

Review of Nova Scotia Department of Energy's "Nova Scotia Energy Strategy - Progress Report"

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Abstract

In late February 2003, the Nova Scotia Department of Energy released its "Progress Report" on the Nova Scotia Energy Strategy. The Progress Report contains a selective review of activities in Nova Scotia's energy sector during 2002. The following paper examines the Progress Report in light of the original energy strategy and many of the activities that took place in Nova Scotia's energy sector in 2002.

1 Introduction

In December 2001, after a summer of public consultations, and several months of in-camera preparation, the Nova Scotia government released its energy strategy document, "Seizing the Opportunity" [16]. Some 14 months later, the Nova Scotia Department of Energy released its first "Progress Report" [17].

Both "Seizing the Opportunity" and the "Progress Report" are "developed around three major themes":

1. Powering the economy
2. Improving our environment
3. Securing our future

In "Seizing the Opportunity", each section of the Energy Strategy is discussed in terms of these themes. For example, in those sections dealing with offshore natural gas, job creation, royalty payments, and the availability of natural gas to all Nova Scotians are all expressed in terms of the various themes.

When first conceived, the provincial Energy Strategy was intended to focus on the potential riches of offshore natural gas. Public response to the strategy resulted in the addition of some material on renewable energy, climate change, and air quality; despite this, the major focus of the strategy has remained offshore development and natural gas. This focus should not be entirely surprising, since most politicians look upon natural resources as an easy way to address things such as the province's \$11.6 billion debt and the need to create employment.

Natural gas is also the primary focus of the Progress Report. Other energy-related topics, such as climate change and renewable energy are considered, but the underlying driving force is natural gas.

The next part of this paper examines a number of sections in the Progress Report; the headings of the sections examined are presented in ***bold-italics***. Statements made in the Progress Report are presented in *italics* followed by the associated page number. Comments and analysis are placed after the statements. The remainder of the paper consists of two parts. First, it highlights what was not covered in the Progress Report and second, it discusses how indicators could help determine the state of Nova Scotia’s energy sector.

For brevity, all references to “Report” refer to the Progress Report.

2 Review of “Progress Report”

The Report consists of 10 pages. The first page is a covering letter from the Minister of Energy, Mr. Ernest Fage.

Introductory Remarks

The Energy Strategy identified a number of action items that were designed to encourage exploration, development, and production in our offshore, bring natural gas to Nova Scotians, and reap the benefits of the exciting growth in the oil and gas industry.

[Page 2]

If anyone in Nova Scotia thought that the provincial Energy Strategy was anything more than a platform for promoting oil and (natural) gas, the above paragraph should clarify these misconceptions.

Exploration

The Canada/Nova Scotia Offshore Petroleum Board has updated the estimate of the commercial potential for Nova Scotia’s offshore. Conservative estimates place our potential at 40 trillion cubic feet of natural gas.

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Over the past few years, a number of studies describing the potential natural gas resources for Nova Scotia’s offshore have been released. Few, if any, credible estimates are as high as 40 Tcf (trillion cubic feet). In fact, *conservative* estimates would appear to be half (20 Tcf) or even a quarter (10 Tcf) of this amount; consider:

- The NEB (National Energy Board) figures for the Scotian Shelf are shown in Table 1 [15]. According to the NEB, the total known reserves are five Tcf, with an undiscovered potential of about 13 Tcf, for a total resource of 18 Tcf.

Table 1: NEB ultimate potential gas resources to 2025 for Scotian Shelf (Tcf)

Cumulative Production	Remaining Established Reserves	Unconnected Reserves	Total	Undiscovered Resource	Ultimate Resource Potential
0	3	2	5	12.9	18

- At the 2002 NEB on New Brunswick’s application for access to Sable Gas, geophysical consultants Dr. James Wright and Mr. Ian Atkinson presented their findings with respect to the Scotian Shelf (reproduced in Table 2) [29]. They estimated that the Scotian Shelf could have a total of between 20.5 and 41 Tcf of natural gas.

Table 2: Wright-Atkinson reserves and resources estimate (Tcf)

Play	Reserves	Discovered Resources	Undiscovered Resources
Missisauga / Mic Mac	2.6	1.0	0 - 3.5
Abenaki Reef Trend	0.9	0	3 - 4
Deepwater Turbidites	0	0	5 - 17
Conceptual (Other basins)	0	0	8 - 12
Total	3.5	1.0	16 - 36.5

- The Greater Halifax Partnership’s hired the Conference Board of Canada to project the economic impact of offshore development; this included ‘potential reserve scenarios’ (shown in Table 3) [8]. The three scenarios cover four years between 2010 and 2030, with scenario 1 being the least optimistic (recovered reserves at 14.4 Tcf) and scenario 3 being the most optimistic (40.3 Tcf).

Table 3: Cumulative Recovered Reserves (Tcf)

	2010	2015	2020	2030
Scenario 1	2.2	4.2	7.1	14.4
Scenario 2	2.7	6.5	12.4	27.0
Scenario 3	3.4	9.3	18.4	40.3

- The consultants GLJ (Gilbert Laustsen Jung) produced a summary of all public reports and their own analysis, from 1989 to the present, on the potential marketable natural gas resources of all offshore plays [7]. GLJ’s estimated remaining marketable reserves are shown in Table 4. The remaining marketable reserves found in publicly available documents ranges from a low of 10.8 Tcf to a high of 88.7 Tcf. The average is 33.6 (still lower than the conservative 40 Tcf mentioned in the Report).

Table 4: Remaining marketable reserves (Tcf)

Play	GLJ	Low Public	Average Public	High Public
Missisauga / Mic Mac	8.0	5.0	10.6	31.7
Abenaki Reef Trend	4.9	0.5	4.9	15.0
Deepwater Turbidites	5.0	5.0	15.0	25.0
Conceptual (Other basins)	-	0.3	3.0	17.0
Total	17.9	10.8	33.6	88.7

- Other organizations have made projections for the ultimate gas potential for Nova Scotia’s offshore, three of these are shown in Table 5 (taken from [7]). It is worth noting that the Ziff Energy projection is based upon a simple extrapolation of the NEB data (above), rather than any actual geophysical work [30].

Table 5: Other Projections (Tcf)

Organization	Projection
First Energy Capital Group	12.0
Ziff Energy Group	50.0+
El Paso Corporation	50 - 100

Nova Scotia’s oil and gas industry is now seeing more activity than ever. In fact, over the next 12–18 months, approximately 8–10 exploration wells will be drilled—that’s more than in the last decade.
(Page 2)

The Report is supposedly a ‘progress report’ not a ‘projection report’ -- a more meaningful set of numbers would be a review of the past year’s drilling, compared with that of previous years. The most recent CAPP (Canadian Association of Petroleum Producers) data for the Scotian Shelf is shown in Table 6, with a slight decline in the number of wells between 2000 and 2001.

Table 6: CAPP data for natural gas wells drilled

1999	2000	2001
6	6	5

Claiming that 8-10 exploration wells “will be drilled” is somewhat optimistic, given the historical trends, the number of dry holes that have been drilled and the fact that EnCana has announced an indefinite postponement on one of its wells [11]. Events after the release of the Report do not appear to support the exploration projections either; Marathon Oil is the latest exploration company to postpone drilling a planned well [13].

One possible reason for companies such as Marathon and EnCana abandoning the offshore is the nature of the offshore natural gas. During the 2002 NEB on New Brunswick’s application for access to Sable Gas, Paul Taylor from the Nova Scotia Department of Energy stated that Nova Scotia’s offshore gas was “lumpy”. By lumpy, Mr. Taylor meant that the gas was in small pockets as opposed to one large field [26].

The department participated in the November 2002 Atlantic Energy Roundtable, a Halifax meeting of federal and provincial ministers, departments, and industry representatives to address issues of

importance to Atlantic Canada's oil and gas industry.

[Page 2]

This meeting was due, in part, to EnCana's announcement that it was having problems with the regulatory environment surrounding its Deep Panuke play. As has now become apparent, EnCana was looking for an excuse to abandon Deep Panuke and last November was the first rumbling of discontent.

Work continues on Nova Scotia's Energy Act, which will contain a series of efficiency improvements.

[Page 2]

There is no suggestion as to what these efficiency 'improvements' might be.

Offshore workers will soon have the same kind of occupational health and safety legislation as those working on land with a coordinated approach to new legislation with the province of Newfoundland and Labrador and the federal government.

[Page 3]

Although no one can dispute that this is good news, it beggars belief that Nova Scotians are permitted to work offshore without adequate occupational health and safety legislation.

Nova Scotia continues to participate in local and international oil and gas conferences and trade shows, which provides us with an opportunity to promote our resources, our workforce, and our competitive edge... In November 2002, Nova Scotia was officially inducted as the newest international member and affiliate of the Energy Council, an organization of 10 oil-producing states ranging from the Gulf of Mexico to the Arctic Ocean.

[Page 3]

It is unclear why the Report includes this information in the section on 'Exploration'.

Development and Production

Just a few years ago, natural gas development and production was simply a topic for discussion—today it is a reality. The Sable Offshore Energy Project is currently producing more than 500 million cubic feet of natural gas each day and is expected to continue for the next 20 years.

[Page 3]

Sable has had a number of reserve reduction announcements over the past year. In 2002, Exxon Mobile announced a reduction from 3.5 Tcf to 2.6 Tcf (a reduction equivalent to the size of Deep Panuke) [29]. In January 2003, Shell Canada announced that its reserves at the Sable project were not as large as expected, further decreasing its size from 790 to 700 billion cubic feet [14]. Furthermore,

Dave Collyer of Shell Canada stated that without further exploration successes, Sable can't be expected to maintain the 500 million cubic feet a day after 2010 [14]. If these projections are correct, SOEP (Sable Offshore Energy Project) will not produce 500 MMcf (million cubic feet) per day over the next 20 years.

Transportation and Distribution

To assist with the transition to natural gas, the Nova Scotia government allocated \$14 million from the Gas Market Development Fund to help individual Nova Scotians, small businesses, and institutions use natural gas.

[Page 4]

Given the considerable uncertainties associated with the offshore natural gas resources, it is unclear why the provincial government is promoting the use of natural gas.

For example, in their successful submission to the UARB, Heritage Gas stated that "Until additional production is brought on-stream, it is unlikely Heritage Gas would be able to contract for long-term supply (10-15 years)" [22]. However, under the terms of an agreement signed between SOEI (Sable Offshore Energy Incorporated) and the Provincial government in 1997, any distributor would have access to 10,000 MMBTU/d (million BTU per day) for three years (10,000 MMBTU/d is about 1.8 percent of Sable's present output, see Appendix I). After this three-year period, if a long-term contract could not be negotiated, prices could fluctuate widely.

The remaining \$6 million of the \$20-million fund, which is financed by gas producers in Nova Scotia, will be used to extend the pipeline system beyond franchise areas approved by the Nova Scotia Utility and Review Board and for customers already using natural gas in Nova Scotia.

[Page 4]

The \$6 million figure is misleading, since it fails to take into account the cost of the pipeline. For example, laying new pipeline in the United States averaged \$1.157 million per mile (\$718,000 U.S. per kilometre), while extending existing systems averaged \$542,000 per mile (\$337,000 U.S. per kilometre) [5]. Even ignoring the exchange rate and Nova Scotia's geology, \$6 million would only extend the pipeline between 10 and 20 kilometres.

It appears that the expansion of natural gas in the Nova Scotia marketplace will not be as fast as envisaged by the provincial government, despite the availability of the \$20 million Gas Market Development Fund. For example, the Heritage Gas proposal is to target 4,000 homes over a ten-year period, while the Strait Area Gas Corporation projects 350 customers in five years and 1,450 customers in 25 years [12].

Training

If we are to be true participants in the development of the oil and gas industry... Our training program for students this past year brought 70 post-secondary students together with 40 employers, providing ... positions in the oil and gas industry... The Province of Nova Scotia, Encana, and the Nova Scotia Community College have helped establish the Offshore Operations Program at the Marconi Campus in Sydney... World-class training taking place at the Nova Scotia Community College and the University College of Cape Breton is also providing opportunities to export our knowledge... We're working with Skills Nova Scotia on a series of seminars to promote the energy sector as a career choice for high school students... We're supporting local businesses with an interest in serving the oil and gas industry with information seminars...

[Page 4]

Again, the Nova Scotia government's overwhelming support for oil and natural gas is demonstrated in its support for training.

Of course, it is necessary to train Nova Scotians for work in the oil and gas industry, but not to the exclusion of other energy industries which the province could attract that will require skilled technicians. For example, Nova Scotia has the potential to support a number of different sustainable energy technologies, from biomass to wind power.

Any sustainable energy industry that is established in Nova Scotia will need skilled electrical and mechanical technologists to manufacture, install, and maintain the equipment. However, unlike technicians trained in the oil and gas industry, those trained for work in the sustainable industry sector will have sustainable, long-term jobs that will not disappear when the resource is exhausted.

Despite the potential of these sustainable technologies, the province is doing little to train or encourage Nova Scotians to pursue careers in these fields. In fact, recent events would suggest that the province is taking a step backwards with the announcement by UCCB in mid-2002 of the closure of its electrical technology programme for power technicians.

Economic Impact

While there's been considerable discussion about the oil and gas industry and its economic impact in Nova Scotia, a recent report prepared for the Department of Finance confirmed that more than \$5 billion was spent in the province between 1990 and 2001.

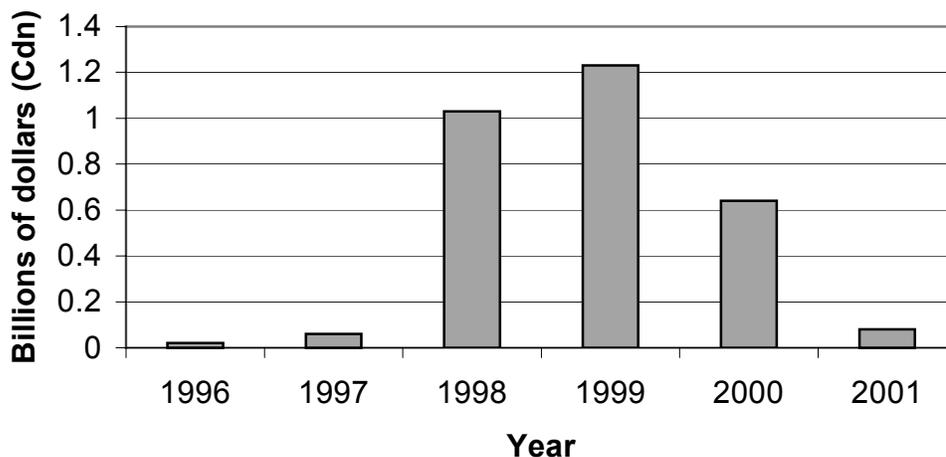
[Page 4]

This statement is both false and misleading,

First, the report in question, “Economic Impact of Offshore Oil and Gas Development on Nova Scotia” [18], was for the period between 1990 and 2000, rather than 1990 and 2001.

Second, according to CAPP (Canadian Association of Petroleum Producers), spending peaked in 1999 at \$1.23 billion, during the construction of the Sable project [1]. Since then there has been a marked decline in spending (see Table 7), down to \$80 million in 2001. Without a significant discovery in the near future, spending may continue to decline as companies look elsewhere for natural gas [11].

Table 7: CAPP - Spending on the offshore



Electricity

The EMGC is made up of representatives from Nova Scotia Power, municipal utilities, and consumer and renewable energy representatives.

[Page 5]

First, it is unclear how members of the EMGC (Electricity Marketplace Governance Committee) were selected. Furthermore, the EMGC does not have anyone representing environmental organizations or environmental interests.

The committee has released its first interim report addressing issues of access to Nova Scotia Power’s transmission infrastructure and expects to release a second interim report in the near future dealing with competition in the market.

[Page 5]

According to the EMGC Terms of Reference, the EMGC was to have one year, starting in April 2002, to make recommendations to the Minister of Energy with respect to the generation, transmission, and distribution of electricity in Nova Scotia. Several interim reports were to have been delivered, with the final report

completed by the end of December 2002. The executive summary of the first interim report (released in December 2002) states that the final report “is due on 31 March 2003” [24]. As of 31 March 2003, there has been no sign of the second interim report or the final report.

The driving force behind the first interim report is access to electricity markets in the United States. The reason for this is the projected growth in demand for electricity in all sectors of the U.S. economy between now and 2025 [4]. In order to tap into this market, it is necessary for Nova Scotia to meet the electricity requirements of the U.S. Federal Energy Regulatory Commission (FERC) Orders 888 and 889. If Nova Scotia’s electrical market is made FERC-compliant, and a transmission corridor is established to the U.S. (probably via New Brunswick [10]), Emera (the parent company of Nova Scotia Power) will be able to sell directly to the United States. This is of particular interest to Nova Scotia Power since Emera also owns Bangor Hydro-Electric Company, an electrical transmission and distribution company based in Maine [3].

Admittedly, some benefits do arise from Nova Scotia becoming FERC-compliant, such as “non-discriminatory” grid access. However, who (i.e., the average electricity consumer in Nova Scotia) or what (Emera or unnamed independent power producers) would benefit from FERC-compliance should be the subject of further study.

The EMGC’s final report is expected in spring 2003, and the department will review the committee’s recommendations as part of the development of the province’s new Energy Act.

[Page 5]

The EMGC meetings were only open to representatives of special interest groups. Any recommendations proposed by the EMGC should be subject to public hearings before they are incorporated in any provincial legislation.

Renewable Energy

Nova Scotia Power purchased these two 670-kW units to generate electricity for their voluntary residential green power purchase program, which allows residential consumers to choose wind power by purchasing blocks of green power.

[Page 5]

First, the two turbines purchased and installed by Nova Scotia Power are not 670 kW units. The one installed in Little Brook, Digby County is a 600 kW Turbowinds turbine, manufactured in Belgium. The other, in Grand Etang, Inverness County is a 660 kW Vestas turbine, manufactured in Denmark [20].

Second, although residential consumers are able to purchase blocks of ‘green power’, the report fails to mention that this electricity will be sold at a ‘premium price’. Each kWh purchased will cost the basic residential rate (presently 8.9 cents/kWh) plus an additional four cents, subject to the 15 percent HST (or 4.6 cents/kWh), for a total of 13.5 cents/kWh. This is more than a 50 percent

increase in the cost of residential electricity -- something that few Nova Scotians will be able to afford.

It is also worth noting that should the green power programme prove popular, Nova Scotia Power is not obliged to purchase power from local, independent power producers. Instead, Nova Scotia Power is proposing that it purchase "green tags" (or green credits) from other (non-Nova Scotian) power producers who generate electricity from renewable sources [21].

Nova Scotia Power is also in the final stages of selecting an independent power producer to supply 100 GWh of wind-generated green power each year. It is expected that much of this electricity will be sold under a green power agreement with the federal government for use in federal facilities in Nova Scotia.

[Page 5]

In mid-December 2002, Nova Scotia Power selected the independent power producer that would be permitted to negotiate with it for the 100 GWh of wind-generated electricity.

In June 2001, when Nova Scotia Power originally sought expressions of interest for this project, they called for the construction of a 50 MW wind farm. In February 2002, this was changed to supplying 100 GWh of electricity from wind (the equivalent of a 33 MW wind farm, see Appendix II). The contract changed from being a construction project to a supply project. This significant change in Nova Scotia Power's 'green power initiative' is neither mentioned nor discussed in the Report.

Furthermore, according to the Energy Strategy, "The province will participate in a green-energy program at premium pricing for at least 20% of the electricity used in its public buildings" [16, Part III, page 17]. The Report makes no mention of this commitment, nor does it mention how the provincial government will meet this commitment.

Conservation and Efficiency

Working with Clean Nova Scotia, the department supports home audit programs that help Nova Scotians find out ways to improve the energy efficiency in their homes and save money.

[Page 6]

For as important as this is, there is no indication about the number of households actually taking part. According to the Energy Strategy document, Clean Nova Scotia's "Home Tune-up Program" in Halifax Regional Municipality "will involve up to 2,000 home visits" [16, Part VI, page 14]. Elsewhere in the Energy Strategy document, it states that "during the past two years ... Clean Nova Scotia performed energy audits for a fee on more than 1,000 units as part of a federal-provincial project" [16, Part VII, page 10].

At best, Clean Nova Scotia's energy auditing programmes will reach some 3,000 homes. Since there are an estimated 360,020 households in Nova Scotia [19], it

means that about 0.8 percent of all households will benefit from an audit (this increases to one percent if apartment dwellings are ignored). At this rate, it will take several hundred years to audit all households in Nova Scotia.

It is worth noting however, that the homes most in need of these types of audit are probably the ones that can least afford it. In February 2003, the rising cost of home heating fuel forced the provincial government to give Nova Scotians on low and fixed incomes a \$50 rebate towards their fuel costs. According to Clean Nova Scotia's web site, the charge for the Home Energy Evaluation is \$75 [2].

The TRAX program, delivered by the Ecology Action Centre and supported by the department, among other partners, promotes transportation alternatives such as public transportation, car-pooling, cycling, walking, and workplace trip reduction.

[Page 7]

Again, for as potentially beneficial that a programme such as TRAX could be, there are no indicators given about its progress towards meeting any of the Energy Strategy's 'themes'.

Climate Change

Nova Scotia continues to be a leader in building a partnership to implement a national climate change plan, an approach that delivers reductions in emissions while ensuring that no one region or industry bears an unreasonable burden for this national issue.

Throughout the late summer and fall of 2002, Premier Hamm and then Energy Minister Balser sided with Premier Klein of Alberta, questioning the entire basis of climate change and Kyoto. For example, Premier Hamm was unwilling to proceed with ratification, wanting "more scientific information" [25].

According to former Energy Minister Balser, Nova Scotia's foot dragging on addressing the issue of climate change is justifiable because of the "challenges that are unique to Nova Scotia", notably the reliance on coal for electrical generation [9].

The single largest source of greenhouse gas emissions in Nova Scotia (slightly over eight million tonnes of carbon dioxide in 1999) comes from the generation of electricity [6]. The province could achieve anywhere from one-third to one-half of its emissions target if Nova Scotia Power were to reduce its emissions by one million tonnes (1 Mt CO₂). This reduction could be achieved by replacing the electricity generated from 115 MW of coal (roughly 1000 GWh) (see Appendix III) from other sources.

According to the Energy Strategy, electricity can be generated from various non-fossil fuel technologies, including biomass, solar, tidal, and wind. The problem is, of course, it isn't possible to turn off 115 megawatts of coal-fired electricity tonight and have 115 megawatts of clean electricity tomorrow morning. Clearly, a long-term strategy is needed, which spells out to Nova Scotia Power what the province expects from them by 2012 (the Kyoto compliance deadline).

The Energy Strategy discusses just such a method; it is known as Renewable Portfolio Standard or RPS. With RPS, the local jurisdiction sets a known target for its utility, requiring the utility to generate a certain percentage of its electricity from renewable sources within a given period. For example, to reduce the province's greenhouse gas emissions by one million tonnes by 2012, the provincial RPS would require Nova Scotia Power to increase its use of renewables by 11.5 megawatts every year for the ten-year period between 2003 and 2012. Of course, Nova Scotia Power would be required to remove the equivalent of 115 MW of coal-fired generation capacity by 2012.

A provincial RPS like the one described above is possible and is realistic, given that many proven small-scale electrical generation technologies exist [28] and RPS is being used in a number of jurisdictions in the United States [27]. However, the Energy Strategy makes it clear that a provincial RPS will not be considered for at least three years after the implementation of Nova Scotia Power's green power programme (see above, Renewable Energy). It has been suggested that if the uptake of Nova Scotia Power's green power programme is not successful, a provincial RPS will not be implemented [23]. At 13.5 cents per kWh, the premium pricing structure of Nova Scotia Power's green power programme discourages Nova Scotians from buying wind-generated electricity. A provincial RPS appears doomed from the start.

Air Quality

Meanwhile, the government is implementing the Energy Strategy's goals to improve air quality for Nova Scotians. The Department of Environment and Labour is working with the Department of Energy, the Office of Economic Development, Nova Scotia Power, Nova Scotia Business Inc., and other industries to focus on reducing the emissions of mercury, sulphur, nitrogen, and ozone.

[Page 7]

The Energy Strategy outlines a number of air quality targets that are to be achieved by 2005, including:

1. Reduction of SO₂ by 25 percent from current levels by 2005.
2. Reduction of mercury (Hg) emissions by 30% below 1995 levels by 2005.

Again, no indication is given about where Nova Scotia is now with respect to these emissions; for example, are emissions being reduced or increasing?

Closing Remarks (Where We Go From Here)

... the department will continue to implement the Energy Strategy with a focus on exploration, benefits, competitiveness, resource management, energy infrastructure, and energy utilization. That means continuing to work to optimize the benefits from offshore development in the short term and focusing on an improved approach to the Offshore Energy Agreements in the long term, all

The Report's closing remarks are in keeping with the direction of the original Energy Strategy -- focussing on the riches that the provincial government wants Nova Scotians to believe exist 'offshore'.

3 What was not covered

Many topics dealing with Nova Scotia's energy sector that occurred during 2002 were omitted from the Report, including:

- The Supreme Court's decision awarding most of the offshore resource rights to Newfoundland and Labrador.
- The rising cost of electricity supplied by Nova Scotia Power.
- The rising cost of fossil fuels and its impact on Nova Scotians.

4 The need for indicators

Central to the Nova Scotia energy strategy are the three 'themes':

1. Powering the economy
2. Improving our environment
3. Securing our future

The Report fails to address the question -- is the Nova Scotia energy sector achieving these 'themes'?

In order to tell if Nova Scotia is achieving the 'themes', it is necessary to select a series of indicators that demonstrate, each year, where are we and where are we going. As an example, consider the home energy audits that have been conducted by Clean Nova Scotia. The Report contains no mention of how many audits have taken place in the past, nor how many are expected to be performed in the future. Furthermore, there is no indication of the cost associated with the energy audit programme.

Indicators should be used as a 'report card', showing the health or state of the Nova Scotian energy sector. Examples of possible indicators for non-renewable provincial energy sources should include:

- Volume of natural gas exported each year. This indicator would allow Nova Scotians to compare present exports with those from previous years. This is a more meaningful indicator than 'projected volumes' since it shows what is actually taking place.
- Royalty revenues. As with other indicators, this one would show the royalties obtained each year, not some vague promise of potential royalties at some far-off date.
- Nova Scotian employment in the energy sector. An indicator that would allow a comparison of the current year's employment with that of previous years.

The indicators should not be restricted to natural gas, they should also include how Nova Scotians use energy and what it is costing them. Examples of these indicators could include:

- Residential End-Use Energy Consumption by Fuel
- Residential Energy Intensity.
- Residential Energy Costs
- Residential Energy Costs for Transportation

5 Concluding Remarks

The Report was issued some 14 months after the release of the original energy strategy. The Report is, for the most part, a superficial document that overlooks many energy-related issues that are important to all Nova Scotians. For example, problems with the offshore are overlooked and questionable claims are made regarding the resource and offshore activity.

Furthermore, the final recommendations of the EMGC must be closely scrutinized. The fact that the EMGC is behind schedule and has produced only one report (that focuses on meeting FERC interconnection requirements), suggests that issues such as the future of renewable energy, RPS, and net metering may not receive adequate attention.

One way in which Nova Scotians can determine the state of the provincial energy strategy is to develop and then apply a set of indicators on an annual basis. For example, without indicators, it is impossible to tell whether provincial air quality is improving, getting worse, or remaining unchanged.

If future 'Progress Reports' are to be of any use to Nova Scotians, they must tell the true state of the provincial energy sector. Hiding or glossing over controversial issues is inexcusable, given the importance of energy in our day-to-day lives.

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Appendix I - Heritage Gas's projected demand

10,000 MMBTU/d is equivalent to how many cu ft of natural gas?

1,100 BTU / cu ft

1 BTU = 1 cu ft / 1,100

$10,000 \times 10^6 \text{ BTU} = 10,000 \times 10^6 / 1,100 = 9.1 \times 10^6 \text{ cu ft}$

Transporting $500 \times 10^6 \text{ cu ft/d}$

About 1.8 percent of Sable output.

Appendix II - 100 GWh is equivalent to what size of wind farm?

100 GWh produced over one year (8760 hours/year)

Average number of megawatts per hour: $100 \text{ GWh} / 8760 \text{ hours} = 11.4 \text{ MW}$

To obtain 100 GWh, an 11.4 MW power station would have to operate at its rated capacity for one year (100 percent capacity factor). A wind turbine does not operate at 100 percent capacity because the wind does not blow continuously; a reasonable assumption is a 35 percent capacity factor. To achieve the 11.4 MW goal with turbines operating at 35 percent capacity factor would require:

$11.4 \text{ MW} / 0.35$ or about 33 MW of wind turbine capacity.

Appendix III - Nova Scotia Power's CO₂ emission reduction target

Want to remove 1 Mt CO₂ from Nova Scotia Power's emissions

1000g (1 kg) CO₂ for every 1 kWh electricity produced (coal)

1 Mt CO₂ = 10^9 kg

10^9 kg CO_2 is emitted from 10^9 kWh (10^{12} Wh) or 1000 GWh

$1000 \text{ GWh} / 8760 \text{ h/yr}$ or about 115 MW (electrical capacity)