERA), Texas got RPS right, specifying the mandate (2,000 MW by 2009), assigning responsibility, compelling performance with large penalties, and tracking compliance through RECs with one administrator.

Fig 4- Impact of Integrated RE Policies in Texas (VERA)



The concentration in one power source in Texas led to its own special problems, including lack of transmission lines to get the power from where it was being generated (West Texas) to where the demand was (East Texas).

The programs were highly successful in generating capacity of 1186 MW, however 96% of it was wind. One conclusion of US and UK speakers at the Feb 2004 Pollution Probe Green Power workshop in Calgary was that low diversity in sources is risky, and that policies should be altered to correct this. Based on the Texas experience, VERA concluded that policy should

- Develop a good credit trading program (RECs)
- Build a foundation using RPS and tax credits
- Design policies for diversity

VERA added that harmonizing policies is a nice ideal, but impossible for 50 states.

5.3. Germany:

To increase the share of electricity from renewable sources, Germany adopted feed-in-tariffs first in 1991 and then updated it in 1997 to last until April 2000. The policy targeted all RES technologies, obligating utilities to buy electricity from renewable energy producers and guaranteeing a fixed price. A multiplier enabled emphasizing different technologies (90% for wind and solar power, 80% for biomass and hydro-power, sewage and landfill gas of less than .5 MW etc). The measure stimulated renewable energy development, particularly wind power. The policy was continued after April 2000, but grid operators instead of utilities were required to pay the feed-in-tariffs. A new pricing scheme was established with different prices for biomass, wind and solar-PV to last 20 years from the time of installation. This policy resulted in growth in a number of different renewable technologies[xi], as shown in Table 5.3-1.

Power Production- Germany

GWh

	2001	2002	2003
Wind-onshore	11,000	15,856	18,500
Solar- PV	150	200	332
Gas from Biomass	1,986	2,000	3,370
Biomass- Wood	639	700	1,770
Hydro	22,151	23,200	20,350
All other	2,044	2,035	1,945
Total	37,970	43,991	46,267

Table 5.3-1

5.4. Austria:

Austria has prided itself in its commitment to renewable energy and other environmental policies. Until early 2003, the Austrian framework for renewable energy was based on local and regional initiatives. With the implementation of the nationwide Okostromgesetz (Green Electricity Act), green electricity investment incentives were harmonized. It provided a change of legislative responsibilities (from provincial to federal), and introduced long-term guaranteed feed-in-tariffs, together with a purchase obligation for electricity dealers. As shown in Table 5.4-1, Austria has set targets for individual renewable sources.

Table 5.4-1

Austrian Objectives Per Green Electricity Act

	% Generation	Support
Large Scale Hydro	62%	none
Small Scale Hydro	9%	Preferential Feed-in-tariffs
New Green Power Max 15 MW	4%	Preferential Feed-in-tariffs
Other Renewable Sources	3%	None
Target from EU	78%	

Feed-in-tariffs are the main instrument for renewable energy stimulation in Austria, though these are complemented by tax incentives and subsidies. The Green Energy Act set feed-in-tariffs by technology for installations approved between Jan 1 2003 and Dec 31 2004 and put into operation by June 30 2006. Biomass is provided a very preferential tariff to ensure competitiveness, shown in Table 5.4-2. The minimum support period was set at 10 years, however a Ministerial decree has increased it to 13 years.

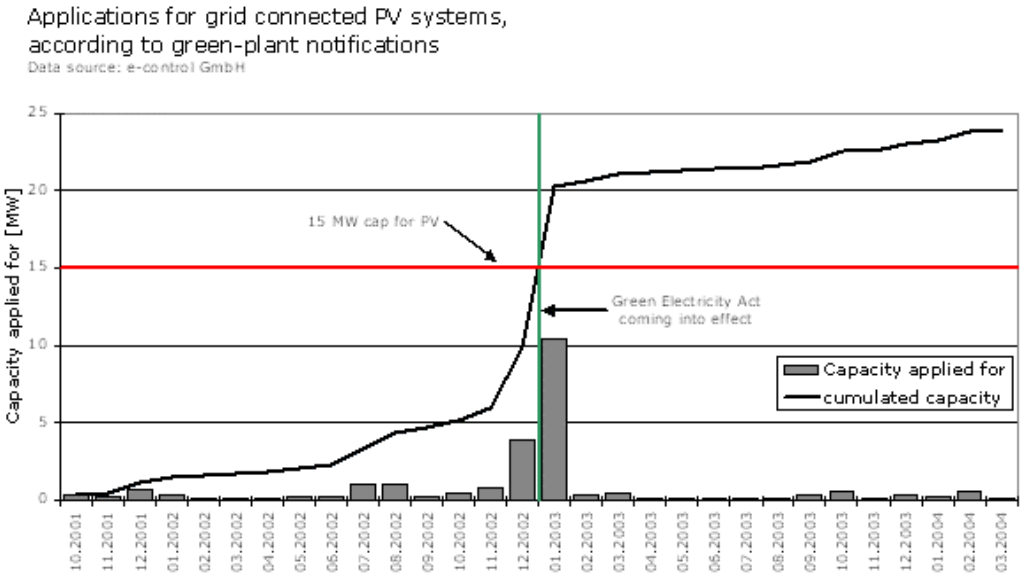
Table 5.4-2

Feed-in-tariffs- Austria

	ct/kWh
Wind	7.8
Biomass & Biogas	10.2-16.5
Landfill	3-6
Geothermal	7
Small Hydro	3.15-6.25
PV	47-60

The provinces provide subsidies of 10-30% to stimulate local renewable projects. The combined EU-RPS for Austria, national feed-in-tariffs, and provincial subsidies resulted in boom in development from PV sources, as shown in Fig 5[xii]. Once the development "cap" was reached and no further tariffs provided and investment fell off. Reflecting the PV growth, biomass production grew 18% in 2001-02 (2003 not available.)

Fig 5. Impact of Feed-in-tariffs on PV Capacity Additions



5.5. Diversity Summary

In Texas, the RPS complemented with feed-in-tariffs led to an explosion in development, however almost all of it was wind power since the federal feed-in-tariff was for wind power. The same pattern is evident in Canada, with a proliferation of wind projects driven by provincial renewable portfolio standards but especially supported by the generous federal Wind Power Production Incentive of 1¢/kWh production. In hindsight, although wind power created a regular cash flow for Texas landowners, the lack of diversity in power was recognized as a serious problem. The same pattern became apparent in the UK. The conclusions of Gaynor Hartnell, Director Policy, Renewable Power Association, UK, and Mike Sloan, Virtus Energy Research Associates, Texas, are that policies should be designed for diversity of renewable sources.

Both Germany and Austria successfully has designed incentive systems to promote a range of renewable power technologies through carefully weighted feed-in-tariffs.

6. Thermal Energy and Renewable Fuels:

While RPS is normally associated with electricity generation, energy also encompasses thermal energy, including industrial process heat and district heating, and liquid fuels, such as ethanol and biodiesel. As shown in Tables 6-1, fully 94% of Canada's renewable energy capacity is for purposes of electricity generation, 6% is thermal capacity, and less than 1% for liquid fuels. 99% the thermal capacity is generated by pulp and paper companies. 8.5% of Canada's renewable energy is derived from biomass wood residue sources (both electrical and thermal).

Table 6-1*

Renewable Energy Capacity	
Electrical	94%
Thermal	6%
Liquid Fuel	<1%

Table 6-2*

Renewable Energy Capacity	
Conventional Hydro	78%
Low-Impact Hydro	13%
Biomass	8.5%
Other	0.5%

*CIEEDAC-2003

While the pulp and paper industry has effectively reduced fossil fuel usage by substituting biomass wood waste, and in doing so reducing GHG emissions by 28% since 1990, much wood waste remains. It may make sense to establish a standard for biomass usage, both for electrical and non-electrical uses (See 7.0)

The liquid biofuels most commonly referred to are ethanol and biodiesel. In its Climate Change Action Plan 2000, Canada established a target to produce 1.4 billion litres of ethanol by 2010, up from approximately 200 million litres in 2001, and 500 million litres of biodiesel by 2010, up from essentially zero in 2001[xiii]. As part of its plan, the federal government undertook a 2-stage ethanol expansion program. In round 1, $71.8 million in capital grants were allocated to six ethanol projects in 2004. A further $27.5 million will

be allocated in round 2, with the deadline for proposals Feb 2005. Development plans are on track to achieve 1 billion litres by 2007. There is no federal standard.

The standard for fuels is commonly referred to as Renewable Fuels Standard (RFS). Only three provinces have an RFS: Saskatchewan, Manitoba and Ontario. Saskatchewan passed its Ethanol Fuel Act in 2002, which resulted in a set of phased-in ethanol-blending rules for gasoline distributors. Plans were to have an average of 5% ethanol by October 1 2004 and 7.5% by April 1, 2005. The targets were projected to result in major ethanol capacity expansion. It is questionable whether there will be enough ethanol available to achieve these targets. Capacity expansion has been slower than expected and standards will be adjusted for achievable expansion. Manitoba has a 5% mandate in effect as of 2007. In Ontario, the Premier announced in Nov 2004 that by Jan 1, 2007 wholesaler's annual gasoline sales must achieve an average of at least 5% ethanol. This target can be accomplished either by actual blending of ethanol, or by trading renewable fuel credits.

To achieve a national RFS is even more complicated than RPS, again due to jurisdictional issues. The federal government environmental mandate enables legislating "removal" of substances from fuel, such as lead, but does not enable "adding" substances, regarded as a provincial matter. While a national standard may be desirable, it is not a current focus. However, technologies are on the verge of commercialization that may make production of ethanol from wood fibre cost competitive with existing production methods. If this occurs then deciding where biomass should best be used will be an issue, and it will be timely to assess balancing a national RPS with RFS.

While ethanol development is proceeding, there are inter-provincial barriers that hinder achievement of targets. For example, almost all of Alberta's ethanol production is sold into the US rather than to Saskatchewan because Saskatchewan's tax exemption of 15¢ per litre applies only to ethanol produced in Saskatchewan. Alberta's tax exemption is 9¢ per litre. To achieve RFS targets at lowest cost, provincial barriers should be examined for reduction and harmonization.

In the EU, Directive 2003/30/EC stipulated that the minimum biofuel proportion of transportation fuels be 2% by Dec 31 2005, and 5.75% by Dec 31 2010. It was recognized that implementing this target may reduce the amount of biomass available for achieving RES-E (electricity), and push up prices for biomass[xiv].

7. Forest Biomass:

While development of renewable energy has become a policy focus and RFP's abound in Canada, only limited new biomass investment in biomass capacity is taking place. There are a number of reasons including:

- Much of the low hanging fruit (large point-sources of biomass) has already been developed
- Forestry industry has little cash flow to finance major energy projects
- RFP processes are usually open for 2-4 months. Organizing biomass projects takes much longer, especially to line up long-term guaranteed biomass supply

- Leading edge technologies, such as bio-oil from wood waste and bio-ethanol from cellulose, are just now emerging
- Biomass is perceived to be a dirty fuel, though state-of-the-art technologies have eliminated most emissions and achieve high efficiencies

The forestry industry has done much to utilize waste biomass from its operations, reducing the annual excess from 12.1 million BDMt (bone dry metric tonnes) in 1990 to 5.9 million BDMt in 2003. Gradually even this amount is being absorbed. Though pockets remain, the perception in Nova Scotia, New Brunswick, Quebec and Ontario is that "all of the waste biomass is gone". Occasionally, with the shutdown of a sawmill or pulp mill, the supply picture changes. The greatest source of unutilized mill waste is in BC, where a considerable amount of fibre is still burned in obsolete beehive burners. Also in BC the mountain pine beetle infestation is now killing the equivalent of 70 million M^3 of harvest wood per year. A considerable proportion of central BC is standing deadwood, which is suitable for wood products for a few years and then only useful for bioenergy. A biomass inventory is required to determine the current availability of mill waste and standing deadwood.

One major source of energy fibre is forest slash. On average 25% of every tree harvested (branches, tops, leaves, needles) is left on the ground after harvest[xv]. While some delimbing occurs at the stump, most delimbing in Ontario and Quebec is done at roadside and slash is subsequently burned and thus entirely wasted. Harvesting of forest floor biomass is being undertaken in a major way in Sweden and Finland, yet only in the last year has it been considered in Canada. Slash bundling technology is being examined by several organizations in Canada. A study is underway in Ontario to model the potential impact of developing forest biomass, particularly in disadvantaged Northern Ontario communities. A study of nation-wide potential of using forest floor biomass is necessary. Also, even though much forest slash is burned at roadside, this source of biomass is not EcoLogo certified. It should be.

The oil and gas industry has employed various financing vehicles to enable extensive exploration and development of Canada's fossil fuel resources. The forest industry, financially challenged with the globalization and commoditization of many of its products, does not have sufficient cash flow to develop waste biomass and forest biomass in time to have a major impact on the Kyoto first commitment period 2008-12. A study of innovative financing vehicles is necessary to direct investment capital from where it exists to where it is needed.

In order to maximize the appropriate development of its biomass resource, the EU is developing a biomass strategy. Austria has already dome so. Essentially, Canada needs a forest biomass strategy, which will examine biomass availability and cost, appropriate technologies, investments required, financing vehicles, domestic markets, trade opportunities, and policies to make it happen. Separate incentives will have to be designed specifically for biomass.

8. Green Power and Certification:

A desirable part of an RPS system is the ability to certify power as "green power", and to establish green credits that can be sold or traded. Unfortunately, definitions of what is "green" abound. As of the end of 2003 there were 11 government green power policies in Canada, seven utility green power development programs, and 14 green power and certificate marketing programs [ii]. The Enmax and Epcor programs have been in place for five years and are well established, while the other programs are fledgling with a few hundred residential customers each. There is no real market for credits.

There are five existing or emerging systems of certification or quality that are relevant to Canadian green power [ii], including Ecologo, BC Hydro's "green criteria" (which may cease), the Green Leaf Standard, and the US Green-e certification system. The Canadian Energy Association has stated that Ecologo certification does not adequately serve the needs of the Canadian electrical market, because of the possibility of double counting. A more robust market could develop more quickly with harmonized definitions and fungible green credits. However, the proposed Large Final Emitter program and offset trading system for GHGs may leave no potential for a green power program of the sort that exists in the US.

9. Opportunities for Harmonization and Complementary Incentives:

The EU constitution provides for central authority to issue directives for member countries and the EU has done so with renewable energy, setting both EU and individual member country targets for overall renewable energy sources (RES) and for electricity (RES-E). The EU tends to operate by setting "top down" mandatory directives on many issues. As a result of EU targets, most member countries have not seen the need to set a national RPS as an obligation to various entities, but have instead chosen to complement the EU targets with other measures, primarily feed-in tariffs, but also grants and tax reductions. Harmonization of policies seems to centre on removing barriers to trade of energy and energy credits, and of equalizing incentives so as not to advantage one region for development over another.

In the US several stakeholders have been considering a national RPS. Various proposals have been made to Senate with varying degrees of success, but none passed into law. It has been mentioned that to expect agreement amongst 51 States would be all but impossible. The Bush administration does not support a national RPS. It appears that neither a single national RPS nor an agreement on incentives over 50 states is likely.

In Canada, a national RPS is an intelligent and practical objective. While each province has unique resources, there are only 10 provinces and three territories so that there is a realistic expectation that a national RPS can be set which is amenable to the provinces and territories. However, the federal government does not have the authority to mandate and RPS[xvi]. Canada does not have a history of setting mandatory goals like the EU, preferring instead to gain consensus through stakeholder meetings. A solution for Canada could be setting a national, non-mandatory stretch objective that is consistent with already established (or planned) RPS in the provinces. Furthermore, the federal

government would be in a better position than the provinces to establish separate RPS for biomass, solar, and other renewable technologies.

In August 2004 the Clean Air Renewable Energy Coalition recommended to the Prime Minister that the federal government set a target of 7% of Canada's total electricity mix from green power by 2010 (from 1.3% in 2004[xvii]), and 15% by 2015. CARE also recommended extending power production incentives to other technologies, such as biomass, geothermal, wave and tidal power.

It has been projected that the EU can reduce costs of achieving target by 17% by harmonizing member country policies and encouraging trade of energy or green certificates. It can be surmised that meaningful savings could be achieved by harmonizing provincial incentives.

A reasonable set of options for Canada to increase energy production from renewable sources through harmonization is:

- Set a national RPS for electricity generation capacity, and a separate RPS for primary energy so that thermal energy can be reflected. To reduce jurisdictional issues, the RPS' should be non-mandatory, and meant as a guide for a national effort. They should be stretch goals, but achievable and consistent with any provincial RPS'.
- Set individual targets for several key renewable sources to promote diversity in energy supply. An example is biomass energy, which has a high capacity factor and is thus dispatchable, whereas wind power and solar power are not.
- Support RPS with long-term guaranteed feed-in-tariffs, in particular extend the wind power production incentives (WPPI) to other renewables such as biomass
- Weight feed-in-tariffs by technology to reinforce the development of diverse renewable energy sources
- Further support RPS with capital grants and low interest loans
- If the Large Final Emitter System and associated Credit Trading System can coexist with a green energy trading program, then harmonize definitions of green energy in order that green certificate programs can be fungible
- Develop a forest biomass strategy for Canada, as was done in Europe, to maximize utility of this resource
- Have forest slash that is burned at roadside Ecologo certified as a green fuel, and possibly slash at the stump also
- Act to alter RFP processes to accommodate the length of time needed by biomass projects to get to the proposal stage
- Act to reduce provincial barriers to achieving renewable fuel standards

Contacts and End-notes

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