

Incentives for Firms to Invest in Bioenergy Production in the Present Process of Redesigning the Tenure and Pricing System of Ontario

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Received 11 April, 2011
Accepted 19 April, 2011.

ABSTRACT

Tenure is the long term fibre security provision. Ontario has three ways of tenure: wood supply commitments, forest resource licences, and forest resource processing facility licences. The existing Crown forest tenure and pricing system in Ontario was established by the Crown Forest Sustainability Act (CFSA) 1994. The main aspects of tenure and pricing of present redesigning process are as follows: maintaining a healthy and productive forest; modernizing licensing and allocation; and improving pricing systems. There are three main ways which can be considered to reform the existing Crown forest tenure and pricing system, namely corporatization, privatization, and decentralization. The Crown forest tenure and pricing system should consider multiple attributes of forests, such as sawlog, pulp and paper, biomass, and non-timber forest products. Canadian Government should give incentives to the firms to produce bioenergy by using wood biomass from its vast forest areas to take the lead of the world in bioenergy production. There must be a strong policy which can support bioenergy sector in Ontario.

KEY WORDS: Tenure and pricing; Forest; Ontario; Biomass; Bioenergy; Policy.

INTRODUCTION

The provision of long term fibre security is called tenure. There are different forms of tenure. Tenure has been used in Ontario as a tool to attract private sector investment and new industry development. Tenure is provided in Ontario by any of the following three ways: (1) wood supply commitments, (2) forest resource licences, and (3) forest resource processing facility licences [1].

Wood supply commitments are agreements, which vary from 10 to 20 years, between the Crown and a licensed mill. By these supplying of forest resources from Crown lands can be made available. To obtain the committed wood fibre, mills with wood commitments must be in business arrangements with forest resource licence holders because wood supply commitments do not provide mills with wood commitments with a licence to harvest wood [1,2].

Forest resource licences are of two types under the Crown Forest Sustainability Act (CFSA) for forest harvesting on managed Crown forest lands. The two types of forest resource licences are as follows: (i) Sustainable Forest Licences (SFLs), and (ii) Forest Resource Licences (FRLs). According to the requirement of CFSA, licensees must pay Crown charges for forest resources whenever Crown timber is harvested. The licences must be signed by the Minister and approved by the Lieutenant Governor [1].

Sustainable Forest Licences (SFLs) are issued under Section 26 of the CFSA for up to twenty years. Every five years the SFLs are reviewed and if certain conditions are met it may be extended for an additional five years. An SFL holder has the right to harvest all species of trees found in a licensed management unit of Crown forest. SFL holders do not have rights to Crown land. With the written consent of the Minister SFLs may be transferred and may not be sold [1]. Certain management responsibilities must be performed by the SFL holders, such as forest management planning; forest information gathering; forest roads constructing; forest regenerating; and compliance planning and monitoring [1, 2].

Forest Resource Licences (FRLs) are issued under Section 27 of the CFSA for a term of up to five years. Under special circumstances FRLs can be extended for one additional year. Generally only portions of management units are

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covered by FRLs, and most often there is overlapping with an area of SFL. In this case to avoid conflict the licensees and Crown arrange different harvest rights agreements. The harvest of certain amounts and species of timber is allowed by the FRLs, but land rights are not allowed by these Licenses. The FRL are transferable but may not be sold. FRL holders must act in accordance with the following: Forest Information Manual; Forest Management Planning Manual; Scaling Manual; and Forest Operations and Silviculture Manual [1]. Some examples of FRLs are as follows: use for firewood and construction purposes; forest resource harvesting of the Crown reserve on patent land; and Crown forest resources on private land [1,2].

Forest Resource Processing Facility Licences (Mill Licences) are described as follows. The CFSA requires that all mills consuming more than 1,000 m³ timber must have a Forest Resource Processing Facility Licence (Mill Licence). By this licence the mills get the right to run and/or build a forest resource processing facility. In Ontario roughly 215 licensed mills are available. To facilitate proper monitoring of forest resources and wood flow the licensed mills need to provide the government with annual wood consumption and production summary statistics [1,2].

At present the process of re-designing the tenure and pricing system of Ontario is going on. Only by the conventional harvesting of sawlog and pulpwood the industries of Ontario cannot compete in global forestry business [2,3]. Wood biomass should be harvested to produce energy in the bioenergy plants by using wood biomass feedstock to make the forestry business profitable and also to reduce greenhouse gas emission [3,4,5]. In the present process of reforming tenure and pricing system of Ontario we need to find out the way how we can create incentives for firms to invest in bioenergy production.

HISTORY OF CROWN FOREST TENURE

Since time immemorial Aboriginal peoples have been using the forests of Ontario for their livelihood, recreation and cultural activities. The Ontario's forests have been used by different types of uses for social, economic and environmental benefits. Historically the forests of this province played a vital role for the development of industrial economy of the province [1,2].

In the early 1800s, government recognized the importance of forest resources. To collect revenue from Crown forests government started taking initiatives step by step. In 1827 Crown dues collection, as payments for Crown timber, was started by issuing licenses to cut Crown timber. During that time government supported railway construction, mining, and timber utilization for fuel, lumber and pulp and paper with land grants and other incentives. Government continued to grant timber licences through the 1800s into the early 20th century. During this time several regulations created to fulfill the demand of that time. In the early 1900s 14 large pulp and paper mills were established and many people were employed by enforcing directions to limit the export of unprocessed timber. By this way economic foundation of Ontario province was built [1,2].

In 1952, to manage the forest resources in an organized way the Crown Timber Act was revised. Then 126 forest management units were created in Ontario province out of which forest companies managed 42 management units and the Crown managed rest of the management units. For managing the forest efficiently and effectively various strategies were implemented [2].

In the 1990s, the approval of the Class Environmental Assessment for Timber Management on Crown Lands in Ontario (Class EA) was done, and the Crown Forest Sustainability Act (CFSA) 1994 was passed. By this way sustainable forest management was ensured in Ontario. The existing Crown forest tenure and pricing system was established by CFSA. In 2003, the Class EA was amended and extended. At present this system is used in Ontario [2].

FOREST OWNERSHIP IN CANADA

Forest ownership in Canada is illustrated in Table 1. Forest area (million ha), harvest volume (million m³), and provincial, federal and private forest ownership (%) in each province of Canada are shown in this table [1,3].

Table 1: Forest land area, annual harvest volume and forest ownership in Canada [1,3]

| Province | Forest Land (million ha) | Annual Harvest Volume (million m ³) | Forest Ownership | | |
|---------------------------|--------------------------|---|------------------|-------------|-------------|
| | | | Provincial (%) | Federal (%) | Private (%) |
| Quebec | 84.6 | 43.3 | 89 | | 11 |
| Ontario | 68.3 | 25.2 | 91 | 1 | 8 |
| British Columbia | 64.3 | 87 | 96 | 1 | 3 |
| Alberta | 36.4 | 23.5 | 89 | 8 | 3 |
| Manitoba | 36.4 | 2.1 | 95 | 2 | 3 |
| Saskatchewan | 24.3 | 6.1 | 90 | 4 | 6 |
| Newfoundland and Labrador | 20.1 | 2.3 | 99 | | 1 |
| New Brunswick | 6.2 | 11.4 | 48 | 2 | 50 |
| Nova Scotia | 4.4 | 6.9 | 29 | 3 | 68 |
| Prince Edward Island | 0.3 | 0.7 | 8 | 1 | 91 |
| Total | 345.3 | 208.5 | 77 | 16 | 7 |

Quebec has the largest forest area (84.6 million ha), Ontario has the second largest forest area (68.3 million ha) and British Columbia has the third largest forest area (64.3 million ha) in Canada. The major forest products provinces of Canada are: British Columbia, Quebec, Ontario and Alberta. British Columbia has the annual harvest volume of 87 million m³ which is the largest harvest volume among Canadian provinces. The colonization of Canada was gradually held from east to west. Before the formation of provinces, most of the land was sold or given away to companies or individuals during colonization. For that reason except Newfoundland all other eastern provinces of Canada have higher percentage of private forest lands, such as Prince Edward Island (91%), Nova Scotia (68%) and New Brunswick (50%). For the same reason western provinces have higher percentage of provincial forest land, such as British Columbia (96%), Manitoba (95%) and Ontario (91%). Out of 345.3 million ha forest land of 10 Canadian provinces the privately owned forest land is only 7%, the rest of the 93% forest land is Crown forest land (provincial 77% and federal 16%) [1,3].

GLOBAL TRENDS IN FOREST TENURE AND PRICING

Canada has only 7% forests under private ownership. The total area of private forests in Canada is 26.5 million hectares. The area of private forest land of Canada is higher than the forest area (of each country) of 200 countries including Japan, New Zealand and all developed European countries except Sweden and the USA [6].

The total forest land owned by the forest industries of 6 member countries (Japan, Germany, France, Italy, the United Kingdom, and Russian Federation) of G8 is about 1.5 million hectares which is less than half of the land (about 3.7 million hectares) owned by Canadian forest industries. In Germany, France, Switzerland, and the Netherlands forest industries do not own forest land. The forest industries in Belgium, Italy, and the United Kingdom own only approximately 1% of forestland [6].

During the 1980's and 1990's, there was high rate of forest tenure changes. In developed countries market forces influenced forest tenure changes, and in developing countries rights and livelihood of people played a vital role to make these changes [6].

The forest tenure changes due to market forces can be divided into six types which are described as follows [6]:

- i. Forestland ownership changes, e.g., the USA and economies in transition;
- ii. Forest tenure allows state-owned company to perform forest management, e.g., Sweden;
- iii. Corporatizing, privatizing and commercializing plantations and not natural forests, e.g., Australia, New Zealand, and South Africa;
- iv. Within the state forestry agencies creating forest enterprises, e.g., Germany, the United Kingdom, and many transition economy countries;
- v. Forest tenure changes in pre-communist countries, e.g., China, Chile, and economies in transition; and
- vi. On public forestland arranging forest concessions to private companies, e.g., Brazil.

In the USA, federal tax laws and accounting procedures play an important role in changing forestland ownership. About 10 million acres private forest land was sold to environmental groups in the USA. In economies in transition forestland ownership is being transferred to local governments, educational institutions, religious organization, households, and community organizations. In Canada, government is recognizing the Aboriginal and Treaty Rights, and government is consulting with Aboriginal people about Crown forest tenure and pricing [1,6].

In Sweden, a state company named Sveaskog AB owns about 15% productive forests of Sweden (3.2 million hectares). It performs forest management for multiple use, such as selling and buying wood, planting seedlings, leasing land and water for hunting, fishing rights, and wind power. It shows that forest ownership makes no difference. Brazil is using forest licensing system similar to Canadian system in providing forest concessions to private companies on public forests. There is no concrete evidence about the better performance of forest corporations compared to state agencies [6]. Many complex factors are involved in timber pricing, such as high transportation costs, diverse forest ownership, different economic interests, and externalities. So there is no perfectly competitive market of timber harvesting. The second-best mechanism is applied to choose the mechanism of timber pricing. There is no strong evidence to suggest that the timber pricing based on auction is better than the residual value based stumpage system. There are advantages and disadvantages of all the candidates of the second-best pricing mechanisms. It is the challenge of the forest managers to select pricing mechanism in the context of forest, economic and social conditions [6].

FOREST TENURE IN OTHER PROVINCES OF CANADA

There are different forest tenure and pricing systems in Canadian provinces. In ten provinces of Canada at present there are approximately 40 different types of forest tenure available [7]. Most Canadian provinces issue long-term licences (20 to 25 years) to large forest products companies which are subject to review every five years. Short-term licences are also issued to smaller logging companies, communities and individuals for specific forest products. Harvesting rights and associated responsibilities are explained in these licences. The licences do not address any rights about non-timber forest products [2]. Most of the licences represent Annual Allowable Cut (AAC) based on area, except British Columbia. Long-term forest licences in British Columbia allocate 50% of AAC of this province based on volume [7].

During 2004 and 2006 considerable change in tenure and pricing system was done in British Columbia. About 20 per cent of the supply in this province was reallocated to the long-term licence holders, half was allocated to a provincial auction pool, and the rest was for First Nations communities and non-First Nation communities. In British Columbia, competitive markets determine the pricing of Crown timber based on auctions. By auctions approximately 20 % Crown timber is sold in this province [2].

In 2009, Bill 57 (Forest Occupancy Act) has been introduced in Quebec. This Bill points toward significant changes of forest management in Quebec including Crown forest tenure and pricing [8]. The Quebec government is adamant to implement it by April 2013. The following are the major proposals of this Bill [2,8]:

- Creation of regional management boards;
- Establishment of intensive silvicultural zones;
- Formation of a Timber Marketing Board; and
- Guarantee of five-year timber supply.

These experiences suggest that Ontario government should modernize the Crown forest tenure and pricing system to fulfill the needs of Ontarians and also to facilitate the forestry business of this province to lead internationally.

FOREST TENURE AND PRICING RE-DESIGNING PROCESS IN ONTARIO

Tenure and Pricing Review in Ontario

The provincial government of Ontario was interested in hearing the views of all interested residents in the process of redesigning its tenure and pricing system [2]. The public meetings and round table discussions were held in various communities across Ontario during late summer – early fall 2009. During the same period the Aboriginal peoples were also contacted to get their opinions through a separate series of dialogue sessions. The dates and locations for public meetings were as follows:

- Sault Ste. Marie – September 17, 2009
- Timmins – September 22, 2009
- Hearst – September 24, 2009
- Dryden – September 29, 2009
- Thunder Bay – October 1, 2009
- Marathon – October 6, 2009
- Huntsville – October 13, 2009
- Pembroke – October 14, 2009

People had also access to submit their input by internet, email, fax and mail to Ontario Ministry of Northern Development, Mines and Forestry by October 27, 2009 [2].

Many aspects of public policy are necessary to be coordinated to fix a complex issue like forest tenure and pricing. Tenure and pricing means the allocation and licensing of Crown timber to forest sector businesses with the associated roles and responsibilities. Stumpage fees for the harvested Crown timber are associated with it. For the purpose of supporting a profitable and sustainable forest sector the relationship between forest resource allocation, licensing and pricing is necessary (Figure 1). The main aspects of tenure and pricing of present review process are as follows [2]:

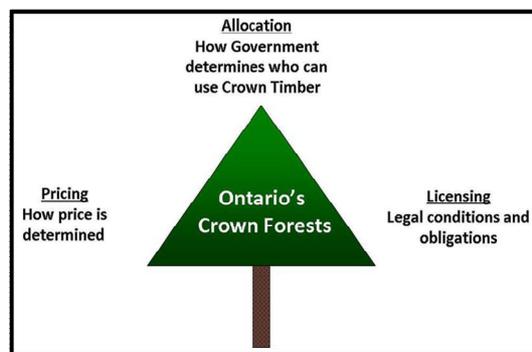


Figure 1: The relationship between forest resource allocation, licensing and pricing of Ontario's Crown forests [2]

- **Maintaining a healthy and productive forest:** Continuous and predictable long-term supply of Crown timber must be ensured to keep the forest industries competitive in the international market.
- **Modernizing licensing and allocation:** It is necessary to maintain an appropriate balance of interests between public and private sectors by properly planning licensing and allocation systems to support greater investment and more open access to fibre.
- **Improving pricing systems:** Greater market forces must be taken into account for setting tenure and pricing of Crown forest resources for the benefit of Canadians, especially all Ontarians.

Options for Crown Forest Tenure Reform

It is essential to reform the Crown forest tenure and pricing system of Ontario because environmental, social and economic objectives of it cannot be achieved any more by using the current system. To reform the Crown forest tenure and pricing system following three levels of reform can be considered [7, 9]:

- Level 1:** The basic structure of the current Crown forest tenure and pricing system can be retained; to address specific problems only some rights and requirements can be redefined.
- Level 2:** Many structures of the current Crown forest tenure and pricing system can be retained; significant changes should be introduced such as, role of government, role of industry, rights reallocation, and methods of pricing and selling public timber.
- Level 3:** In whole or in part the current Crown forest tenure and pricing system will be discarded and replaced with alternative arrangements of Crown forest tenure and pricing system.

Level 1 reforms can be applied by implementing certain measures, such as transferability and divisibility modification, mill appurtenance removal, cut controls relaxation, and granting compensation for reducing harvest rights. The potential benefits of this level of reform are: industrial tenure holders may respond to market forces more effectively; and the compliance costs will be reduced. This level of reform does not have influence on social objectives [7].

Level 2 reforms can perform certain important jobs, such as AAC reallocation by diversifying the tenure system, separation of timber growing from manufacturing, and participation of individuals, First Nations, and other local communities in forest management activities. Level 2 reforms have some important benefits, such as upgrading the efficiency of forest industries, reduction of regulatory compliance costs, and improvement of economic condition of forest-dependent communities [7]. This level of reforms can bring the firms to the position at which the firms can dominate in the international market. At this level tenure rights could be broadened, such as rights of certain non-timber forest products, selling the harvested timber on open market etc. For example, British Columbia has already implemented many of the Level 1 and Level 2 reforms [7].

Level 3 reforms perform many institutional changes and introduce new models of forest tenure and pricing system by replacing the existing forest tenure systems. Different countries around the world have already implemented the Level 3 reforms, such as Australia, New Zealand, Germany and Sweden [6,7,9,10,11].

Ways of Crown Forest Tenure and Pricing Reform

There are three main ways which can be considered to reform the existing Crown forest tenure and pricing system which are as follows: (1) Corporatization, (2) Privatization, and (3) Decentralization. These three ways are briefly discussed by the following way:

Corporatization

Corporatization is referred to a Crown corporation in Canada in which public forest land is placed under the authority of a public corporation. The corporation works as an autonomous organization to maximize the profits by protecting broader public interest. Although it does not have authority to sell equity but it strives to get financial gain in capital markets [7].

Corporation plays an important role in creating market-driven incentives for the production of timber in a well-organized way. It helps the creation of competitive timber markets by diversifying the Crown forest tenure and pricing system. Corporatization would work in Ontario in many cases. To make the corporation workable certain initiatives must be taken, such as good planning, and strong political will. Strategies must be taken to overcome ENGO propaganda, bureaucratic barriers, and some opposition from the general public [7].

To implement the corporation in Ontario successfully some very essential preparations must be preceded, such as effective negotiation with the First Nations, and proper zoning of land-use. The areas which are documented as dominant areas for commercial timber production only those areas should be considered as candidates for areas under corporatization. Areas which are dominant areas continued to be conserved for public goods and services those areas must be under public agencies for the purpose of sustainable forest conservation [7].

Although corporatization has some positive aspects it has also some negative aspects which are the weaknesses to be considered it as a vital way for the economic prosperity of the forest sector of Ontario. The major weaknesses of corporation are as follows [7]:

- Political intervention is huge over all public corporations;
- Equity markets cannot enforce financial discipline over corporation because of the absence of shareholders;
- There are fewer incentives to make hard decisions about management of the corporation to raise the profits of business;
- During the time of financial crisis of the corporation government has to face serious pressure to bail it out for the purpose of protecting it from shut down.

Privatization

Privatization is an effective way to increase the forest industries. But still one popular misconception about privatization is that it trims down public control over forest land by selling forests to private interests. Evidences show that this is not always true. Privatization does not deny public access to the forests [7].

In New Zealand, government sells rights to the standing timber and land productivity to private owner by keeping the land ownership in the hand of government. In this country owners of timber rights must allow public access to their forests for recreation. In the US, forest practices legislation regulates private forest land owners' behavior managing the private forests sustainably by protecting social and environmental values. Common law ensures public access to all private forest land for multiple purposes in the Nordic countries [7,12].

Privatization is a debatable issue whether it will be applied or not in the forest sector of Ontario. According to many experts [6,7,9,11,12] it would not be politically, economically and socially possible to implement the strategy of forest land privatization in this province because there would be massive protest from general public, and ENGOs. Even there would be little support from bureaucrats and current tenure holders as both have vested interests in the present Crown forest tenure and pricing system [7]. Privatization would be possible in some cases in this province by applying the following arrangements: by retaining title to the land itself government can sell long-term timber rights for private forest practices by ensuring public access rights and First Nations satisfaction [7].

Decentralization

Decentralization is Crown forest tenure reform strategy which does devolution of control over some forests to some regional management boards within Ontario. In this system though permanent professional staffs are available in each regional board but priorities are given to hire local workers and to contract local firms for forest inventories, silviculture, logging, construction etc. [7].

The regional management board would be free to use the forest land within its jurisdiction for the local and provincial benefits [7]. It is the responsibility of a regional management board to maximize the profit from the land-base of its own region. It has the authority for producing and selling timber of its jurisdiction. It can also issue permits of licences for trapping fur bearing animals, gathering mushrooms and other non-timber botanicals, and guiding and eco-tourism etc. By using predetermined formulae net revenues from forests would be shared between the local authorities and provincial government [7].

Decentralization strategy would reduce the AAC of current long-term licence-holders to around 50% to drive them to the competitive markets. The take-back regional forest lands can be given to First Nations, other communities and non-integrated companies with long-term tenure to diversify the tenure system in this province [7,9].

The main benefits of decentralization are as follows: creation of competitive regional timber markets; control diversification over public forest lands; and regulatory compliance costs reduction for the private sector [7,9].

INCENTIVES FOR FIRMS TO INVEST IN BIOENERGY PRODUCTION

Key Elements of a Bioenergy Strategy for Ontario

The target of the Province of Ontario is to generate 2,700 Megawatts of electricity from renewable energy sources by 2010 [13]. The BioEnergy Focus Ontario is a network of major organizations which are dedicated to develop bioenergy in Ontario. The goal of this network is to generate 500 Megawatts of electricity from biomass by 2013. To fulfill this target at least \$2 billion investment is necessary. Over 115 smaller combined heat and power plants (each of 3 MW) and at least 5 larger industrial projects (average capacity of 30 MW each) are available in Ontario. Most of them are in northwestern and northeastern Ontario [13]. The range of sustainably harvestable forest biomass is 12.5 to 20 million bone dry tonnes per year in Ontario. From energy crops on unproductive agricultural lands 9 million bone-dry tonnes biomass could be produced. Therefore, in Ontario the total annual biomass availability is between 21.5 million

and 29 million tonnes of biomass. To produce 500 Megawatts of bioenergy only 3 million tonnes of biomass is required which covers only 10 – 14 % available biomass [13].

The key elements which are very important to formulate a bioenergy strategy in Ontario can be described by the following way [13]:

1. Bioenergy awareness programs should be initiated by education, extension, communication and demonstration projects.
2. It is necessary to position bioenergy development throughout Ontario within the context of economic development.
3. To generate value-laden biomass opportunities for bioenergy environmental sustainability should be ensured.
4. To accommodate business innovative growth by creating an enabling policy environment for bioenergy for regulations, incentives and standards, the Government of Ontario should work closely with forest industries, Environmental Non-Government Organizations (ENGOS), and communities.
5. To develop bioenergy project in Ontario it is essential to create a roadmap by tools, templates, case studies, due diligence and community readiness.
6. Complete inventories of forest and agriculture biomass in Ontario must be ensured.
7. To fulfill the achievement of the 500 MW bioenergy production target by 2013 regular monitoring system should be applied.

The technologies to produce bioenergy by using biomass feedstock are rapidly evolving but more policy support is required to make the bio-economy profitable and sustainable. The key steps in developing a bioenergy project using biomass are shown in Figure 2.

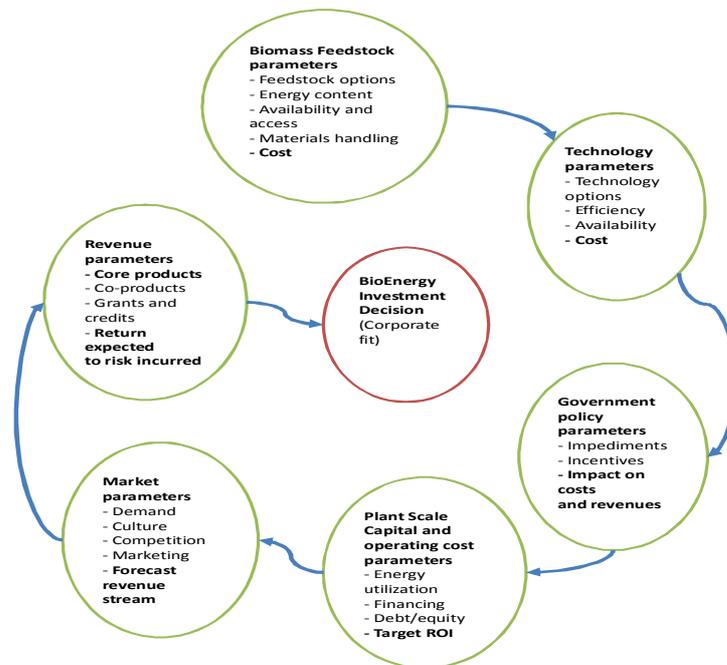


Figure 2: Key steps in developing a bioenergy project using biomass [13]

Incentives for Bioenergy

There are strong policy frameworks in Finland and Sweden to use biomass for energy production. The biomass for bioenergy policies in both the countries helped reduce the costs of biomass supply chains. These two countries do not have oil reserves. They had to import oil [3,5].

In Sweden, high oil price in 1970s acted as a driving force to start using biomass as an alternative to oil for energy production. This country started biomass R&D program. In the 1980s and 1990s Sweden provided investment subsidies up to 25% on boiler for power generation. For combined heat and power (CHP) plants and district heating systems total investment costs were available at that time [3,5]. In 1991 Sweden imposed carbon tax and taxes on NO_x produced by fossil fuels which helped biomass for energy production program competitive. This country implemented two strong acts

relating biomass for energy production, namely (i) The Solid Fuel Act and (ii) The Wood Fibre Act. In 2003 the Government of Sweden introduced a renewable electricity certificate system to further promote bioenergy production. By the help of above mentioned incentives at present Sweden is able to produce power and heat by using biomass feedstock in an economically feasible and sustainable way [3,5].

Finland has many incentive programs to produce energy by using biomass feedstock [3,4,5]. In 1990 Finland implemented a carbon-based tax on fossil fuels for heating purpose, but there is no tax on wood biomass-based fuels. In Finland, in 2004 the energy taxes on coal, natural gas, light fuel oil, and heavy fuel oil were 6.3 €/MWh, 1.9 €/MWh, 6.0 €/MWh, and 5.3 €/MWh, respectively [3,5]. In this country the consumer's tax for electricity is 6.9 €/MWh which is refunded to electricity producers who use forest biomass feedstock or wind for electricity production. If any producer procures chips for energy production by using small-diameter trees from thinning operation in young stands he or she gets a subsidy of 5.5 €/MWh from the Finnish government. The government provides 25% subsidies on investments in new forest biomass for energy production technology, such as biomass vehicles, balers, chippers, crushers and felling heads. The government of this country gives financial support to commercialize new wood biomass-based technology. Today's successful biomass for energy production sector in Finland is the result of the proper policy implication and incentives on biomass-based energy production system by Finnish government [3,4,5].

Canada can use the experience of policy implications and incentives for biomass for energy production in Sweden and Finland. Canada has had less incentive in the past as fossil fuels and hydro-electric energy were plentiful and relatively cheap. Canada's commitment to the Kyoto Protocol has promoted Canada to adopt the philosophy of producing bioenergy with reduced CO₂ by using wood biomass feedstock [14]. In Canada many pulp and paper companies and some independent power producers use mill residues for heat and power generation. Some Canadian provinces have already initiated bioenergy incentives. At present the province of Ontario offers 11¢/KWh in normal hours and 14.5¢ in peak hours for power produced by renewable resources including wood biomass [3,5,14]. Still there is no direct incentive offered by the government to use wood biomass, such as forest harvest residue, for energy production. The main barrier to starting the wood biomass business for energy production is the heritage legislation by provincial ministry of environment. This legislation has to be amended or changed to develop a profitable and sustainable bioenergy sector. Ontario declared Biofibre Directive in August 2008. This directive indicates how to allocate and use forest harvest residue on Crown land of Ontario. New Brunswick has also initiated using forest harvest residues [3,5,14].

CONCLUSIONS AND RECOMMENDATIONS

The trends of forest tenure and pricing envisage that forestry is going to be changed drastically. To carry out leadership in forestry internationally Canada must apply innovative forest tenure and pricing system to lead in bioenergy production globally. Canada should not sell the forest land to forest companies without ensuring ecological sustainability, social acceptance and economic stability. The countries which are now successful in bioenergy production their governments helped the bioenergy business by providing with incentives in different ways. Canadian Government should also give incentives to the firms to produce bioenergy by using wood biomass from its vast forest areas to take the lead of the world in bioenergy production.

Some major key elements for the current Crown forest tenure and pricing re-designing in Ontario which can help create incentives for firms in bioenergy production are recommended below [3,5,6,15]:

- The Crown forest tenure and pricing system should consider multiple attributes of forests, such as sawlog, pulp and paper, biomass, and non-timber forest products.
- In the tenure and pricing system the flexibility, diversity, and adaptiveness must be considered.
- Competitiveness among the forest industry must be ensured, and the non-competitive forest industries should not be given any life-saving support.
- The tenure should be formulated in such a way that forest product supply can be optimized economically, and not based on annual allowable cut.
- Tenure and pricing system should maximize the harvested forest product value and should not maximize the harvest.
- The Government should give financial support to start biomass based business and to buy equipments to produce bioenergy by using biomass feedstock efficiently.
- Carbon tax credits should be given to the companies to produce bioenergy by using wood biomass feedstock.
- There must be a strong policy which can support bioenergy sector in Ontario.

Canada can use the experience of Sweden and Finland for policy implications and incentives for firms in bioenergy production.

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