

# Energy— Systems to Manage Royalty Reduction Programs

## SUMMARY

The Department of Energy uses royalty<sup>1</sup> reductions to help achieve its strategic objectives for Alberta's energy resources and for royalty revenue. Specifically, these programs are designed to increase overall royalty revenues by giving companies an incentive to recover oil and gas, previously considered unrecoverable, from existing locations.

The department manages 12 royalty reduction programs that provide an incentive for companies to recover oil and gas that would otherwise cost too much to produce. The use of these programs reduced royalties in 2014–2015 by about \$1.4 billion.<sup>2</sup> These reductions are intended to generate incremental royalties from oil and gas that would otherwise not have been recovered.

### What we examined

We chose three programs and examined the processes the department uses to:

- analyze and report on whether the programs are helping the department meet its objectives
- improve the programs as needed

The three<sup>3</sup> programs we examined account for about 10 per cent of the royalty reductions from all 12 programs. We chose programs of different sizes, attributes and potential benefit to Albertans. These three programs are representative examples of the department's various royalty reduction programs.

### Overall conclusion

Royalty reduction programs increase the amount of oil and gas recovered using new technologies and processes. Although the department knows and reports the amount of the royalty reduction (\$1.4 billion), it does not report on the amount of additional royalties generated or other value derived through these programs. Without knowing whether these programs are achieving their intended results, the department cannot assess whether they are working.

### What we found

The department identified what it wanted to achieve through its royalty reduction programs. The department had effective processes to:

- develop and administer its royalty reduction programs
- assess program applications for approval
- approve royalty reductions only after the department had evidence that the companies met all program criteria

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<sup>1</sup> Royalties are usually a percentage of gross or net revenues the company receives when it sells the resource. Alberta has different royalty regimes for different types of oil and gas.

<sup>2</sup> See the Department of Energy's 2014–2015 annual report.

<sup>3</sup> Innovative Energy Technologies Program, Incremental Ethane Extraction Program and Enhanced Oil Recovery. See Appendix A for descriptions of these three programs.

For the three royalty reduction programs we examined, we also found that the department:

- had not done sufficient analysis or provided enough information to show that these programs achieved the desired results and provided the expected value
- had identified performance metrics for one program but had not used them to analyze or report on whether the program achieved its intended results
- had recently implemented performance metrics and processes to analyze those metrics, for another program, but had not analyzed the results or reported on whether the program achieved its desired results

### What needs to be done

The Department of Energy should analyze, evaluate and report on whether each royalty reduction program is achieving its objectives and providing value to Albertans. And, if not, what can be improved.

### Why this is important to Albertans

Oil and gas companies pay royalties for the right to extract and sell Alberta's natural resources. These royalties help pay for the cost of running the government and providing Albertans with infrastructure, health care and education. Alberta collected over \$8 billion annually in oil and gas revenue in each of the past two financial years. Royalty reductions for all 12 programs amount to over \$1 billion annually—that is more than 10 per cent of all oil and gas revenues collected by the government.

There is currently a royalty review panel assessing Alberta's overall oil and gas royalty framework. This underscores the importance of these programs to Alberta. Thus, it is important that the department have effective processes to analyze and report to Albertans whether the royalty reduction programs are meeting their objectives and providing the intended value and benefits.

## AUDIT OBJECTIVES AND SCOPE

Our audit objectives were to assess whether the department had effective systems and processes to set and achieve objectives through royalty reduction programs, and to monitor and evaluate the effectiveness in terms of costs and benefits to Albertans and the energy industry.

Our audit scope focused on three royalty reduction programs and the department's processes to:

- set desired results for each program
- analyze and report on the benefits and value Albertans receive

We conducted our field work between June and October 2015. We substantially completed our audit on December 15, 2015. Our audit was conducted in accordance with the *Auditor General Act* and the standards for assurance engagements set out in the CPA Canadian Handbook—Assurance.

## BACKGROUND

Results analysis is a process that managers use to evaluate how well a program is working, and to improve or discontinue programs if needed.<sup>4</sup> Results analysis can be an ongoing process but should be reported on at least annually to be effective. The importance of royalty reduction programs makes results analysis especially important to know whether a program is on track to meet its strategic

<sup>4</sup> In July 2014 we recommended that the Department of Treasury Board and Finance improve results analysis reporting within the government. See <http://www.oag.ab.ca/webfiles/reports/AGJuly2014Report.pdf> (page 15).

objectives. Done well, annual analysis would allow the government to inform Albertans:

- what is working and what is not
- whether actual results match desired results
- what can be done to improve results

Three royalty reduction programs form the basis of our audit and findings. Following are brief descriptions of these programs and their intended purpose.

### Innovative Energy Technologies Program

The Innovative Energy Technologies Program (IETP) can provide up to \$200 million in royalty adjustments to help support early stage research and technology projects that would improve efficiency of oil recoveries from existing reserves and encourage responsible development of oil, natural gas and in situ oil sands reserves.

### Enhanced Oil Recovery Program

In 2014 the Enhanced Oil Recovery Program (EORP) replaced the Enhanced Oil Recovery Royalty Relief (EORRR) Program. The EORP's objective is to enable incremental oil production through tertiary development resulting in increased recoverable reserves and incremental royalties for the Crown.<sup>5</sup>

### Incremental Ethane Extraction Program

The Incremental Ethane Extraction Program (IEEP), started in 2006 and extended for an additional five years in 2011, supports continued growth of Alberta's petrochemical sector. IEEP provides royalty reductions in the form of credits to petrochemical companies that use incremental ethane and ethylene for value-added upgrading in Alberta.

## FINDINGS AND RECOMMENDATIONS

### Systems to evaluate and report on royalty reduction programs

#### Background

The Department of Energy uses royalty reduction programs to encourage the use of new technology, processes and research in the oil and gas industry. Royalty reductions give industry operators financial incentives to develop or use new technology and processes, or to help make certain resource extraction activities economically viable. Royalty reduction programs are intended to increase the overall royalties paid to the province.

For example, the IETP and EORP encourage developing and using innovative and more efficient ways to extract a higher percentage of crude oil from existing locations. This reduces the need to build and use new infrastructure and increases environmental sustainability of resource extraction. The IEEP encourages value-added upgrading of natural gas resources in Alberta.

In general, each royalty reduction program invites industry operators to apply with a project to take advantage of the opportunities within each program. The department has administrative processes to:

- review, vet and approve proposed projects into each program
- verify all documentation provided by the operator for royalty reduction requests
- ensure each project meets all program criteria and requirements before the department reduces any royalties

<sup>5</sup> Enhanced Oil Recovery Royalty Relief Program Review—Report and Recommendations (May 6, 2011), page 12.

**RECOMMENDATION 1: EVALUATE AND REPORT ON ROYALTY REDUCTION PROGRAM OBJECTIVES**

We recommend that the Department of Energy annually evaluate and report whether the department's royalty reduction programs achieve their objectives.

**Criteria: the standards for our audit**

The department should have effective systems to analyze and report on the results of its royalty reduction programs and should use the analysis to improve its programs as needed.

**Our audit findings****KEY FINDINGS**

The Department of Energy had effective systems to develop and administer its royalty reduction programs.

The department has not:

- analyzed the royalty reduction programs using relevant performance metrics
- publicly reported whether these programs are achieving their objectives and providing value to Albertans

**Administrative systems for royalty reduction programs**

The department has effective processes to:

- develop and administer its programs
- ensure only qualified projects are admitted into a program
- ensure each operator and project meets all criteria before royalties are reduced or adjusted

**Performance metrics and systems to evaluate programs**

The department used the government's policy development process and due diligence to develop the three royalty reduction programs to support its strategic objectives. The government's guide to this process also indicates the need to:

- evaluate and measure the performance of policy programs
- monitor and report the results to Albertans<sup>6</sup>

During our audit, managers for one of the programs started to develop performance measures and processes to report on their achievement annually. These measures were implemented in September 2015.

Another program had a performance metric in place from the start of the program. However, that metric was not being used and there were no other performance metrics identified that would allow the program to measure whether it was achieving the desired results.

**Reports on royalty reduction programs**

The department prepares some internal reports for the programs we examined. For example, one program prepared a high level summary and status report for the assistant deputy minister for the past two years. There is also internal reporting on oil and gas volumes for specific programs. However, those internal reports did not use relevant performance metrics to analyze whether the overall program was achieving the desired results or what could be done to improve or expand the program.

<sup>6</sup> Policy Development Process Guidance for Alberta's Public Service—obtained from the Department of Energy. See Appendix B for details.

One program implemented performance measures in September 2015. Program managers told us they plan to use the measures and report on the program's achievements in early 2016.

The 12 royalty reduction programs are grouped together and reported publicly in the department's annual financial statements as a single note to the statements. However, there was no separate analysis or reporting whether individual programs were achieving their desired results or, if not, what could be done to improve them. The note on page 74 of the Department of Energy's 2014–2015 annual financial report states:

*“The department provides twelve oil and gas royalty reduction programs. The intent of these programs is to encourage industry to produce from wells which otherwise would not be economically productive. For the year ended March 31, 2015, the royalties receive under these programs were reduced by \$1,441,451,000 (2014—\$1,191,501,000).”*

Although the department discloses the combined amount of the royalty reductions for the 12 programs, it does not disclose the amount of royalty reductions in individual programs. Nor does it report on the actual royalty revenues individual programs help generate. The department does not have requirements to publicly report any other financial analysis on the reduced royalties, or other individual program costs. For example, are the royalty reductions and the administrative costs incurred by each program generating the expected financial return through increased incremental royalties or other financial measures?

The department publicly reports the successes of some of its projects within the royalty reduction programs. For example, successful projects and new technology supported by the IETP were presented at the World Heavy Oil Conference in Edmonton.<sup>7</sup> Information obtained from industry operators in the IEEP program was used in the department's 2014–2015 annual report. The department also publicizes other successful projects or programs on program websites, in news releases or in industry publications.

However, we were unable to find evidence that the department annually evaluated the three royalty reduction programs using defined, relevant performance metrics and then reported on the aggregate program results of those evaluations to Albertans. We were also unable to find evidence that the department stated whether each program achieved its desired results and provided the intended value and;

- if yes, should the program be kept, extended or expanded?
- if no, what could be done to improve the program or discontinue it?

#### **Implications and risks if recommendation not implemented**

Without effective systems and processes to annually evaluate and report on its royalty reduction programs, the department is unable to show whether the programs are achieving their objectives and providing the intended value through the use of royalty incentives.

<sup>7</sup> World Heavy Oil Conference, March 24–26, 2015.

## THREE ROYALTY REDUCTION PROGRAMS

### Innovative Energy Technologies Program

The Innovative Energy Technologies Program (IETP) has a cap of \$200 million in royalty adjustments to pilot scale research and technology projects that improve efficiency of oil recoveries from existing reserves and encourage responsible development of oil, natural gas and in situ oil sands reserves. It can provide up to 30 per cent of the funding of a project to a maximum of \$10 million. The province can publish the results of the new technology after three years thus giving access to the new technology to the entire energy industry.

The program objectives are:

- increasing the recovery from oil and gas deposits resulting in incremental production and royalties
- finding a flexible commercial technical solution to the gas over bitumen scenario that will allow efficient and orderly production of both resources improving the recovery of bitumen resources by in situ technologies
- improving recovery of natural gas from coal seams
- disseminating technology and information developed through the projects supported by this program<sup>8</sup>

This program is unique, as it uses the royalty system to fund research projects in the form of royalty allowances. Projects approved will be able to receive royalty adjustments of up to 30 per cent of approved projects costs while industry must cover the remainder of total project costs. In 2013–2014 there was an estimated \$12 million reduction in royalties due to the IETP.

Another unique aspect of the IETP program is that it is difficult to set quantified performance metrics. As per the department, failure is a normal and integral part of a research program. For example, it is good to know something doesn't work so it can be improved before going into full production.

### Enhanced Oil Recovery Program

The Enhanced Oil Recovery Royalty Relief (EORRR) Program was established in the late seventies to encourage tertiary recovery from conventional oil pools. The EORP's objective is to enable incremental oil production through tertiary development resulting in increased recoverable reserves and incremental royalties for the crown.<sup>9</sup> In 2014 the EORRR program was replaced by the new Enhanced Oil Recovery Program (EORP). The program objective and principles remained unchanged and the new EORP included a five per cent royalty rate cap applied, for a defined period of time, to well events rather than a royalty reduction based on cost.

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<sup>8</sup> Alberta Energy Website <http://www.energy.alberta.ca/OilSands/794.asp>

<sup>9</sup> Enhanced Oil Recovery Royalty Relief Program Review—Report and Recommendations (May 6, 2011), page 12.

The EORP encourages the use of enhanced oil recovery methods to obtain additional oil from wells or pools where oil cannot efficiently be recovered through traditional drilling technology. Enhanced oil recovery projects inject hydrocarbons, CO<sub>2</sub>, nitrogen, chemicals or other approved substances to increase oil recovery from an existing oil well or pool. Enhanced oil recovery increases the amount of oil that can ultimately be recovered from conventional oil fields, providing incremental oil revenue and other economic benefits across Alberta.

Enhanced oil recovery aims to increase oil production from existing oil fields with existing infrastructure (roads and pipelines). Using existing infrastructure helps preserve undeveloped areas. There is a lot of potential for this program as only about 22 per cent of Alberta's conventional crude oil has been recovered. For the 2013–2014 fiscal year, it was estimated there was a total of \$86 million in royalty reductions due to the EORP.

#### Incremental Ethane Extraction Program

The Incremental Ethane Extraction Program (IEEP) was a five-year program started in 2006 with a budget of \$350 million. The program was extended for an additional five years in 2011 to support continued growth of Alberta's petrochemical sector. IEEP is an incentive program that provides credits to petrochemical companies that use incremental ethane and ethylene for value-added upgrading in Alberta (for example, production of higher valued products such as ethylene, polyethylene and other derivatives).

The program's objective is to sustain and grow the petrochemical industry in Alberta. The department's 2014–2015 annual report indicates IEEP funds are now fully designated and the program has contributed to approximately \$1.8 billion in projected new capital investment<sup>10</sup> and industry production of approximately 92,000 barrels per day of ethane.<sup>11</sup> The department provides incentives through royalty credits to offset the high capital costs of recovering incremental barrels of ethane feedstock. For fiscal 2013–2014, the royalty reduction due to IEEP was about \$34 million.

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<sup>10</sup> Information obtained from industry and not verified by the department.

<sup>11</sup> Energy Annual Report 2014–2015, page 26.

## POLICY DEVELOPMENT PROCESS

The government's Policy Development Process also states that:

- performance measurement is the ongoing collection of quantitative and qualitative information
- evaluations, conducted periodically, gather information intended to answer specific questions such as:
  - Is a program efficient?
  - Is it adequate?
  - Is the program relevant?
- evaluations provide the necessary in-depth information required to assess policy



# Energy—IT Security for Industrial Control Systems in Alberta’s Electrical Industry

## SUMMARY

Industrial control systems<sup>1</sup> help control industrial processes. ICS devices are widely used in Alberta’s electrical industry and are generally controlled by instructions received from information technology devices.

The electrical industry uses ICS to control and monitor critical components such as turbines and circuit breakers in power generation and distribution. These control systems help to ensure electricity reaches Albertans and other markets efficiently, safely and securely. Therefore, IT security<sup>2</sup> must be carefully considered when designing and using ICS.

We decided to audit ICS because we believe Albertans may be at risk if ICS are unsecured or do not meet minimum IT security standards.

The Alberta Utilities Commission is a provincial agency that provides independent, adjudicative functions. The AUC is accountable to the Legislature through the Minister of Energy, who is designated the responsible minister.<sup>3</sup> The Government of Alberta has given the AUC a regulatory mandate over the utilities sector, and natural gas and electricity markets to protect the social, economic and environmental interests of Alberta where competitive market forces do not. The AUC also establishes mandatory requirements and standards of practice for the retail electric markets through the use of a rule-making procedure involving a consultative process with stakeholders and interested parties.

On September 15, 2015 the AUC approved mandatory IT security standards for ICS in the electrical industry. Although some electrical operators may have already implemented IT security standards for ICS, they do not have to comply with these new standards until October 2017.

## What we examined

We examined the Alberta Utilities Commission’s role in:

- assessing risks and developing, implementing and communicating adequate IT security standards for ICS to mitigate those risks
- monitoring operators in the electrical industry for compliance with IT security standards for ICS and enforce compliance with the standards

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<sup>1</sup> These systems include Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS), Programmable Logic Controllers (PLC) and other types of control systems.

<sup>2</sup> IT security is the protection of information technology systems against unauthorized access or modification of data in storage, processing, or transit, and the hardware on which the data resides.

<sup>3</sup> <http://finance.alberta.ca/publications/budget/budget2015/energy.pdf>

## Overall conclusion

The AUC fulfilled its role and followed its processes, as required by regulation, to adjudicate<sup>4</sup> and approve the IT security standards recommended by the Alberta Electric System Operator (AESO). However, Alberta's electrical operators do not have to comply with the newly-approved IT security standards until October 2017.

## What we found

The AUC and AESO have clear roles and responsibilities for developing and approving IT security standards for ICS used by Alberta's electricity operators. The AESO's role is to develop and recommend the standards. The AUC's role is to approve the recommended standards. If there are objections to the standards from electrical industry operators or Albertans, the AUC is required to assess the objections before deciding whether to approve the recommended standards.

## Why this is important to Albertans

Electricity is essential to modern life. Disruption or loss of electricity from accidental or targeted disruption to Alberta's electricity grid could harm the safety of Albertans or the environment.

## AUDIT OBJECTIVE AND SCOPE

Our audit objective was to determine what the AUC's role is with respect to objections and complaints filed in connection with the approval of the Alberta Reliability Standards - IT security standards for ICS, and if there are effective AUC processes to carry out that role.

We conducted our field work between January and July 2015. We substantially completed our audit on September 18, 2015. Our audit was conducted in accordance with the *Auditor General Act* and the standards for assurance engagements set out in the CPA Canada Handbook—Assurance.

## FINDINGS

### The AUC followed its processes to approve IT security standards

#### Background

Alberta's electrical industry relies on critical infrastructure to safely and efficiently generate and deliver electricity to Albertans and to other national and international markets. ICS are a critical part of electrical operators' efforts to monitor and ensure safe and reliable operations. If the ICS devices are not secure, they could be misused to cause damage to critical infrastructure (e.g., electrical generation stations, high voltage power lines), resulting in harm to Albertans or the environment.

The electrical industry uses ICS to control and monitor critical components such as turbines and circuit breakers in power generation and distribution. IT security for ICS is a critical part of decisions about the design of these controls and their use in operations. In essence, these ICS help ensure electricity reaches all Albertans efficiently, safely and securely.

For the safety of Albertans, Alberta's environment and its economy, it is important to regularly assess IT security risks in the electrical industry and implement IT security standards to mitigate the identified risks.

<sup>4</sup> That is, to make a formal judgment or decision about a problem or disputed matter.

The *Transmission Regulation*<sup>5</sup> under the *Electric Utilities Act*<sup>6</sup> gives the AESO the authority to develop reliability standards for Alberta’s electrical industry based on the North American Electric Reliability Council’s (NERC) standards.<sup>7</sup> NERC implemented IT security standards in 2008 and the AESO started a process to adopt those standards in 2012.

The *Transmission Regulation* under the *Electric Utilities Act* also:

- requires the AESO to submit proposed reliability standards to the AUC with its recommendation to approve or reject them
- requires the AUC to follow the AESO’s recommendation unless a third party can show that the standards are technically deficient or they are not in the public interest

**Criteria: the standards for our audit**

The AUC should have effective processes to assess objections to Alberta Reliability Standards dealing with ICS IT security standards for Alberta’s critical electrical infrastructure.

**Our findings**

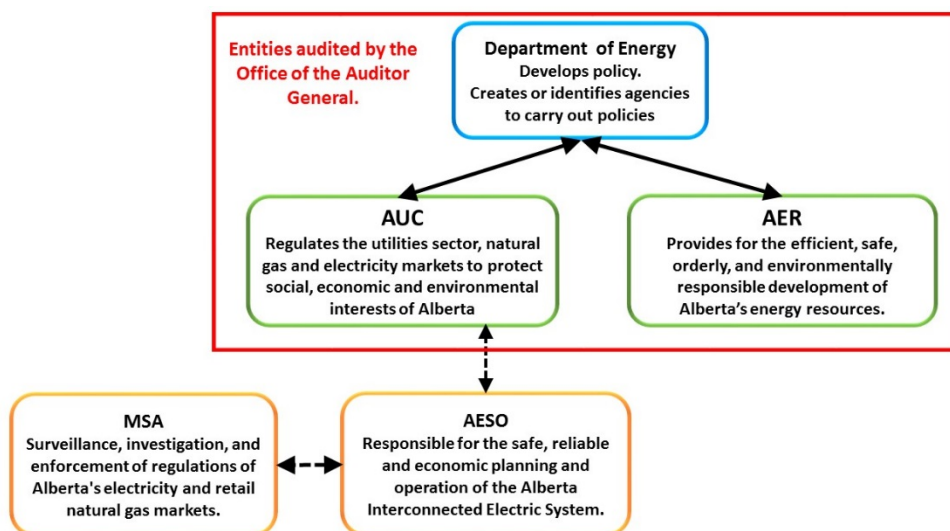
**KEY FINDINGS**

- The AUC followed its processes to assess the IT security standards recommended by the AESO and to adjudicate the objections from the electrical industry.
- The AUC approved the recommended IT security standards for ICS. Alberta’s electrical operators must comply with the standards by October 2017.

**The AUC reviewed and approved the security standards**

The AESO developed NERC-based IT security standards to protect Alberta’s electrical infrastructure. In September 2014 the AESO put forward the IT security standards to the AUC with a recommendation to approve the standards. However, electrical operators objected to implementation costs and the effective dates of the standards.

We are not the auditor of the AESO or the Market Surveillance Administrator.<sup>8</sup> We did, however, talk to the AESO about its process to develop the Alberta Reliability Standards for IT security. The AESO provided us with versions of the standards they sent to the AUC.



<sup>5</sup> *Transmission Regulation*—Alberta Regulation 86/2007

<sup>6</sup> *Electric Utilities Act*—Statutes of Alberta, 2003, Chapter E-5.1

<sup>7</sup> <http://www.nerc.com/pa/stand/Pages/default.aspx>

<sup>8</sup> The *Electric Utilities Act* states the AESO and Market Surveillance Administrator are not provincial corporations for the purposes of the *Financial Administration Act* or the *Auditor General Act*.

We reviewed, but did not audit or assess, the AESO's processes to develop, or to monitor and enforce IT security standards for Alberta's electrical industry. Our review of the documentation did not identify anything to suggest the AESO cannot develop a reasonable set of ICS IT security standards based on electrical industry best practices.

The AUC has defined its processes to assess objections to proposed standards before making a decision to approve or reject the standards.

The AUC followed its adjudicative processes to assess the electrical operators' objections and decide whether to approve or reject the AESO's reliability standards for IT security. The AUC approved the IT security standards after its review on September 15, 2015.

The standards are now approved. The *Transmission Regulation* gives the AESO and Market Surveillance Administrator the authority to monitor and enforce the industry's compliance with the reliability standards. However, Alberta's electrical operators do not have to comply with the standards until October 2017.