



RENEW
Renewable Energy New England



**Testimony of RENEW before the
Energy and Technology Committee on Proposed Substitute Bill 1138 (LCO No. 4767)**

An Act Concerning Connecticut's Clean Energy Goals.

March 19, 2013

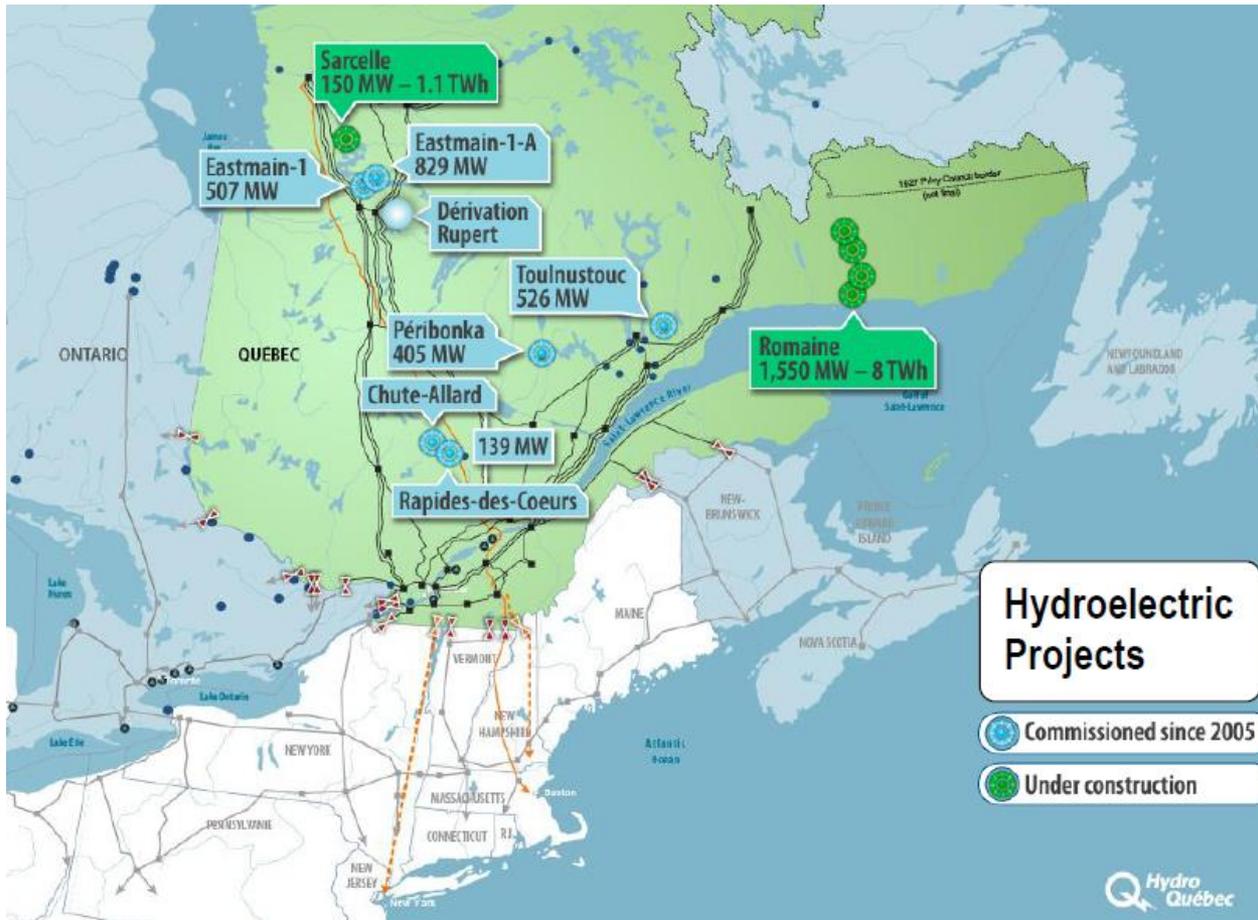


2013 CONNECTICUT POLICY POSITIONS

1. Connecticut should provide **competitive solicitations for long term contracts** with Class I renewable energy developers under a **portfolio approach** (no limit on project size) that **does not pick winners** to ensure the maximum amount of sustainable, cost-effective renewable resources are developed to meet Connecticut's Class I RPS requirements;
2. Allowing Canadian hydro to offset a portion of Class I is incompatible with the very purpose of a Renewable Portfolio Standard approach which is to **develop new renewable resources** not subsidize fully amortized resources or ones that needed no incentives to get built;
3. Rather, Connecticut should **explore opportunities for all hydro to provide base-load generation as well as the potential for load-following electricity**. Canadian hydro can make new transmission for distant variable resources more economic by "firming" the line during times of their lower output. All hydro improves the reliability of the power system by diversifying the type of resources now becoming dominated by natural gas. This can partly justify paying "above market" for Canadian hydro;
4. Large-scale renewable penetration in New England will result in **substantial reductions in harmful air emissions**. New large hydroelectricity facilities are a large emitter of carbon dioxide in the early years of operation. Even over their lifetimes newly flooded Canadian reservoirs may emit nearly two-thirds of the greenhouse gases emitted by natural gas power plants. **Imports from Hydro-Quebec, now untagged as to the origin of the resource or "system power", include fossil-fuel derived electricity which lowers its price while weakening its environmental attributes;** and
5. Connecticut's renewable energy industry benefits from regional RPS policies regardless of whether projects are sited within the state or across New England. Scores of Connecticut-based companies are part of the wind and solar energy manufacturing and services supply chains. **Connecticut contractors and developers even build New England wind projects**. By contrast, Connecticut companies are unlikely to benefit from new Canadian renewable energy projects due to provincial local content requirements.

Why an RPS?

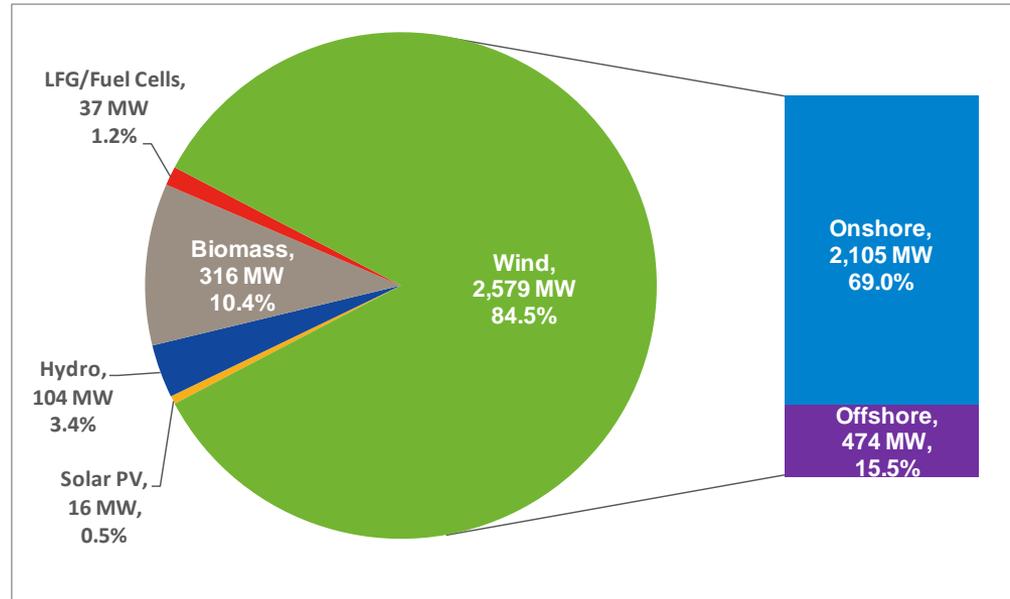
The principal goal of an RPS is to drive *new* renewable resource development. Quebec hydro resources needed no incentives outside Quebec to get built.



Substitute Bill 1138 Offsets Class I RPS Resources with Large Hydro

Year	Class I Existing	Class I Proposed	Proposed Class I offset - max. Canadian large hydro	Proposed Class I offset - min. existing Class I
2013	10	10	0	10
2014	11	11	2	9
2015	12.5	12.5	3	9.5
2016	14	14	3	11
2017	15.5	15.5	3	12.5
2018	17	17	3.5	13.5
2019	19.5	19.5	4	15.5
2020	20	20	4.5	15.5
2021	20	21	5	16
2022	20	22	5.5	16.5
2023	20	23	6	17
2024	20	24	6.5	17.5
2025	20	25	7.5	17.5

Class I Resources Are Abundant



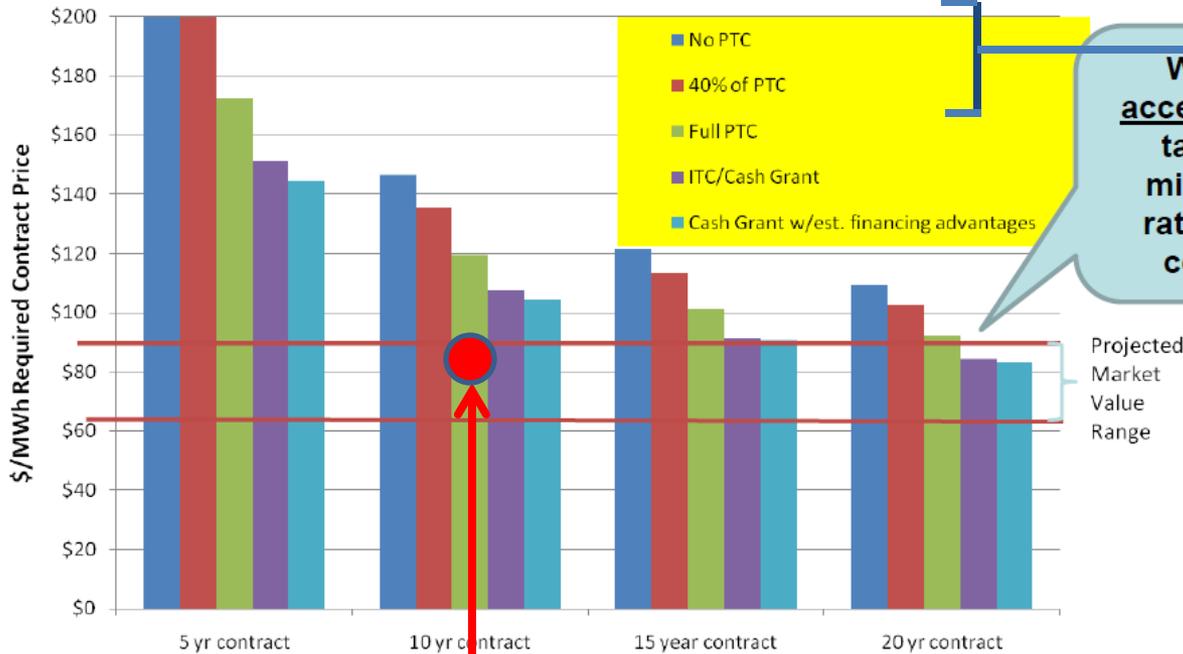
Proposed New England capacity from renewable resources in the ISO Generation Interconnection Queue. Source: ISO New England 2012 RSP.

150 MW of wind (a small fraction of proposed wind plants) will produce enough energy to meet the this year's increase (from 9 to 10 percent) in Connecticut's Class I RPS requirement.

Large Wind Versus Solar; Longer Term Contracts; and Expiring Federal Tax Credits

Federal Incentives on RE Premium (gap)

Illustration of Impact of Policy, Revenue Stability, Finance on RE Economics for Sample 50 MW Wind Farm



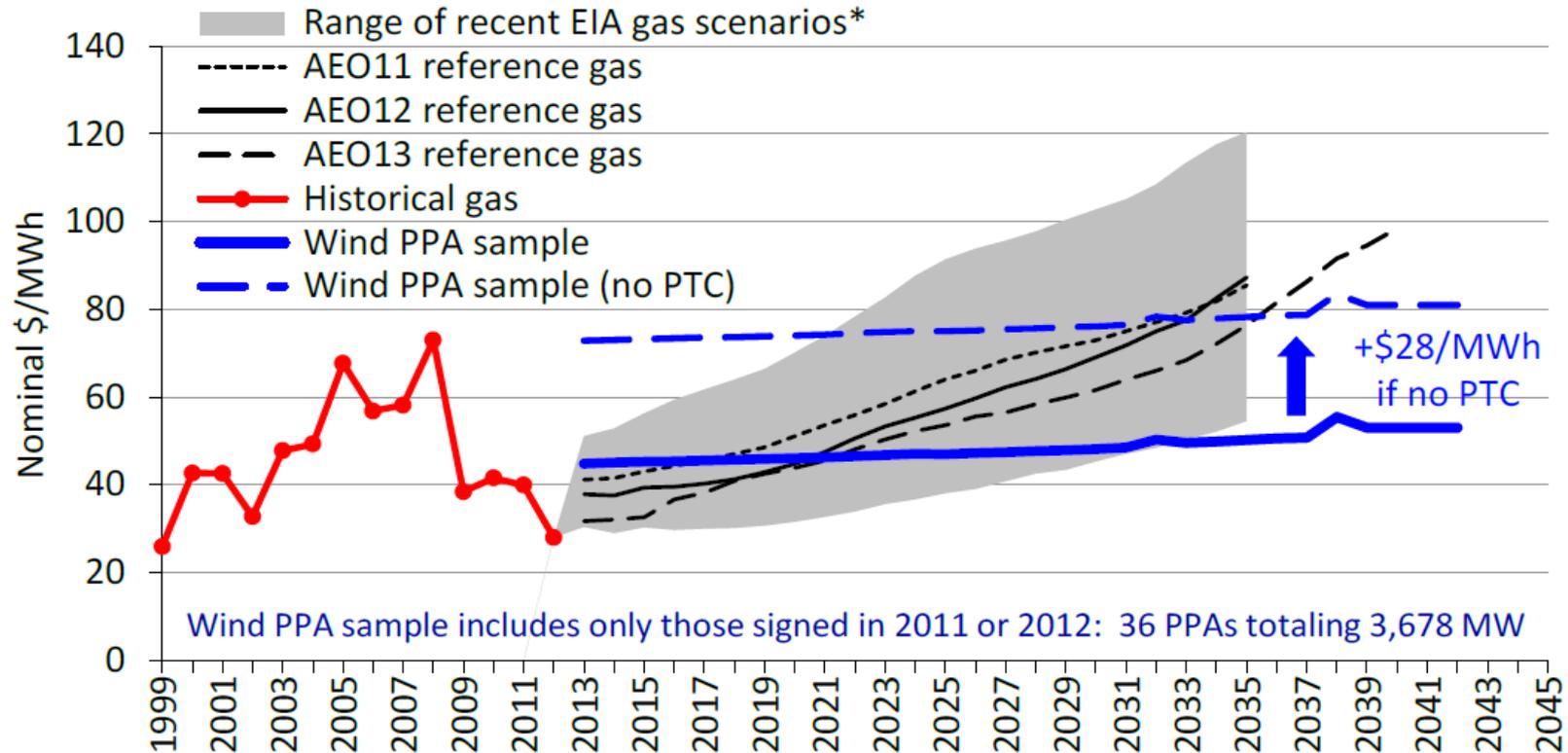
Would accelerating targets minimize ratepayer costs?

Connecticut Sec. 127 solar procurement in 2012 for 10 MW (2 projects) of energy and RECs under 20 year contracts starting at \$157 and \$190 MWh escalating each year to end at \$229 and \$333 MWh.

Massachusetts "Green Communities" large onshore wind procurement by NSTAR Electric in 2011 for 109 MW (3 projects) of energy and RECs under a 10 year contracts with a fixed price of around \$85 MWh.

Value of Wind in Hedging Energy Prices

Only renewable resources with their “free” fuel can provide an effective long term hedge against electricity price swings caused by the volatility in natural gas markets which generally set the price of electricity in New England.

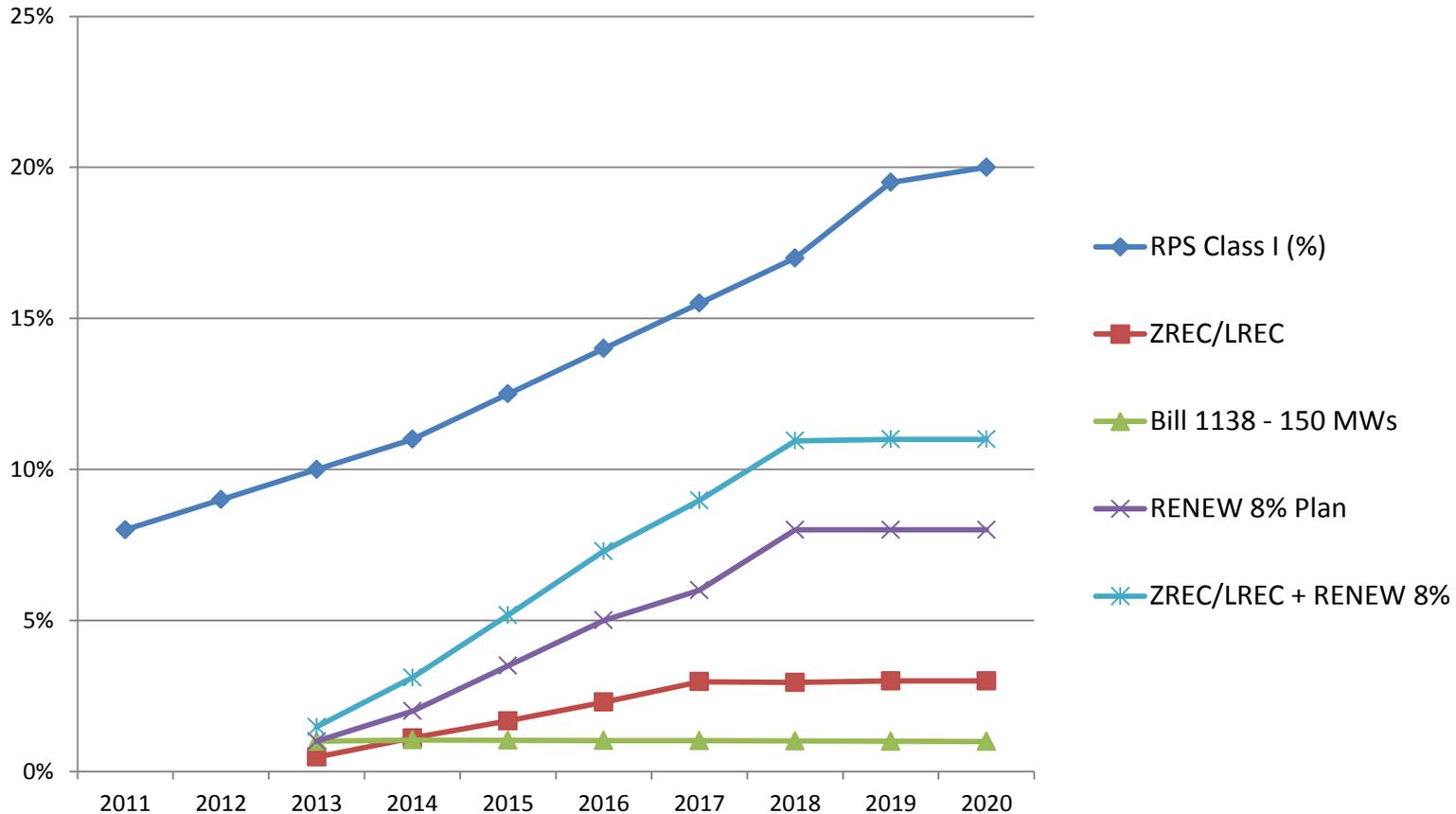


*Fuel cost projections are translated from \$/MMBtu into \$/MWh terms using average heat rates implied in the NEMS modeling output

Source: M. Bolinger, “Revisiting the Long-Term Hedge Value of Wind Power in an Era of Low Natural Gas Prices,” Lawrence Berkeley National Laboratory, LBNL-6103E (March 2013).



Long-Term Contracting Proposal for Connecticut to Meet Class I RPS Goals



The current Class I RPS programs (largely from ZREC/LREC) will meet less than a quarter of Connecticut's RPS requirements by 2018. RENEW's 8% Plan aims to have at least half of Connecticut's 2020 RPS goal under long-term contracts by 2018. Large scale wind resources are cost-effective and provide value by hedging energy and REC costs.



**Testimony of Renewable Energy New England, Inc. before the
Energy and Technology Committee on**

Proposed Substitute Bill 1138 (LCO No. 4767)

An Act Concerning Connecticut's Clean Energy Goals.

March 19, 2013

Senator Duff, Representative Reed, Senator Chapin, Representative Hoydick and members of the Energy and Technology Committee, my name is Francis Pullaro and I'm here on behalf of Renewable Energy New England, Inc. ("RENEW"), its Executive Director, to testify in opposition in part and support in part to Proposed Substitute Bill 1138, *An Act Concerning Connecticut's Clean Energy Goals*.

RENEW is a non-profit association uniting from New England the renewable energy industry and environmental public interest groups. Its mission involves promoting clean, renewable and environmentally responsible technologies for the region that will increase energy diversity, spur economic development, and improve environmental quality.

The New England States Committee on Electricity's 2011 Request for Information and its 2012 Supply Curve analysis point to large scale wind plants- primarily onshore wind now and considerable offshore wind in the years ahead- as the predominant renewable energy resource for meeting New England's collective RPS goals.

Recommendation Summary

Recommendation One: RENEW recommends the 150 MW cap in the bill be removed in favor of contracting for 8 percent (the RPS requirements are measured in percent of MWh not MW) of the Class I RPS requirements by 2018, which will place at least half of Connecticut's Class I RPS goal under long-term contract giving consumers substantial benefits

Recommendation Two: For out-of-region hydropower to provide the benefits of fuel diversity and a cleaner (than gas) energy supply, it is not necessary to weaken the Class I RPS requirements by allowing large hydropower resources into it. Contracts for the power alone are sufficient. RENEW recommends Section 4 be stricken from the bill to eliminate the ability of large hydropower to offset RPS requirements.

The Good.

In Section 5 of the bill, RENEW supports giving the Commissioner of the Department of Energy and Environment Protection (“DEEP”) the authority to enter long term contracts with RPS Class I renewable energy developers. Long term contracting opportunities will enable the industry to make long term investments and reduce the cost of RPS compliance for Connecticut’s consumers.

The bill seeks to give DEEP the authority to act soon so Connecticut can complete an RFP process in time to secure long term contracts with wind energy developers having projects that are able to qualify for the federal wind energy tax credits, which lower the cost of wind development, before they expire at the end of this year. A key ingredient for success in getting renewable projects built is providing developers with the long term commitment from a creditworthy counterparty, such as the utility, for their products- energy, RECs and capacity. Today, renewable energy and even most traditional new generation are very difficult to finance without a long term contract due to the risks of relying on short term energy markets to recover a project’s long term capital investment.

Another benefit of long term procurements lies with giving the state the opportunity to coordinate its procurement of renewable energy with the other New England states (line 244). RENEW applauds Governor Malloy for his support of regional coordinated procurement at the 2012 meeting of the New England Governors’ Conference. The benefits from regional coordination will arise by capturing some of the economies of scale (like consumers at club warehouse stores) from larger scale renewable energy projects and potentially facilitating in the years ahead additional intraregional transmission capacity to deliver the energy from those resources.

While some may be concerned about locking the state into long term contracts with wind resources, having a significant amount of the Class I RPS requirements under long term contract provides consumers with the benefit of hedging their exposure to volatile energy and REC prices.

Although we are in a low natural gas price environment, wind can be a cost effective near term way to offset fossil fuel consumption with cleaner resources and, in the long term, provide hedge value. Conventional hedging instruments are unavailable or too expensive to lock in

natural gas prices over longer terms. Only renewable resources with their unlimited “free” fuel can provide an effective long term hedge against electricity price swings caused by the volatility in natural gas and other fossil fuel markets. The lack of fuel inputs also allows them to be price takers in our regional electricity market. By bidding zero in the real time market, renewable resources make it unnecessary to dispatch more expensive resources with higher operational and fuel costs. The result is a reduction in wholesale market clearing prices.

Long term contracts also provide an alternative to address concerns with REC market volatility and the level of the ACP. A longer-term contract that includes RECs will enable renewable energy developers to offer a price less subjected to short-term supply and demand and more reflective of the project’s incremental costs. This will produce a flatter average price over time that will significantly reduce the risk that future supply shortages will lead to price spikes that will both negatively impact electricity customers and REC compliance.

Recommendation One: Connecticut should provide for long term contracts with renewable energy developers to ensure the maximum amount of sustainable, renewable resources are developed at the least cost to meet Connecticut’s RPS requirements. The current Class I RPS programs (largely from ZREC/LREC) will meet less than a quarter of Connecticut’s RPS requirements by 2018. The bill provides for the procurement of up to 150 MW of Class I RPS resources at any point after March 31, 2013. RENEW recommends the 150 MW cap be removed in favor of contracting for 8 percent (the RPS requirements are measured in percent of MWh not MW) of the Class I RPS requirements by 2018, which at that point will place at least half of Connecticut’s Class I RPS goal under long-term contract. By not limiting the size of projects eligible for contracts, as under the ZREC/LREC programs, consumers can benefit through contracts with the least cost resources.

The Bad.

RENEW opposes the changes in Section 4 of the bill that allow large Canadian hydropower to offset a portion of the Class I RPS requirements.

If the purpose of this change is to address the 2012 IRP’s projection of potential shortfalls for Class I RECs starting in 2017, and corresponding high long term REC prices, then it overlooks the potential of available state policy options, such as state directed long term contracting, to give Connecticut a stable, low-cost path to meet its RPS goals. Several recent data points suggest that Connecticut’s current RPS goals are achievable and appropriate in light of future supply. For example, through its Request for Information (“RFI”), NESCOE concluded that developers could supply approximately 15,000 GWh/yr by 2017, or more than the regional RPS target for 2020.

The suggestion that “out-of-region” large hydropower might help meet Connecticut’s Class I RPS requirements more effectively overlooks the sound reasoning behind the prior decisions by all state legislatures in New England that established an RPS to do just the opposite and establish Class I RPS requirements without eligibility for large hydropower. In the first instance, RPS requirements are intended to facilitate deployment of new, sustainable technologies that need financial incentives to be deployed at utility scale. Providing ratepayer incentives to existing large hydropower capacity would amount to sending ratepayer funding out of the country for a resource that is already economically viable and with questionable sustainability and clean energy attributes.

The idea large hydropower imports will be cheap (as in “below market”) and entirely clean is misplaced. First, any large-scale import from the Hydro-Quebec system will require new transmission inflating the costs of any such purchase, while simultaneously impairing its near-term viability. Second, an import from Hydro-Quebec will either need to be tagged to the qualifying resource of its origin, or it will be similar to the “system power” electricity that is provided to other jurisdictions like Vermont.¹ If it is the former, the cost of the import plus associated transmission is likely to be very high and prohibitive for the ratepayers of Connecticut given the cost of such resources at Hydro-Quebec. If it is the latter (i.e., an import of “system power” from Hydro-Quebec), the power simply cannot be considered fully clean nor renewable. The reason for this is straightforward: As has been noted by Hydro-Quebec, it operates a system with large storage capacity associated with reservoirs, and has significant inertia capacity with its neighbors. To optimize this system, Hydro-Quebec frequently imports power from jurisdictions reliant on fossil fuel generation during lower-priced hours, and then exports this power to markets in need, including New England. As a result, any import of this “system power” from Hydro-Quebec is likely to include fossil-fuel derived non-renewable energy rather than electricity generated entirely by hydropower.² While smaller-scale hydropower resources that are tagged to their unit of origin should qualify for the Connecticut RPS, imports of Hydro-Quebec “system power” clearly do not meet the intent or objectives of the program.

As for the cost to Connecticut for system power from Quebec under a long term contract, it likely will not be cheap, particularly given the current period of low natural gas prices, nor below market based on recent evidence with the Quebec-Vermont long term contract for energy. That contract started in November, 2012, at \$58/MWh and “after the first year, the price of power under the HQ PPA is derived by a formula based on regional electricity prices and the movement in general of price levels observed across the U.S. economy, subject to a damping feature that limits the change from the prior year’s price.”³ In other words, the contract started

¹ See Vermont Public Service Board, Docket 7670, Order of 4/15/11 at 3.

² See “Electricity Market Impacts of the Northern Pass Transmission Project,” PA Consulting Group, June 2012, available at

<http://www.nepga.org/files/library/pa_report_electricity_market_impacts_of_the_northern_pass_transmission_project_june_11_2012.pdf>.

³ Vermont Public Service Board, Docket 7670, Order of 4/15/11 at 11.

above market this past fall (average price in Vermont for a comparable “7x16” peak product over the last 12 months, Oct 2011 – Sep 2012, in both day-ahead and real-time wholesale electricity market was approximately \$38/MWh) and in subsequent years adjusts upwards or downwards based on the market price for energy subject to a price volatility smoothing feature.

The biggest beneficiary of Connecticut giving large hydroelectricity resources above market contract for its energy will be the government of Quebec as the single shareholder of Hydro-Quebec. Its state-controlled hydroelectric projects have been, and new projects will be, built regardless of whether the RPS Class I definition is modified to include large hydroelectric facilities. Since 2005 alone, Hydro Quebec has commissioned over 2400MW of new hydroelectric facilities. Construction is now underway for an additional 1700MW. Allowing large hydropower resources to benefit from above market contracts provides economic benefits to the people of Quebec, at the expense of Connecticut ratepayers, for building hydroelectric dams that need or needed no encouragement or financial support to be built. Even Northeast Utilities, which is looking to facilitate the importation of Canadian hydroelectric power through their Northern Pass transmission project, submitted to the Massachusetts Department of Public Utilities that the RPS was designed to “support the development of renewable generation that is unable to compete on price with conventional generation. Large-scale hydroelectricity is not viewed as needing these types of subsidies because it may be the lowest cost source of clean power available.” DPU Docket 10-170, Information Request DPU-02, Q-DPU-NU2-005, Filed February 11, 2011. In sum, large hydropower’s environmental impacts and ability to compete without RPS incentives make it unsuitable for RPS eligibility and REC revenue.

Large hydropower does not rise to the high level of sustainability of wind or solar resources. The redirecting of rivers and flooding of vast amounts of land that comes with building large hydroelectric projects has significant negative environmental impacts. It harms fish, displaces native peoples and releases mercury into the environment. A recent Synapse Energy Economics report, *Hydropower Greenhouse Gas Emissions: State of the Research*, concludes that the new reservoirs created by hydroelectric dams emit greenhouse gases, relative to the forests and wetlands they flood (which often take greenhouse gases out of the atmosphere). In the first several years after a reservoir is created, large amounts of newly inundated organic material decompose, emitting carbon dioxide that diffuses through the water into the atmosphere. As a result, a reservoir’s net emissions in its early years are very high – starting out even higher than emissions from a natural gas power plant per unit of power generated. In this regard, new Canadian hydroelectricity resources will not contribute to the requirement of the Connecticut Global Warming Solutions Act to reduce greenhouse gas emissions to 10 percent below 1990 levels by January 2020. Public Act 08-98, *An Act Concerning Global Warming Solutions*. Even when emissions are projected over their lifetimes, newly flooded Canadian reservoirs may emit nearly two-thirds of the greenhouse gases emitted by natural gas power plants - far more than renewables like wind, solar, and run of river hydropower.

RENEW does see a potential important role for all hydropower including Canadian hydropower. According to the New England States Committee on Electricity, land-based and offshore wind resources will be largely responsible for meeting the region's renewable energy goals and transmission upgrades will be needed to make larger quantities of wind energy deliverable in the years ahead. State planning for these transmission upgrades should evaluate whether imports of Canadian hydropower and state support and incentives to expand existing dams in Connecticut⁴ and the region can lower the cost of these improvements by "firming" the lines during times of lower output from variable resources. Today, flexible gas-fired generation is seen as a reliable and cost-effective solution to firming intermittent renewables generation. Canadian hydropower may have a large part in making long distance transmission upgrades more economic, improving the reliability of the power system by diversifying the type of resources able to respond to the variable nature of many renewable resources, and providing that reliability benefit with carbon emissions that, in the long term, are lower than natural gas resources. State contracting policies alone can facilitate the importation of Canadian hydropower; it does not require large Canadian hydropower resources also to be eligible for REC revenue and/or to satisfy RPS requirements.

Recommendation Two: RENEW supports a contracting-only tier for hydropower resources for the reasons described in lines 272-275 of the bill but it should not be limited to only large hydropower resources in Canada. The bill's definition of large-scale hydropower resources as a "Class I contracted tier renewable energy source" excludes existing older-vintage small-scale hydropower resources. This is contrary not only to the environmental goals of the RPS, the policy of the administration to not "pick winners and losers," but also our desire to generate more renewable energy in-state and reduce the cost burden on Connecticut consumers. Pre-2003 small-scale hydropower can have operating characteristics that are substantially beneficial to the environment, but also increase their operating costs. These increased operating costs are relative to their low generation output, which without appropriate recognition, can result in difficulty keeping the facilities viably operating. A long term contracting tier for all hydropower types should ensure we also develop, maintain, and make more sustainable New England's own hydropower resources. What Massachusetts' Commonwealth Hydropower Program, for example, does through grants to increase the output of ecologically-appropriate projects hydropower assets might be accomplished in Connecticut through long term contracts with these resources.

⁴ A recent DOE study shows that 247 MW (68 MW in Connecticut) of hydro generation in New England could be developed at non-powered dams, which currently do not produce electricity but provide a variety of services, such as water supply and inland navigation. Over 80% of the conventional hydro dams in New England have some water storage capability that allows for peaking and ponding hydro plant operation. Source: ISO New England 2012 RSP

Economic Development Benefits of Wind for Connecticut

While large Canadian hydropower may potentially be a cost-effective energy resource for Connecticut, it will not produce any economic development opportunities. Unlike in the rest of the region where Connecticut companies are developing and operating large wind facilities, Quebec's proposed wind projects, for example, totaling over 4000 MW, will not provide any opportunities for Connecticut companies due to the province's protectionist local content restrictions. We should not forget the benefits wind power can provide to our state.

Connecticut's renewable energy industry benefits from RPS policies throughout the region even if projects are sited outside the state. Several wind developers and operators have headquarters or offices in Connecticut. The Old Saybrook office of Quantum is developing wind projects in New England including a 37.5 MW project in Maine having a long term contract with Northeast Utility's Western Massachusetts Electric. Connecticut is directly connected to wind turbine manufacturing. Torrington-based Optiwind makes innovative small and mid-sized turbines and Fairfield headquartered GE is a global leader in the large wind turbine classes. One of the top construction contractors in the country, Cianbro, has completed large wind projects outside the state using its regional office in Bloomfield. As a contractor for large scale wind projects, the Bloomfield facility can benefit from Connecticut's support for large wind projects outside the state. Scores of Connecticut-based companies, beyond solar installers, are part of the renewable energy manufacturing supply chain in areas such as construction, electronic equipment, gears and bearings, metal fabrication, trucking, wire and cable; and they provide project finance, legal services and insurance.

The construction of proposed offshore wind projects totaling more than 1 GW in the waters beyond Block Island and onshore transmission infrastructure can boost the economy of southeastern Connecticut by using its ports and drawing upon its skilled labor force. One offshore wind developer, Deepwater Wind, has even proposed bringing its offshore wind power to Connecticut through undersea transmission to Bridgeport Harbor and/or Millstone (Waterford). The state's maritime sector and the other economic activity it generates already produces more than \$5 billion in output and more than 30,000 jobs. Offshore wind can build on these impressive figures.

Conclusion

Addressing our energy and environmental challenges cost effectively requires predictable policies, a long-term perspective, and recognition that additional support for large projects can lower development costs because of the more efficient production associated with larger wind turbines and a higher number of turbines per project. Establishing a program of state directed long term contracting and support for regional coordinated procurement that spurs large scale

resource development will enable the industry to make long term investments and reduce the cost of RPS compliance for consumers across our region.

Thank you for the opportunity to testify before you today.

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