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Woodland owners' attitudes towards energy from forest biomass in a carbon-intensive jurisdiction: Case study of Nova Scotia, Canada

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ABSTRACT

The use of forest biomass in thermal generation processes has been recognized by the Government of Nova Scotia (NS) as one option that could help meet its renewable electricity goals (25% by 2015 and 40% by 2020). Over half of the woodland in NS is owned by small-private woodland owners (51%), indicating that they could significantly influence the future of NS forests and its potential use for energy purposes. This paper presents the results of a survey of small-woodland owners on their attitudes towards using energy from forest biomass. 489 small-woodland owners responded to mail-out surveys and 14 rural community members participated in three focus groups. Three major findings emerged. First, it was found that the acceptability of using forest products varied depending on multiple factors – the source of biomass, harvesting methods, and [predicted] end-use. Second, forest sustainability and keeping resources local were the two most important concerns amongst respondents. Finally, respondents felt that better collaboration with other stakeholders and education around the issues would be the best strategies for overcoming these concerns. The paper also highlights the barriers and drivers as perceived by the woodland owners as they relate to the possibility of using more biomass for energy in the future.

1. Introduction

Nova Scotia, a peninsular province located on the eastern coast of Canada, is facing major challenges in meeting its energy security needs. Energy security, as stated by the International Energy Agency [1], is to have an available supply of energy at an affordable price. That energy must also be accessible to all and from an acceptable source. The World Bank lists three key pillars of energy security: energy efficiency, diversification of energy supplies, and being able to manage price volatility [2]. When analyzed on all three pillars, NS falls quite short [3].

Being a peninsular land mass, the province is virtually surrounded by the Atlantic Ocean. It has abundant wind [4], tidal [5] and solar [6] potential, as well as abundant forests; potentially available for biomass production. However, up to 88% of NS's energy resources have been based on imported fossil-fuel resources [3,7,8] making NS energy-insecure. The Government of NS is taking steps to improve its energy security by increasing its renewable energy portfolio and, more specifically of interest to this research, its renewable electricity supply.

To increase renewable electricity generation from 12% to 25% by 2015, and to 40% by 2020, the Government of NS commissioned Dalhousie University to hold stakeholder consultations to explore a new renewable energy strategy for the province [7,8]. In the final report, biomass was included as an integral part of the new renewable energy mix, but it also recognized the need for further research to ensure that the sustainability concerns associated with biodiversity, conservation and existing forest management practices, such as clear-cutting, are properly addressed [6]. So, while a market for biomass does exist, it was noted that the sustainability of the biomass supply and the acceptability of using forest resources for energy need further research.

Most of the biomass being used in Nova Scotia for energy is forest biomass, and will be referred to simply as biomass for the remainder of the paper. In NS, biomass provides: firewood for over 100,000 homes; fuel for co-generation facilities; fuel for heat energy systems within pulp and paper plants and two sawmills; raw material for pellet manufacturing; and fuel for other wood-related industries to power their facilities (waste wood and production waste) [9]. There are also several institutional users of biomass for energy, with several such applications in the planning and development stages.

While many institutions are dedicated biomass users, other groups are opposed to using forest resources in this way. For

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example, many anti-biomass headlines have recently appeared in regional newspapers, such as "Biomass project means big risks" [10]. On April 13th, 2011, a press conference and rally was organized by the Ecology Action Centre (EAC), a local environmental non-governmental organization (ENGO), to oppose large-scale biomass operations [11]. This division poses challenges for government and other policy-makers trying to move forward with new technology and policy development. This is particularly true when even woodland owners and the general public – not just ENGOs and industrial sector types – have limited consensus about timber harvesting and forest management practices [12].

During the 2009 stakeholder engagement process, through which the Government of NS attempted to achieve such a consensus, a number of stakeholder groups effectively voiced their opinions to government on issues they believe need to be addressed [8]. However, not all stakeholders are comfortable engaging on such a controversial topic. For example, Sanderson et al. [12] found that over 50% of the respondents to a province-wide survey targeting small-woodland owners had never really expressed their views on the use of Nova Scotia's forests in any active way. When they did discuss their feelings, it was not an action-centred engagement, but involved talking with friends, neighbours or other landowners about their concerns [12]. This study, therefore, endeavours to address this potential information gap by determining the views of small-woodland owners, highlighting both the disparities and agreements within that stakeholder group. We aimed to reveal what small-woodland owners perceive to be the benefits of and barriers to pursuing a biomass energy agenda in NS.

To understand the context within which NS woodland owners live and form their opinions, the paper first addresses three key areas: a) the current state of Nova Scotia's forest biomass energy supply; b) the forest economy, ownership and management practices; and c) the attitudes of five key stakeholder groups. These stakeholder groups are: government agencies; environmental non-governmental organizations (ENGOs); industrial woodland owners; energy companies; and small-woodland owners. Along with an overview of the pertinent literature, this will provide important context for the survey approach, results and key outcomes of the research.

2. Current situation

2.1. Biomass energy in Nova Scotia

Electricity from biomass is currently produced by independent power producers (IPPs) and either purchased by the province's largest electric utility, Nova Scotia Power Inc. (NSPI), or used inside the industrial facility where it is generated. It represents a minimal contribution to the grid, equivalent to the energy needed to power 7500 homes [13]. This is less than 1% of the total energy demand in NS and barely 2% of total electricity generation. Of the total renewable electricity generation, biomass makes up about 13% of the 1690 GWh produced annually.

Other jurisdictions in Canada and world-wide are using biomass to a much greater extent that Nova Scotia, often with much smaller local resources. For example, in Denmark, where less than 11% of the total land base is forested, biomass currently fuels nearly 70% of renewable energy generation [14], and in Sweden (55% forest covered), biofuels, including peat, organic wastes and forest materials, represent approximately 65% of renewable energy supplies [15]. In the Province of Ontario, 78% (114 TWh) of its renewable energy generation was supplied from biomass [16]. Ontario covers a vast area (107.6 million hectares) with nearly two thirds of it forest [17]; while this represents a resource approximately 16 times greater than NS' 4.3 million hectares of forests, the energy generated by biomass in Ontario in 2011 was more than 500 times that being generated in Nova Scotia.

2.2. Nova Scotia's forests

The ownership of NS forested land can be divided four ways: 3% federal, 29% provincial, 18% industrial private, and 51% small private (for a combined total of 69% private ownership) [18]. There are more than 30,000 small private woodland owners in NS, defined as individuals owning between 2 and 2000 ha of land [19] many of whom are involved in supplying wood to the forest-products industry. In order of financial significance, these industries include: the paper-and-pulp industry; the saw-timber industry; the wood-pellet industry; and the Christmas-tree and maple-syrup industries (categorized as "other" industries in Table 1). There are also significant numbers of wood-exporting businesses in NS (Table 1).

2.3. Stakeholders

The key stakeholder groups at play in this debate are five in number: government agencies; ENGOs; industrial woodland owners; energy companies; and small-woodland owners. They are highlighted here because of their ability either to influence policy outcomes or to be affected by them.

2.3.1. Government

While Canada is not currently a full signatory of the Kyoto Protocol, the agreement was a catalyst for the Government of NS to focus on developing new energy policies [7]. In Canada, provincial governments have authority over and manage most natural resources, including energy. In the Government of NS, three departments are integral to energy decision-making: the Department of Environment; the Department of Energy; and the Department of Natural Resources. To support this decision-making, there are two primary pieces of policy. In 2007, the Government of NS developed the Environmental Goals and Sustainable Prosperity Act (EGSPA) [20] and then the Climate Change Action Plan in 2009 [21].

The Climate Change Action Plan lists three actions [15–17] which are directly linked to future biomass potential production. The intent of the actions is to: develop a bio-resource strategy; provide funds for future feasibility studies of biomass for energy generation; and support development of other uses of biomass [21]. The intent of the actions will help redefine what is acceptable in terms of using biomass for energy. EGSPA, on the other hand, defines the legal limits and obligations of NS to meet climate change mitigation strategies. Limits on GHG emissions, guarantees of land protection (12% by 2015), and renewable energy targets are all significant influencing factors when considering the addition of more biomass-based generation facilities to the electricity grid of NS [21].

The NS Department of Energy's most recent and significant plan, which overlaps with the work of the Department of Environment, is

Table 1
Number of operational businesses.

Business type	2009	% of total wood harvest
Firewood sales	14	0.4%
Other	12	2.4%
Pulp/paper mill	3	41.0%
Sawmill	185	51.3%
Wood exports	27	4.9%
Total	**241**	**100.0%**

Source: Registry of Buyers, DNR, 2010.