Becoming Green – The Potential for Fraud in a Solar Energy Joint Venture and The Role of The Investigative and Forensic Accountant in Assessing and Preventing That Fraud

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For Professor Leonard Brooks

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Table of Contents

BECOMING GREEN - THE POTENTIAL FOR FRAUD IN A SOLAR ENERGY JOINT VENTURE and THE ROLE OF THE INVESTIGATIVE AND FORENSIC ACCOUNTANT IN ASSESSING AND PREVENTING THAT FRAUD

Section 1: Executive Summary

Every day, the sun emits 20,000 times more energy than the world population can consume.[1] The advantage of a solar photovoltaic (PV) system is that it allows electricity to be produced locally in the area where it is consumed and when it is most needed.

The Impact to Business Development

Canadian Solar Industries Association (CanSIA) claims that the solar energy systems installed in Ontario in 2010 resulted in over $750 million being injected into Ontario's economy. CanSIA also projects that the solar energy industry will support more than 35,000 jobs in the economy and displace 15 to 31 million tonnes of greenhouse gas emissions per year by 2025.[2]

According to Sandra Pupatello, the MPP of Essex Windsor and Minister of Economic Development and Trade, the solar industry made a significant contribution[3] in reducing the local unemployment rate to 9.6% in February 2011 from a high of 15.2% in July 2009.[4]

Solar energy will play an important role in electricity and energy provision.

The Challenges

There are challenges: sun energy is intermittent, depending largely on weather conditions. Also, efficiency in converting sun energy to electricity is low (about 11% - 15%

[1]Ecoworld Nature & Technology in Harmony. (2006, June 14). How *much Solar Energy Hits earth?* Retrieved from http://www.ecoworld.com/energy-fuels/how-much-solar-energy-hits-earth.html/
[2] CanSIA, *Solar Vision 2025: Beyond Market Competitiveness*, December 2010
[3] Based on Sandra Pupatello's speech at the Solar Ontario 2011 conference in Windsor, May 6, 2011
[4] Statistic Canada, July 2009

currently), initial capital is high and storage to save up excessive energy produced in a sunny day remains expensive and limited.

The Government Incentives

In order to support the research and development of renewable energy including solar energy, many European countries (starting with Germany) developed a Feed-in-Tariff (FIT) program to stimulate interest in installing solar PV systems. The concept of FIT is to buy back renewable energy generated by small and large systems at a substantially subsidized rate. The rate is designed to provide interested parties a reasonable return on their investment.

The Issue

The gap in pricing attracts parties who may scheme to obtain benefits from the FIT program in a fraudulent manner. Without proper monitoring, fraudsters are motivated in taking advantage of this significant difference to sell electricity generated by fossil fuel as if they are generated from the approved renewable system. Since the rate payers are ultimately responsible for the additional cost, this problem may be perceived as inability of the government and a negative attitude toward the solar energy business. Until solar PV reaches parity[5], the business will depend heavily on government incentives — changes in political power, public attitude and support from an environmentally conscious public will have a profound impact on the solar PV business.

[5] For solar PV, parity is the point at which generation costs become competitive with other sources of power. For solar thermal, parity is achieved when generation costs match the costs from using natural gas fired equipment

The Hope

Globally, technology in harnessing solar energy remains in the developing stages but is catching up gradually. A study by Boston Consulting Group reported that concentrated solar photovoltaic (PV) energy production costs could fall to less than $0.10 per kilowatt-hour by 2020 and will become market-competitive.[6]

Summary

The Ontario Feed-in-Tariff program guarantees a favourable contract rate for 20 years, makes investing in renewable energy a secure investment for the investors, manufacturers and suppliers.

While I believe that it will have an important position in the future of energy, it's imperative to understand and prevent the possibilities of fraud and to evaluate risks. This paper will provide some of the mitigation measures to achieve this objective.

[6] Boston Consulting Group, *What's next for Alternative Energy*? November 2010, page 15

Section 2: Introduction

2.1 Background

2.1.1 Value of Solar Energy

Solar energy is an energy that is clean, quiet, abundant, provides energy locally at peak demand hours and has no emissions of CO_2 that could impact land or environment. It uses almost no water, requires minimum maintenance once installed and is a secure source of energy for many years. With increasing oil prices and depleting oil resources, the pressing need to reduce greenhouse gas emissions from fossil fuels and the safety concern over nuclear plants (especially in light of the recent Fukushima Daiichi nuclear power plant crisis after the earthquake and tsunami), solar energy appears a desirable choice for the future.

In the wake of the Fukushima experience, Japan's Prime Minister Naoto Kan announced the country would increase solar power 15-fold by 2030. The target will require every new building, including residential houses, to have solar panels by then.

In the Technology Roadmap [7] published by International Energy Agency (IEA) in 2010, IEA reported that the global PV capacity has increased at an average rate of more than 40% since 2000. The roadmap envisions that PV will provide 11% of global electricity (4500 TWh per year) by 2050. IEA also projects that solar systems will provide substantial benefit to society in terms of security in energy supply and socio-economic development.

2.1.2 Dependence on Government's Incentive

Unfortunately, the technology needed to convert sun energy to electricity remains inefficient and therefore makes the investment not feasible. Solar energy is also intermittent,

[7] International Energy Agency. (2010). *Technology Roadmap, Solar photovoltaic energy, 3*. Retrieved from http://www.iea.org/papers/2010/pv_roadmap.pdf

dependent largely on weather conditions. The goal to make solar energy business sustainable can only be reached if we have the technology to harness the sun's energy efficiently to reach grid parity as well as a breakthrough in electricity storage. Stakeholders' participation in developing a balanced policy, ramping up of manufacturing and innovation in research and development are critical in reaching that goal.

Until that time comes, government support remains the key driver in renewable energy development including solar energy in Canada and other countries. According to the World Energy Outlook 2010 factsheet, total government support for renewable energy will grow "*from US$57 billion in 2009 to US$205 billion (in year 2009 dollars), or 0.17% of global GDP, by 2035"*[8].

[8] International Energy Agency. (2010). *World Energy Outlook 2010 Factsheet*, 5

2.2 The Issue – Susceptibility to Fraud

The potential for fraud is unquestionably large — we know that when a large amount of money is involved, it creates businesses opportunities, but it also creates incentives and opportunities for fraudsters.

Donald Cressey [9] describes three factors contributing to business fraud: motive, opportunity and rationalization. If all three factors are presents, fraud will likely occur. Grid power can be purchased at a fraction of the FIT contract rate; this significant gap motivates fraudsters to generate electricity through the grid or diesel generation to inflate their solar profit. In an actual case in Spain, a fraudster generated diesel energy and sold it to the government as renewable energy. This case, which will be covered in section 6.1, is a good example of fraud committed with this motive.

Individuals looking for investment opportunities in the solar energy sector will find many offers; owners of commercial buildings are flooded with offers to build solar PV systems on their rooftops[10]. While many are probably legitimate project operators, there may be fraudsters who seize this opportunity to approach uninformed owners, misrepresenting the investment by promising great return. However, solar PV projects have many down sides, which include: high capital cost, risks associated with grid capacity, uncertainty in government policy changes, potential contract price reduction, the lengthy process in obtaining OPA approval and many regulations required for safety inspections.

Uninformed investors who are eager to make quick profit can be victimized if they lose their objectivity to rely on these material omissions or deceiving information.

[9] Donald Cressey, a sociologist; co-author of *Principles of Criminology*
[10] Based on input from a commercial complex's management, he received an average of 1-2 calls a day offering solar PV system opportunity during the peak period in 2010

2.3 The Response

In May 2009, modeled after Germany, Ontario introduced the *Green Energy and Green Economy Act, 2009* (GEA) to attract business development in renewable energy and to create green jobs and opportunities for a declining manufacturing sector in Ontario. The Government of Ontario announced the Feed-in-Tariff (FIT) program in October 2009, in which the Ontario Power Authority (OPA)[11] guarantees buyback of energy produced from approved renewable sources at a premier rate for 20 years. Qualifying renewable sources include biogas, renewable biomass, landfill gas, solar photovoltaic (PV), water power and onshore wind. [12]

By observing its development in Germany, Spain and other European countries, this paper will cover how the FIT program has promoted the solar energy business in other countries, how fraudsters perpetrated and took advantage of the program and how OPA may borrow the experiences from actual fraud cases and incorporate mitigation measures in the FIT contract and FIT rules for prevention of fraud.

2.4 Purpose and Structure of Paper

This report is written for two types of readers: the first are investors interested in pursuing solar PV business, so that they may understand the risks associated with the business; the second one is for anyone interested in understand how the FIT program works and how it can be perpetrated by fraudsters.

[11] OPA was established by The Electricity Restructuring Act, 2004 to forecast electricity need for Ontario
[12] Off-shore wind originally included in the FIT program but is no longer accepted and existing application cancelled as of February 11, 2011 by Ministry of Environment

This report will provide an overview of the FIT program offered in Ontario, it will identify key players of the FIT program, the reasons for each player be interested in the issues; it will also look at laws and regulations applicable to the program and the potential for fraud and risks associated with the FIT program and solar PV business venture.

Capital requirement to start up a solar system is high. Without incentives, it requires an average of 15-20 years just to pay back capital invested. Even with incentives, it is still not the most economically attractive project. [13] Therefore, it is important that anyone considering becoming a renewable energy supplier must fulfill his or her due diligence to evaluate risk factors, capital requirement (long and short term), financing options, government incentives and commitment, mitigation available, professional knowledge and time commitment to ensure that these projects are deliverable and not motivated by fraud.

Solar PV manufacturing is indirectly driven by the FIT program. In order to meet the domestic content requirement, foreign manufacturers establish production plants in anticipation of rising demand of locally produced solar panels, modules and inverters because of the FIT program. However, with a two-year review expected in October 2010 and the upcoming provincial election, many participants from the manufacturer sector at the Solar Ontario 2011 conference made it clear that substantial layoff would be imminent should there be any serious changes to the FIT program.

Therefore, this paper will identify the financial and political risks associated with solar PV ventures, based on an actual case studies and information available in the OPA's online resource, this paper will provide a practical guide to mitigate these risks.

[13] Maeda, Risa(2011, May 25). *Japan to unveil push for renewable energy-cheaper solar*. Globe and Mail. Retrieved from http://www.theglobeandmail.com/report-on-business/international-news/japan-to-unveil-push-for-renewable-energy-cheaper-solar/article2033998/

In order to achieve the objective of this paper, this research paper will cover the following:

- To provide an overview of the Feed-in-Tariff program (FIT) in section 3
- To identify key players, their roles in solar venture and reasons for them be interested in the issues of the FIT program in section 4
- To identify what laws and regulations apply to solar energy venture and FIT program in section 5
- To identify risk, potential for fraud and mitigation measures in FIT program in section 6 and 7
- A successful community based solar projects in section 8
- To identify role of an investigative and forensic accountant in solar energy venture in section 9

2.5 Approaches and Methodologies

Information for this research is collected through the following methods:

- Interview owners – conduct interviews with corporations and community representatives who have completed solar PV projects
- Interview representative from OPA – conduct interview to understand the role of OPA in FIT program, potential for fraud, mitigation measures implemented to prevent fraud, the outlook of FIT program and the outlook of energy supplies in Ontario

- Interview project operator – conduct interview with a company providing services and supplies in solar energy to understand challenges and obstacles in solar PV business
- Attend Solar Ontario 2011 conference held in Windsor, Ontario to understand business opportunities and constraints, regulatory procedures and various challenges that solar PV operators are facing
- Tour a newly set-up solar modules manufacturer in Windsor and observe production in action
- Obtain information from the Ministry of Energy through email, phone inquiries and internet search
- Obtain information about FIT program through online resource provided by OPA
- Other information through internet searches, publications and presentations

The qualities of an investigative and forensic accountant (IFA) such as investigative mentality, adaptability, investigative conviction, objectivity and analytic aptitude will be used where it is needed to evaluate the accuracy of information.

Section 3: The Green Energy Act and Feed-in-Tariff Program

3.1 Green Energy Act

Ontario's *Green Energy and Green Economy Act, 2009* (GEA), received Royal Assent on May 14, 2009; regulation and tools were introduced in September 2009. *"The landmark Green Energy Act will boost investment in renewable energy projects and increase conservation, creating green jobs and economic growth to Ontario."*[14] By creating the Feed-in-Tariff (FIT) program (modeled after the successful program in Germany), establishing priority in connecting to grid system, setting up a one-stop system managed by Ontario Power Authority, the Ontario government is hoping that *"The GEA will expedite the growth of clean, renewable sources of energy, like wind, solar, hydro, biomass and biogas, helping Ontario become North America's leader in renewable energy."*[15]

3.2 Concept and Assumptions of FIT

Enabled by the GEA, the Ontario Power Authority (OPA) is responsible for implementing the FIT program. The program provides a significant incentive to encourage and to promote greater use of renewable energy; under the FIT program, Ontario Power Authority (OPA) enters a 20-year contract and purchases renewable energy produced at an inflated price. Specifically, the current contract prices for solar energy are summarized in the table in below:

[14] Ontario Government, (2009, May 14). *Ontario Green Energy and Green Economy Act: A Vision for the Future*. Retrieved from http://www.mei.gov.on.ca/en/energy/gea/
[15] Ibid

Feed-in-Tariff Prices [16] for Solar Energy Projects in Ontario – August 13, 2010			
Solar PV	**Size Tranches**	**Contract Price ¢/kWh**	**Escalation %**
Rooftop	≤ 10 kW	80.2	0%
Ground-mounted *	≤ 10 kW	64.2	0%
Rooftop	>10 ≤ 250 kW	71.3	0%
Rooftop	>250 ≤ 500 kW	63.5	0%
Rooftop	>500 kW	53.9	0%
Ground-mounted *	>10 kW	44.3	0%

Source: OPA program Overview *Includes all non-rooftop solar PV technologies

To illustrate the extent of the premium rate difference, the current contract rate offered by OPA to buyback the renewable energy for a less than 10kW rooftop microFIT is 80.2¢/kwh verse the Time-of-Use rate is 5.1¢/kwh to 10.7¢/kwh [17]; together with the impact of applicable delivery charge, OPA is paying an estimated four to five time more than the current time-of-use rate that a residential home or small business would pay the local distributor company (LDC).

The FIT contract rate[18] is developed based on the following principles:

[16] Ontario Power Authority, (2010, August 13) *FIT Price Schedule*, http://www.fit.powerauthority.on.ca/Page.asp?PageID=924&ContentID=10543

[17] Power Stream (n.d.). *Time of Use Rates*, effective November 1, 2010 to October 31, 2011. Retrieved from http://www.powerstream.ca/app/pages/TOU_Rates.jsp

[18] Ontario Power Authority. (2009, April 7) *Stakeholder Engagement – Session 4.* http://fit.powerauthority.on.ca/Storage/10147_FIT_Stakeholder_Engagement_-_Session_4_FIT_Price_Schedule_FINAL_(HP).pdf,

Public Support - Prices are intended to encourage solar PV projects on existing permanent buildings, such as schools, commercial buildings and residential houses. The participants are business operators in which solar energy is not their regular line of business;

Firm Contract – The Green Energy Act regulates that purchases of energy from renewable energy must take priority over fossil fuel. Since energy produced from a solar system remains a small percentage, this basically guarantees all energy generated from solar energy will be purchased;

Guarantee Prices - Prices are designed to provide participants and associated industries with a high measure of price stability and program sustainability (FIT contract is entered into for 20 years);

Efficiency - Prices for each category favour the most cost-efficient projects in order to manage customer rate impacts;

Reasonable Return - Prices are established to allow the participants to recover project costs, cover ongoing operating expenses and earn a reasonable rate of return on investment;

European Example - Prices are determined based on cost-based pricing methodology used in many European FIT programs;

Financing Assumptions - The financing structure is determined based on the following assumptions:

- 30% of equity, 70% of debt
- 11% of after-tax return on equity,
- 7% of cost of debt,
- 30.5% of income tax rate,
- 2.25% of inflation and

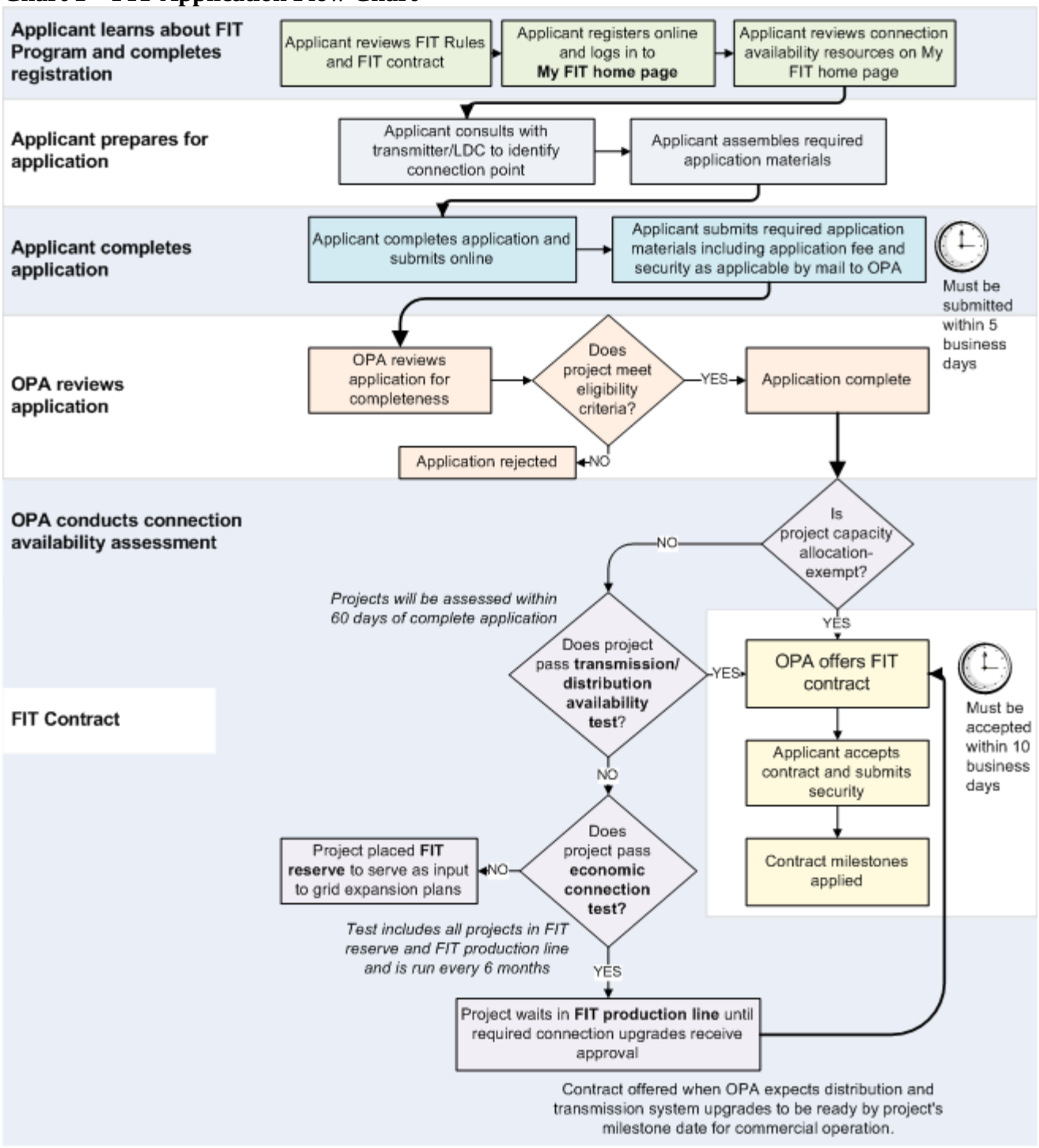
- qualify for Class 43.2 CCA rate – 50% on the declining balance limited to the net income – making the first few years of investment almost income tax-free

3.3 Participation in the FIT Program

While it sounds like a safe and secure investment, applicants must be willing to invest in constructing the solar system, hosting facilities in compliance with applicable laws and regulations and ensuring that the system is properly maintained and operated. The applicant must also make the necessary applications, provide performance security, pay for and obtain approval for connection to a local grid system. Therefore, understanding how the FIT program works is critical in accessing the solar energy project. The overview of the FIT program is summarized in Appendix C in this paper to provide readers with an understanding of the program.

3.4 FIT Application Procedure

Chart 1 – FIT Application Flow Chart



Source: reproduced from OPA

The above flow chart is available at the OPA's web site and it provides a good illustration for a rooftop FIT application. However, details for capacity allocated-exempted projects and ground-mounted systems are not specifically covered in this flow chart.

Capacity Allocation-Exempted Projects

Capacity allocation-exempted projects are small projects connected to the distribution system. The Ontario Energy Board rules that project must be ≤ 250 kW if connecting to a line less than 15 kV and must be ≤ 500 kW if connecting to a line ≥ 15 kV to be considered allocation-exempted. Capacity allocation-exempted project will be offered a FIT contract after the application has been reviewed and information provided is complete. These projects do not need to meet the distribution and transmission availability test, the economic connection test, the FIT production line or the FIT reserve. [19]Capacity allocation-exempted projects are not required to provide application security; only the completion and performance security are required.

However, connection impact assessment will be performed on all application for system higher than 10kW. Grid upgrade may be required to connect to the distribution system and the applicants may be asked to pay all attributed connection costs.

Ground-mounted System

A ground-mounted system greater than 10kW requires Renewable Energy Approval (REA) from the Ontario Ministry of the Environment (MOE), however, procedures to obtain the REA are not included in Chart 1. According to a presentation by Ms. Doris Dumais, Director of Approvals, Environmental Assessment and Approvals Branch, Ontario Ministry of the Environment at a panel discussion at the Solar Ontario 2011 conference, almost 50%

[19] FIT Program Overview, section 1.1 (c)

of the Applications for Approval of a Renewable Energy Project were rejected and returned to the applicants in their first submission. She cited that reasons for most of the refusals are because of incomplete information.

Depending on the location of the proposed solar PV system, the REA application[20] requirements may include other provincial approvals such as development permits under the Niagara Escarpment Planning and Development Act, Greenbelt Belt Plan, Oak Ridges Moraine Conservation Plan, archaeological reports, heritage reports, environmental impact study reports and water body reports. Inexperience investors must leverage on the expertise knowledge of engineers, consultants, planner and attorneys to complete the application.

microFIT Application

On the other hand, a microFIT application for system under 10kW capacity is considered Capacity-Allocation Exempted and a micro system; it follows a much simpler procedure. Ms. Patricia Lightburn, an analyst of the FIT program, said during an interview that if information requested is provided in full; a microFIT application can be approved in 30 days after the online submission.

A microFIT system must be connected, directly or indirectly, to a distribution system. Project also must have metering suitable for data collection and payment calculation, as specified by the LDC. For a solar PV microFIT system (about 99% of microFIT applications), the project must meet domestic content requirement (60% effective January 1, 2011). The interested parties in microFIT must observe and adhere to this requirement.[21]

[20] Ontario Government, Ministry of the Environment, *Application for Approval of a Renewable Energy Project, PIBS 7216e01 (12/09)*, December 2009
[21] OPA, *microFIT Overview, page 10, 11 14*, December 8, 2009,

Section 4: Key Players in FIT Program

The structure of energy management in Ontario is complex. Identifying the parties that might be affected or interested by the investigation is important, in order to complete an investigation into matters related to FIT program and solar PV venture. This section summarizes the involvement of each key player in the FIT program.

Category and Key Players	Involvement in energy and FIT program / Reasons for each party be interested in the issues
Ontario Government	▪ In accordance with s.91 and s.92 of The Constitution of Canada, the legislature in each province has exclusive authority to make laws in relation to development, conservation and management of electrical energy ▪ The government of Ontario would be interested to know if the FIT program been abused and how the law can be amended to stop the abuse
Ministry of Energy and Infrastructure (MEI)	▪ The Ministry of Energy and Infrastructure, under direction of the legislature, is responsible for development of energy policy framework ▪ The Ministry also has legislative responsibility[22] for several agencies, including: o Hydro One o Independent Electricity Systems Operator

[22] Government of Ontario, Ministry of Energy (n.d.). *About the Ministry of Energy*, http://www.mei.gov.on.ca/en/about/

	○ Ontario Energy Board ○ Ontario Power Authority ○ Ontario Power Generation ▪ MEI would be interest to know everything about energy to ensure the electricity need in Ontario are met
Ministry of Environment (MOE)	▪ Solar PV systems greater than 10kW that are not mounted on the rooftop or the wall of a building are required to submit Application for Approval of a Renewable Energy Project to Ministry of Environment[23] ▪ Applicants are responsible for completing the application form and providing documentation according to Ontario Regulation 359/09, Part IV made under the Environmental Protection Act ▪ MOE would be interested to streamline the application process in collaboration with other agencies and to protect the environment in a balance manner
Independent Electricity Systems Operator (IESO)	▪ The Independent Electricity System Operator [24] (IESO) was established in 1998 under the authority of the *Electricity Act, 1998*; it manages the reliability of Ontario's power system and operates the wholesale electricity market where the hourly price of electricity is set

[23] Ontario Government, Ministry of Energy, *Ontario Regulation 359/09 of Environmental Protection Act, part II, section 4*, September 8, 2009
[24] Independent Electricity System Operator. (n.d.). *Who we are?* Retrieved from http://www.ieso.ca/imoweb/siteShared/whoweare.asp

	▪ For system directly connected to the IESO-Controlled grid, IESO pays the Supplier within 20 days after receiving the settlement statement from OPA ▪ IESO would be interested to review the total cost effect from the FIT program and to set the electricity price accordingly
Ontario Energy Board (OEB)	▪ OEB regulates the electricity and gas supplies sectors in Ontario ▪ The Board sets transmission and distribution rates and approves the Independent Electricity System Operator's (IESO) budget and fees ▪ The OEB licenses all market participants including the IESO, generators (e.g. OPG), transmitters (e.g. Hydro One), distributors (e.g. Toronto Hydro, Power Streams), wholesalers and retailers ▪ Solar system ≥500kW must obtain a licence from OEB ▪ OEB is responsible for setting the rules for cost allocation between the Applicant and LDC. The Rules are set out in the Distribution System Code and the Transmission System Code[25] ▪ OEB would be interested in regulation of the license-issuing procedures
Ontario Power	▪ Ontario Power Authority was formed in 2005 under the

[25] Ontario Power Authority, *Feed-in-Tariff Program Overview*, December 8, 2010, 19

Authority (OPA)	*Electricity Restructuring Act, 2004* ▪ OPA is responsible to forecast long-term energy need and to identify resources available for Ontario ▪ OPA is responsible for procurement for new generation of energy in Ontario ▪ Its goal is to engage, to promote and to facilitate cleaner energy for Ontario ▪ OPA is responsible for designing, planning, implementing, rate setting and continuous monitoring of the FIT program ▪ OPA is the key player in renewable energy would be interested in identifying possible loopholes; amend the FIT contract, FIT Rules, classification, auditing procedure, application process and contract rate when and where necessary
Electrical Safety Authority (ESA)	▪ To establish standard for electrical safety ▪ To conduct electrical safety inspection and approval prior to connection of system ▪ ESA would be interested in making enhancement of the safety standard and inspection procedure
Local Distribution Company (LDC) – e.g. Toronto Hydro, Power Stream	▪ Project of ≤10MW typically would be connected to the distribution system ▪ Applicant should consult LDC to obtain project-specific connection information

	▪ LDC to conduct a distribution availability test, that includes assessment of grid capacity, connection feasibility and connection cost for each specific project ▪ If an expansion to the distribution system is required to connect the specific project, some of the system upgrades may be needed while others will be benefit; the costs for expansion will be shared between the LDC and the Applicant, that is called "expansion costs" ▪ Enter Connection Agreement and Connection Cost Recovery Agreement with the Applicant ▪ To install generation meter after the system is inspected and approved by the Electricity Safety Authority ▪ For a non-IESO market participant, to settle payment with the Supplier of solar energy generated from the approved system periodically, LDC would be interested in improving the procedure to curtail the fraudulent activities ▪ LDC basically owns the monitoring meter for each Supplier, LDC would be also interested in improving the communication between OPA and LDC for proper monitoring
Transmitter – e.g. Hydro One	▪ Project ≥10MW typically connects to the transmission system directly ▪ Responsible for developing and maintaining Ontario's

	transmission and distribution grid to continue connecting customers with secure and uninterrupted electricity supplies ▪ To conduct a transmission availability test on both transmission and distribution connected projects to assess the impact of the project to the capacity of the existing transmission system ▪ Entering Connection Agreement and Cost Recovery Agreement with Suppliers connecting directly to transmitter
Renewable Energy Suppliers	**Parties entering contract with OPA to provide renewable energy (in this paper, solar energy provider only)**
Residential Home Owners / Building Owners / Communities / Solar Farmer investors	▪ To submit an application to OPA for installation of a solar PV system on their properties under microFIT (for system ≤ 10 kW); under FIT program (for system ≥ 10kW), systems can be rooftop or ground-mounted ▪ To select an appropriate location for the system ▪ To determine the nameplate size tranches ▪ Contact LDC/ Transmitter to determine connection point to the grid system ▪ To invest financially, undertake all risks and costs associated with the installation – connection cost, zoning applications, environmental study, transportation study, development cost, building permit and construction costs (zoning and environmental approval not required for rooftop system) ▪ To remit connection cost, in case grid capacity is insufficient,

	may be liable for the upgrade cost (microFIT not required to go through connection availability test) ▪ Ensuring compliance to applicable laws and regulations (detail see section 5) ▪ To select a qualified installer and supplier for equipment ▪ To remit taxes on sales of energy and income tax generated from profit earned ▪ To properly maintain of the PV system ▪ Potential investors and Suppliers would be interested to remain objective while evaluating the investment proposal — it would be to their best interest to keep abreast of the latest development of the FIT program, policy changes, relevant laws and regulations and any changes that associated with the electricity development
Service Providers	**Service providers who offer services during the process of FIT program and installation of solar systems**
Project Operators	▪ Renewable project operator provide expertise knowledge to investors should have an in-depth working knowledge affecting FIT program, these issues include assessment of size tranches, system design, connection point, domestic content requirement, financing options and projections, transmission and distribution capacity ▪ Project operators assist the completion of solar PV system, therefore, they should have gained firsthand experience in

	procurement of components – panel, modules, rack, inverter and metering ▪ To engage other professionals such as engineer, planner, lawyer, accountant and others where needed ▪ To communicate with LDC to obtain connection option, grid capacity and connection cost on behalf of investors ▪ To oversee construction until it reaches commercial operation ▪ Project operators are the primary coordinators of a solar PV project; project operators not in compliance with the professional standard would damage the reputation of the solar industry and public confidence
Engineers	▪ To conduct structural assessment on rooftop to determine if the structure can carry the extra weight load from the solar system ▪ To conduct electrical study to assess inverter location, electrical design and system layout ▪ To perform environmental study for impact from ground-mounted system to the surrounding, especially impact from a solar farm ▪ To prepare working drawings for building permit
Planners	▪ To review zoning and if a proposed system will be in compliance to town and regional development plan
Financial Analyst	▪ To conduct feasibility study and evaluation of finance model,

	ensuring that methods used, assumptions made, terms and conditions employed in proposal are accurate
Solicitor	▪ To prepare contract for OPA and, in case modification is required, amend the contract where necessary ▪ To identify legal constraint for their respective clients, go through obligations and benefits of a FIT contract ▪ To review and to prepare service and construction contract between service providers and participants of FIT program ▪ In case of legal dispute in above contracts, provide litigation services
Arbitrators	▪ FIT contract [26] specifies that if either Party considers that any dispute has arisen in connection the FIT, OPA and Suppliers should meet in person or by telephone discussion to resolve the dispute. ▪ If that fail, any matter in issue between the parties be decided by arbitration. ▪ Any arbitration will be decided by a single arbitrator appointed by the Party. ▪ The decision of the arbitrator shall be conclusive, final and binding upon Parties[27]
Other Parties	
Municipal Office	▪ Requirement for solar PV installation is different depending

[26] Ontario Power Authority, *Feed-in-Tariff Contract version 1.4, Exhibit E*, December 8, 2010.
[27] Ibid, Section 15.2

	on bylaws, policy and municipality ▪ Review application to ensure that project is in compliance with zoning requirement ▪ Review working drawings and to issue construction permit ▪ Conduct structural and mechanical inspection if required ▪ Impose and collect development charge where applicable
Revenue Canada	▪ Assess and introduce tax regulations for revenue generated from FIT program
Insurance	▪ Provide appropriate insurance coverage for solar system, including but not limited to builder risk, liability, or income loss coverage [29] ▪ Solar energy production is a business ventures and all businesses ventures have risk. Suppliers engaged in the business will look for financial instruments to mitigate the financial risk from operations
Rate Payers	▪ Ability to participate in renewable energy development ▪ When solar PV system costs reach parity, energy supplies can become local and self-sufficient ▪ Cost for energy generated by the approved FIT system is paid for by LDC/IESO, so the total burden incurred from the FIT program is ultimately borne by the rate payers (OPA

[29] United Nation Environmental Programme, (n.d.). *Financial Risk Management Instruments for Renewable Energy Projects, UNEP 2008, page 1*, Retrieved from http://www.unep.fr/energy/finance/risk/

	estimates that the additional cost of FIT program to rate payers for 20 years will be about 5% of their total electricity cost [30])
	▪ Significant fraudulent activities will lead to loss of confidence towards the administration of the FIT program and it will diminish support for this incentive program

Source: FIT Program Overview and microFIT program Overview

[30] Patricia Lightburn, Analyst, FIT program of OPA, *interview by author*, June 1, 2011

Section 5: Laws & Regulations Apply to FIT Program

The FIT program was enabled by the Green Energy and Green Economy Act, 2009 (GEA). The Ontario Power Authority is responsible for implementing the program and has the authority to change FIT rates and rate classes.

However, in addition to the GEA, there are many laws and regulations that apply to the FIT program. Assimilation of applicable laws and regulations will ensure that the FIT application and connection will be completed accordingly. In the event of dispute, it is critical to have a comprehensive knowledge of these laws and regulations to define the obligations and commitments.

FIT Contract - The FIT contract specifies the contract capacity, contract price (including applicable aboriginal price adder and community price adder), required domestic content level, type of renewable fuel, location of the system, connection point, host facility, the applicable version of FIT rules, development and operation of the facility, payment obligation, security requirement, termination and assignment and contract operation and administration. In the event of any conflict or inconsistency with the IESO Market Rules and the terms of the FIT contract, the IESO Market Rules shall govern to the extent of such conflict or inconsistency.[31]

FIT Rules - FIT Rule provides reference and definitions for FIT contracts as of the contract date. In the event of any conflict or inconsistency with the FIT contract, the FIT rules shall be resolved in favour of the FIT contract. [32]

IESO Market Rules - The Independent Electricity Systems Operators (IESO) Market Rules is prepared by the Market Design Committee of IESO to govern the wholesale electricity

[31] Ontario Power Authority, *FIT Contract version 1.4, section 1.7*, December 8, 2010
[32] Ontario Power Authority, *FIT Rules version 1.4, section 1.1*, December 8, 2010

market. It governs the manner in which electricity and ancillary services are sold, purchased and dispatched in the IESO-controlled grid. IESO monitors the electricity market and ensures a fair market competition.

Distribution System Code (DSC) – The code[33] sets the minimum conditions that a Local Distribution Company (LDC) must meet in order to distribute electricity under its licence and the *Energy Competition Act, 1998.* The DSC specifies the conditions between a LDC and the generators, transmitters and consumers of electricity who use the distributor's distribution system. The DSC also stipulates that: [34]

- The LDC shall promptly make available a generation connection information package to anyone requesting this package (includes information for the process, approvals from the ESA, the IESO, OEB), technical requirements for being connected to the LDC and the standard contractual terms and conditions;
- Upon application, the LDC will complete a connection impact assessment
- The LDC shall require a person who applies for the connection of a generation facility to pay their impact assessment costs and all necessary technical information for connection impact assessment and proposed point of common coupling with the distribution system;
- The distributor will enter into a Connection Agreement with generators who have a generation facility connected to the LDC's distribution system prior to connecting.

Transmission System Code (TSC) – The code [35] sets out the minimum conditions that a transmitter shall meet in designed, constructing, managing and operating its transmission system. The Code and Connection Agreement set out the technical requirements, standards,

[33] Ontario Energy Board, *Distribution System Code*, July 14, 2000 revised on April 1, 2011
[34] Ibid, section 6.2
[35] Ontario Energy Board, *Transmission System Code*, July 14, 2000

terms and conditions between a transmitter and all distributors, generators and consumers of electricity connected to its transmission system.

Zoning By-Law – Agricultural land capability is classified in seven classes, Class 1 having the highest capability to support agricultural land-use activities and Class 7 having the lowest capability. To preserve agricultural land, the FIT Rules stipulate that the ground-mount solar PV systems greater than 100 kW must not be installed on *CL1 Class 1 lands, CLI Class 2 Lands or CLI Class 3 Lands that have not been designated on website as Class 3 Available Lands, unless any such lands were zoned by the applicable municipality to permit non-agricultural uses as of October 1, 2009.* [36]

Environmental Protection Act – As outlined under Regulation 359/09 of the Environmental Protection Act, solar PV installation great than 10 kW not mounted on a rooftop or wall of a building must obtain a Renewable Energy Approval (REA) from the Ontario Ministry of the Environment. [37]

Building Code – The Building Code establishes the standard of construction, ensuring that material, equipment, appliance and system installed *shall possess the necessary characteristics to perform their intended functions when installed in a building.* [38]

Building Permit – Municipalities are not involved in the FIT application directly. Installation of a solar PV system, however, requires a building permit and development charges may be imposed on land use.

Electrical Safety – The Electrical Safety Authority (ESA) must inspect and approve the solar PV installation prior to the LDC connecting the project to the grid. For a microFIT

[36] OPA, *FIT Rule, version 1.4 , Section 2.1 (a) (iv) (A)*, December 8, 2010
[37] Ontario Government, Ministry of Energy, *Ontario Regulation 359/09 of Environmental Protection Act, part II, section 4(3),* September 8, 2009
[38] Ontario Government, *Building Code Act, 1992, section 1.2.2*, last amendment 2010

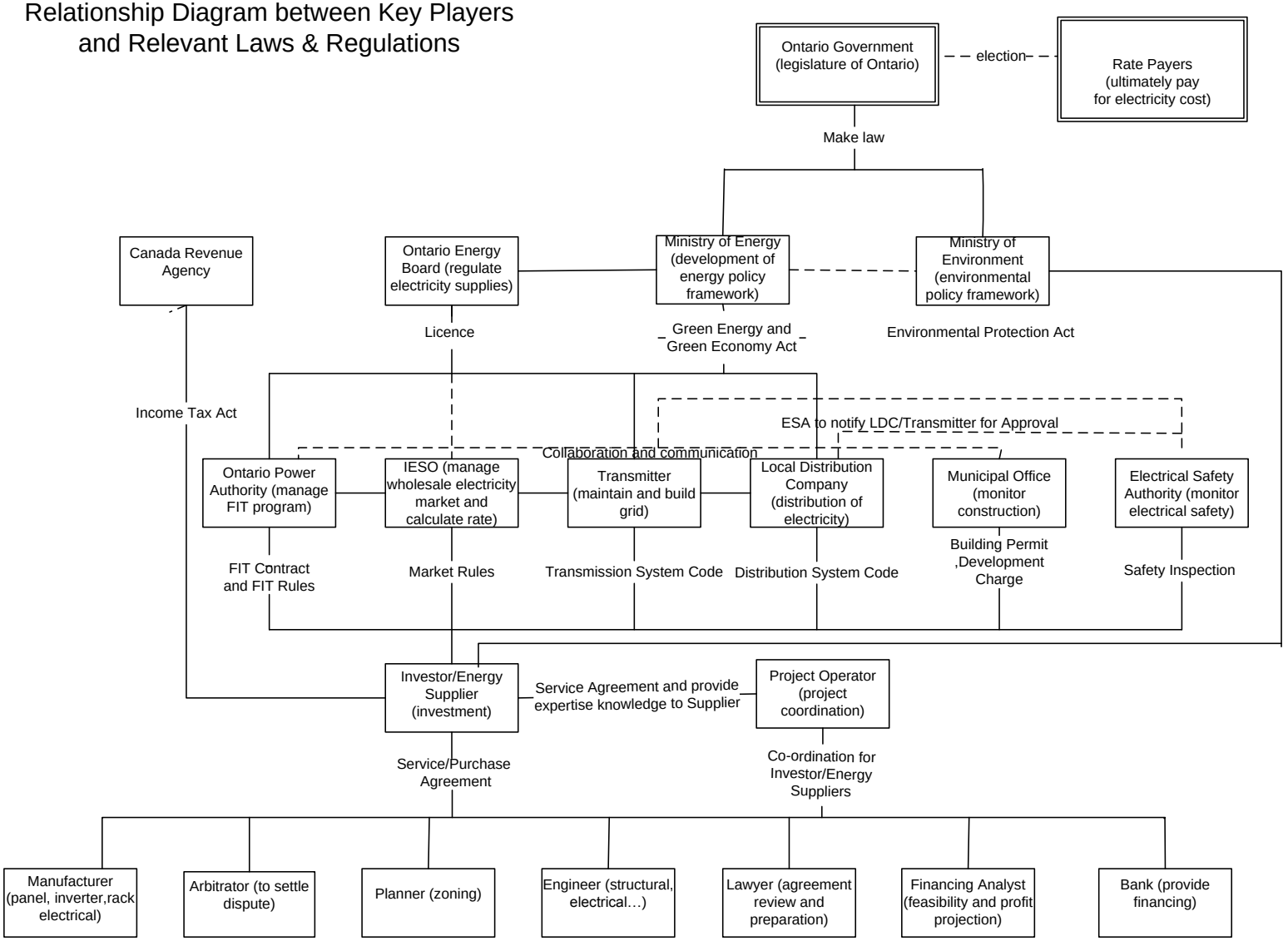
project, the ESA plays the role of an inspector at the end. For a larger scale FIT project, ESA inspects the electrical layout and drawing and ensures the proposal is in compliance with the Ontario Electrical Safety Code. ESA visits and inspects during the construction and completes the final inspection before LDC can connect to the grid.

FIPPA – Information contained in the FIT contract is confidential and all information between OPA and the Suppliers is secure. However, the OPA may disclose the supplier's name, contact, site, contract capacity, renewable fuel and connection point on OPA's website. [39]

A diagram illustrating how key players and applicable laws and regulations are relating to each other is summarized on next page.

[39] OPA, *FIT Contract version 1.4, section 7.1*, December 8, 2009.

Relationship Diagram between Key Players and Relevant Laws & Regulations



Refer to Section 4 and 5 for details of Key Players' Roles, Laws and Regulations

Section 6: Risk/ Potential for Fraud and Mitigation Measures against OPA

The definition of fraud in accordance with the Canadian Criminal Code s.380 (1) is "*everyone who, by deceit, falsehood or other fraudulent means, whether or not it is a false pretence with meaning of this Act, defrauds the public or any person, whether ascertained or not, of any property, money or valuable security or any service.*" Using few solar cases, elements of criminal fraud and the fraud triangle, this section will look at the potential for frauds, review a number of actual cases to demonstrate how fraudsters have abused government incentive programs around the world and study how key players must exercise provision in applicable laws and regulations to mitigate these frauds.

OPA is a government-controlled agency; the cost for electricity generated from solar systems purchased by the local distribution company will be recovered from the IESO. Therefore, any damage suffered by LDC or IESO is ultimately borne by rate payers.

6.1 Electricity generated from illicit system

In April 2010, Spanish newspaper "El Mundo" published a story [40] that 4500 MW of electricity was sold to the electricity grid between midnight and seven in the morning during the period of November 2009 to January 2010. The newspaper suspected that some solar farmers had been using diesel generators connected to their solar panel arrays and running them at night to illegally cash-in the premium rate for electricity generated under the FIT contract.

[40] De Wachter, Bruno (2010, June1). *Messages on fraud about Spanish solar energy incentives*. Retrieved from http://www.leonardo-energy.org/messages-fraud-spanish-solar-energy-incentives

Similar fraudulent activities can occur in Ontario; the pricing gap can create a motive for fraudulent perpetrators to substitute generated power to inflate their profits. The OPA must ensure that energy purchased under the FIT is actually generated through the system they approved.

The OPA developed a robust auditing process, which stipulates that any supplier found inflating income by deceit risks losing the contract. The FIT contract stipulates criteria that OPA may terminate the contract in the event of default by the Supplier. Section 9.1 (d) states that:

> *Any representation made by the Supplier in this Agreement is not true or correct in any material respect….*

Mitigation measures that can be incorporated into FIT Rules include:

- Specifying the type of renewable energy to be deployed in the contract between OPA and the supplier for monitoring purpose;
- Requesting the design and layout of solar PV system, including inverter layout, be prepared, reviewed and signed-off by an independent electrical engineer;
- Submitting appropriate information to the local municipality for building permit approval, maintaining an effective dialogue and collaboration with municipal inspectors to ensure an uniform approval standards that can catch irregularities in set-up;
- Conducting system inspections by the Electrical Safety Authority upon completion of installation, to ensure that the system will meet safety and electricity delivery standards;

- Providing access to OPA/LDC to monitor devices as required. Ancillary metering should be installed by LDC/ IESO, which will be responsible for the settlement;
- Requiring that FIT payment be based on real-time delivery. Solar energy production typically follows a bell-shaped path of output every day, depending on the weather condition. Data and information of solar energy collected from these monitoring devices should be monitored and compared with other systems in the region to identify exceptions and irregularities; and
- Providing OPA/LDC with the right to conduct unannounced or short-notice inspections throughout the 20-year contract period to ensure integrity of the system

6.2 Contract Rate

The National Energy Commission of Spain ruled in April 2011 to suspend paying premiums to 304 solar plants that allegedly received payment under the FIT even though these systems were installed without approval and after the subsides program ended.[41]

The FIT contract rate is reviewed approximately every two years and is expected to be lowered because of reductions in solar system costs or policy change; the OPA need to ensure that contracts entered after the review will not fraudulently induce a higher rate than what was contracted for.

Mitigation measures to prevent this fraud include:

- Ensuring contract rate changes take effect immediately and that contract rates should be grandfathered in according to the effective rate at the time the contract was submitted;

[41] Shah, Abhishek. (2011, April 15). *Why did it take Spain 3 years to stops/changes subsidies to Solar Power Plants getting Feed in Tariff through Fraud*. Retrieved from http://greenworldinvestor.com/2011/04/15/why-did-it-take-spain-3-years-to-stopschanges-subsidies-to-solar-power-plants-getting-feed-in-tariff-through-fraud/

- Avoiding confusion and delivery validation by requiring that applications be submitted online with a "timestamp"[42] made by a secured computer system rather than manually time stamped; and
- Maintaining a transparent, collaborative tracking system and shared database to ensure accurate settlements are paid between the OPA and LDC, using time stamped contract rates.

6.3 Projects Splitting

The FIT program offers the highest rate, 80.2 ¢/kwh, to microFIT rooftop system (≤ 10kW) to encourage broad participation from homeowners and small businesses. However, fraudsters may attempt to split a project on a single property into a few attempting to obtain a higher contract rate.

OPA has learned a lesson from Spain on preventing project-splitting. Section 7.3 (e) of the FIT Rules prohibits the move, by stipulating that:

- Only one microFIT project (either rooftop- or ground-mounted) will be permitted on one property;
- Only one FIT project per renewable fuel type will be permitted on a single property, provided that the ground-mounted system is at a low contract rate and not at the 80.2¢/kwh rate. Thus, a rooftop solar system and a ground-mounted system under separate meters are allowed on a single property because ground-mounted and rooftops is considered separate types;
- Multiple projects must be submitted on the same day for consideration and approval to be consolidated; and

[42] "Time Stamp" date means the date that the FIT Application was submitted online to the OPA web site in accordance with instructions

- Phased-in installation is allowed, but the aggregated capacity of all phases on a single property will be used to determine the applicable contract rate. This will eliminate project-splitting objectives for a higher rate.

6.4 Fabricated Rooftop

FIT program was designed to encourage rooftop systems to be built on existing permanent buildings by allotting a higher contract price and creating a simpler application for rooftop system that does not require approval from Ontario Ministry of Environment (MOE).

Fraudulent parties may approach owners of farmland to build barns and storages with just skeleton structures in order to support a rooftop PV system.

Mitigation available to prevent this includes:

- Coordinating with municipalities to identify the possibility of fabricated structures being constructed when issuing building permits;
- Conducting interviews with neighbours to confirm structures existed prior to rooftop PV installation, if fraudulent fabrication is suspected; and
- Requiring applicants to provide a declaration of the prior existence of structure for rooftop system.

6.5 Grid Capacity

The PV-Tech news [43] reported that around 55,000 applications for the Italian FIT program were submitted as developers rushed to sign up before the better FIT rates expired at the end of 2010. The sudden surge in project proposals had caused concern among ministers in Italy, particularly because major discrepancies regarding project sizes were found in these applications. As an example, one application attempted to pass off an 8MW industrial-sized

[43]Whitmore, Chris. (2011, Feb 4). *Italian minister fears feed-in-tariff fraud.* Retrieved from http://www.pv-tech.org/news/italy_fear_feed_in_tariff_fraud

project but turn out to be merely a 40kW domestic installation. The Italian government claimed that all applications would not be handed out at the last minute and would be subjected to thorough inspections and control.

Since the announcement, as of May 27, 2011, there have been a total of 5,782 solar energy applications under the Ontario FIT program, but only 1,380 applications have been approved and 31 of them are commercial operations. There are a total of 30,168 applications under the microFIT program (99% of microFIT applications are solar PV system) and only 5,093 executed.[44] The Toronto Board of Education has just announced it will take advantage of the 20-year FIT contract opportunity by installing a total of 450 solar systems (about 66MW capacity) on their school rooftops.[45] The support for the FIT program is gaining momentum, but with the slow approval process at OPA, the Ontario government may face a challenge similar to Italy's.

Because of limited connection availability, project operators may intentionally over- or underestimate the capacity required for connection. Mitigation measures include requiring:

- Prior to submission of FIT application, dependent on size and availability, project operators must determine the connection point of the project to the transmission or distribution system and include the connection information in the application;
- The LDC to provide connection information directly to OPA in accordance with registration ID;

[44] OPA, bi-weekly FIT and microFIT report as of May 27, 2011

[45] Toronto District School Board (2011, May 19). *Historic green energy deal funds long-term school roof renewal*. Retrieved from http://www.tdsb.on.ca/about_us/media_room/Room.asp?show=allNews&view=detailed&self=29875

- Project operators accurately project capacity. Any material increase should obtain OPA's prior consent before deployment and contract price should be lowered to the actual capacity contract rate [46];
- That OPA has the right to withhold consent for increased capacity to minimize fraudulent motives to manipulate the project size; and
- To avoid fraudsters overestimating the name-plated size and unnecessarily blocking opportunities for other suppliers, OPA should reserve the right to pay the lower rate — even when the actual size is much lower and would have been entitled for a higher contract rate;

6.6 Financial Capacity

Solar PV systems demand significant upfront capital, so energy suppliers and investors must have sufficient financial resources to complete their projects. OPA must implement necessary deposits and security to ensure that applicants can take their project from application all the way to commercial operation. OPA should include the following procedures:

- Collect a reasonable, non-refundable application fee to ensure that only applicants with genuine interest will apply;
- Collect reasonable application deposits for systems that require capacity allocation;
- Once contract is offered, collect performance security in the form of certified fund or irrevocable and unconditional standby letter of credit, issued by a financial institution in acceptable terms to OPA to ensure system completion; and
- Create a "Notice to Proceed" milestone, the notice that OPA provides to applicants informing them that the application is cleared for grid capacity that they may proceed

[46] OPA, *FIT contract version 1.4, section 2.1*, December 8, 2010.

to install. OPA should collect another performance security upon commencement of the project to ensure that the system installed meets safety standards.

6.7 Domestic Content

The production cost in Ontario is high — systems manufactured overseas and in US costs a lot less than those manufactured locally. Effective January 1, 2011, the domestic content requirement for solar PV system is 60%. The high domestic percentage is designed to create new green energy jobs in Ontario. Intentional misrepresentation of domestic content to lower capital costs will defeat this objective. As a result, ensuring the accuracy of the domestic content is critical in preventing fraud. To avoid complicated calculations, the OPA should stipulate a rigid percentage of domestic content for each component of the PV system.

The domestic percentage grid is provided in Appendix D. To ensure accuracy of the domestic content, OPA should incorporate the following checklist for mitigations:

- Certificate of domestic content must be declared by applicant;
- Brief description of each designated activity as specified in Domestic Content Grid (see Appendix D), including summary of process, procurement procedure, documents must be available for inspection and verification;
- Supporting documents such as invoices, delivery slips and payment confirmation should be retained for auditing;
- Consent for verification, which will allow OPA to verify and audit that the component are produced locally[47];
- According to Christian Wentzel, who has been actively participating in solar PV plant development in Germany, in US and in Canada, said a unique serial number is

[47] OPA, FIT contract, *version 1.4, exhibit D, section 1.6*, December 8, 2010.

assigned during the production of modules. OPA as a program monitor can use the tracking software available in to perform duplicated testing to avoid multiple use of domestic product serial number; and

- Ability to conduct plant tour, examine specification sheet and verify manufacturer production record if there is reasonable ground to suspect irregularity.

Section 7: Risk/ Potential for Fraud and Mitigation Measures against Investors

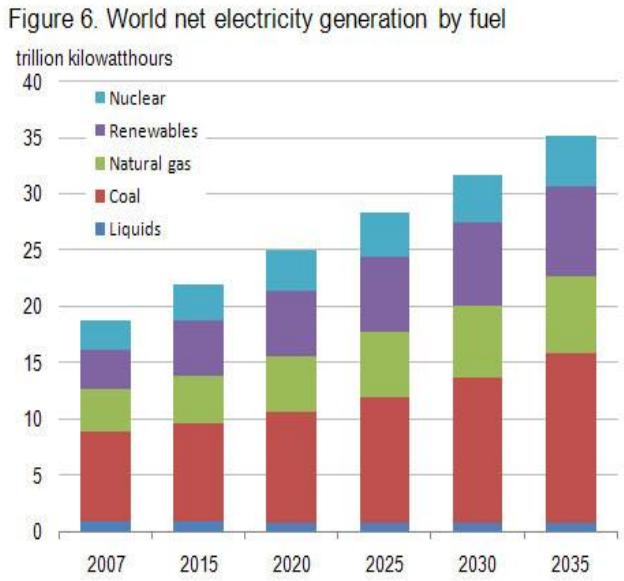
Investment in solar PV system demands significant financial resources; therefore, this section will cover risk for financial loss as well.

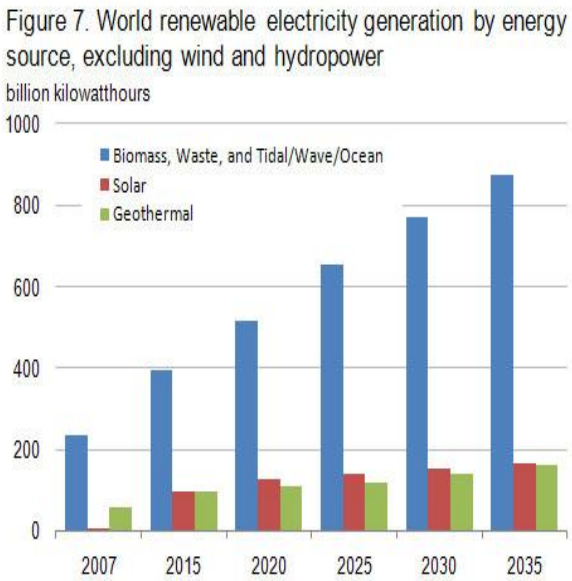
Fraudsters may take advantage of a new concept — one high-profile fraud case in renewable energy involved Mantria Corporation (a Pennsylvania company that traded on the SEC) and Speed of Wealth (an investment company that promoted the investment in Mantria). The company claimed "Mantria was the world's leading manufacturer and distributor of biochar," but in fact was nothing more than a Ponzi scheme that took $30 million from about 300 international investors.[48]

The technology using silicon material in solar panel production is not new, the solar PV business will remain underdeveloped until more countries recognize the benefits and begin to implement incentive programs to support the research and development of this industry. Based on the information from the International Energy Agency (IEA), world renewable electricity generated by solar in 2007 totaled 6 billion kWh, which accounted for about 0.17% of total renewable energy. But the IEA expects that solar energy production will increase to 95 billion kWh by 2015, about 1.92% of total renewable energy. (see chart 2)

[48] Austin, Anna (n.d.). *Biochar company Mantria charged with investor fraud.* http://biomassmagazine.com/articles/3322/biochar-company-mantria-charged-with-investor-fraud

Chart 2 – World electricity generation by fuel





Source: International Energy Agency, Report #:DOE/EIA-0484(2010), released May 25, 2010

The growth of the solar industry cannot happen without investor participation. The challenge is to exercise objectivity to ensure success is acute. This section will look at some possible risks investors face.

7.1 Knowledge & Reputation

Take the case of Michael McKinley, a Philadelphia-based solar contractor who was charged by the Montgomery police with felony fraud and theft charges for allegedly cheating clients out of $84,000. McKinley's company, Solaris Energy, had been on the qualified installer list approved by the state Department of Environmental Protection. Many residents in the Montgomery Township took advantage of the state rebates for solar energy installation, provided him with advance deposits for construction of thermal hot water and solar electric power systems, only to find out later that either the work done was inferior or

never completed. [49] McKinley was arrested, appeared before the District Judge for bail hearing and now awaits trial.

Suppliers and investors in solar PV venture in Ontario are not immune to the industry's challenges. Based on information from CanSIA, many project operators brought their European experience to help guide these businesses in the early stages.

To ensure that projects are properly installed and completed to meet all laws and regulations, finding an experience and reputable project operator is critical to ensure success. Canadian Solar Industry Association ("CanSIA") was formed to enhance and promote the welfare of the Canadian solar industry; company wishing to become member of CanSIA must signs and voluntary agrees to a ten-point code of ethics, CanSIA may discipline Members by non-renewal, suspension or expulsion from membership.[50] Investors interested in solar PV venture should check for the services providing company's membership status with CanSIA to ensure they are dealing with a company with reasonable knowledge and compliance to the Code of Ethics.

Investors must shop around for multiple biddings to make certain that the proposals submitted are reasonable, achievable and measurable. Investors should also perform reference check from previous customers to ensure that they are dealing with a reputable company.

A practical guide to perform due diligence to evaluate a project operator is contained in Appendix E.

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[49] Coughlin, Matt. (2011, Feb 17; updated 2011, Feb 25). *Solar contractor took $84K,* retrieved from http://www.phillyburbs.com/news/crime/solar-contractor-took-k/article_4b3e1a5a-3aef-11e0-a3ad-00127992bc8b.html

[50] Canadian Solar Industry Association. (2009, April 30). *Voluntary Code of Ethics*. Retrieved from http://www.cansia.ca/membership/code-ethics

7.2 High Capital

Based on information provided by a reputable turnkey solar PV system provider during the Solar Ontario 2011 tradeshow, a turnkey Solar PV rooftop system with 60% domestic Ontario content requirement that qualified for the FIT program will cost approximately $6 - $7 per kWp. A typical 3.6 kW residential rooftop requires a total investment of $28,000. [51] Investment in a typical commercial building rooftop system ranging from 75 kW to 500 kW can cost millions of dollars.

In addition, FIT program applicants are required to provide the following to OPA/LDC:

- Applicable fee (non-refundable) - $ 0.50/kW (minimum of $500);
- Application security - $20/kW for a solar FIT application (the application security is waived for capacity allocation-exempted projects);
- First Completion and Performance security - $50/kW (due within 10 days of contract offer);
- Second Completion and Performance security - $25/kW (due within 30 days of notice to proceed);
- All new connection costs to connect project to the grid; and
- Upgrades and expansion cost that benefit project and the existing system will be shared between the rate payer and the supplier. OEB/OPA together with collaborative input from LDC and Transmitter is responsible to determine how the cost will be shared.

Anyone interested in investing in solar PV ventures should consider each option prior to committing to a solar venture.

[51] Oya Solar Inc., *Marketing guide* , distributed in May 2011

Risk of Financing - Based on the experience of European nations, the FIT program remains the biggest driving force for small solar PV system installations. With the 20-year guaranteed government purchase of electricity, financing institutions are now willing to provide loans to support 70% to 80% of the upfront costs for a system. The drawback of this option is that these financing plans may have a long repayment period; the financing agreement must have an early termination clause should the owner wish to sell the solar PV system along with the property.

Risk of Leasing – Many solar PV companies that provide turnkey solar PV systems offer roof leasing option. These companies will install, own and maintain the system and pay the owner of the property an annual lease payment based on the roof size and KW size of the solar PV system installed. The drawback of this option is that the financial stability and the reputation of the solar-providing company must be carefully verified. Otherwise, owners of the buildings under lease may find themselves unpaid for the rooftop lease while the revenue generated from the solar system continues to flow to the solar-providing company. Another consideration is the transferability of the lease agreement, should the owner want to sell the building at a later date.

7.3 Change of Government

Under the leadership of the Liberal government, Ontario is the first jurisdiction in North America to adopt the FIT program.

During the presentation at the Energy Forum held on December 8, 2010, Colin Andersen, the CEO of OPA, urged all levels of government to work together to find local solutions to new energy structures and become locally sufficient.[52] The Ontario's Long-Term Energy Plan projected that by 2018, Ontario will develop 10,700 MW of renewable

[52] Andersen, Colin, *Ontario's 20-Year Vision for Sustainable Electricity Supply* , May 6, 2009, 3

energy, enough to power 2 million homes.[53] Paul Ekins, the author of "*Economic Growth and Environmental Sustainability: The Prospects for Green Growth"* said during a debate at University of Ottawa that broadcasted by CBC radio, "*we are already late for climate change…it is imperative to maintain sustainability and it must come before economic growth."*[54]

However, because of the heavy subsidy, opinions on how renewable energy (including solar) should be developed are divided. The current Ontario opposition party leader, Tim Hudak, criticized the FIT program as "*expensive experiments"* and vowed to cancel the FIT program and to dismantle the OPA [55] should the Conservative Party form the next government in the upcoming election on October 6, 2011.

The solar energy business development in Ontario remains in its infancy and the outlook could become rocky due to the unpredictability of government policy.

7.4 Grid Capacity

In the early stages of the FIT program, contracts were awarded before mandatory confirmations of grid capacity with the local distribution company (LDC) were carried out. Based on a report in the Toronto Star on February 11, 2011, "*A thousand mostly rural residents across Ontario who were awarded solar energy contracts last summer have been told their projects have been put on hold… that they can't connect to the electrical grid because of technical issues.*"[56] These homeowners were left with tens of thousands of dollars

[53] Ontario Government, Ministry of Energy (2010). *Long-term Energy Plan.* Retrieved from http://www.mei.gov.on.ca/en/pdf/MEI_LTEP_en.pdf
[54] Ekins, Paul (2011, Feb 2). *Green Growth or No Growth*, a debate hosted by Paul Kennedy, CBC Radio, Retrieved from http://www.cbc.ca/ideas/episodes/2011/02/02/green-growth-or-no-growth/
[55] Hudak, Tim (2011, May 10) *Speech at Ontario Power Summit,* Retrieved from http://probeinternational.org/library/wp-content/uploads/2011/05/2011-05-10-Ontario-PC-Leader-Tim-Hudak-Speech-Ontario-Power-Summit.pdf
[56] Spears, John (2011, Feb 12). *Ontario solar projects put on hold.* Retrieved from http://www.thestar.com/business/article/937782-ontario-solar-projects-put-on-hold

invested, but no grid connection — and no income to support interest payments and expenses incurred from these installations.

OPA has since changed its rule that grid capacity and connection assessment must be conducted prior to offering a contract.

7.5 Contract Rate Change

In Germany, the current feed-in-tariff rate for a small system dropped to 28.74 eurocent/kwh [57] from 59.53 Eurocents/kwh in 2004. (Comparison of Ontario and German FIT program is contained in Appendix F). Likewise, the OPA is going *to review and amend as necessary, the FIT program,… and the Price Schedule at regular two-year intervals.*[58] The FIT was first introduced in September 2009, so the overall contract rate will likely be reviewed in early October 2011. If Ontario follows the trend set by Germany, Spain and other countries that have adopted the FIT program, the contract rate will come down.

The FIT rule specifies that the applicable price [59] as set out in the Price Schedule according to the "timestamp."[60] The FIT Rule also stipulates that the completed application form in electronic and hard copies be delivered to the OPA office within five business days of the electronic submission of the Application. Failure to do so will result in forfeiture of the reference number and the timestamp. Investors interested in solar PV projects should take note of the critical dates and follow them accordingly.

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[57] Lang, Mutschler. (2010, Oct 30). *Federal network agency publishes September PV figures and 2011 solar feed-in-tariff*, German energy blog. Retrieved from http://www.germanenergyblog.de/?p=4392
[58] OPA, *FIT Rules version 1.4, section 10.1*, December 8, 2010
[59] Ibid, section 7.1 (b)
[60] Ibid, section 4.1 (a)

7.6 Solar PV Panel Quality

Solar panel defects occur on a regular basis. Investment in solar PV system payback depends not only on FIT contract rate, but also the power output, power degradation and lifetime of the PV modules. When selecting manufacturers for solar products, investors must first determine if the solar panels are produced according to the industry standards. Quality of the solar panel can be verified by these steps:

- To ask for an independent certification to confirm that the panel produced meet the industry standard and has the name-plated capacity, certification can be viewed on-line to confirm its authenticity; and
- According to information provided by a specialist in solar energy, investors should request a specification sheet and request to perform a flash test on the module. During a flash test, the PV modules is exposed to a short, bright flash of light from a xenon filled arc lamp, the output of this arc lamp is simulated as sun light; data of the output of the solar PV modules is compared to the specification sheet to ensure that the performance of the module meets the flash test.

Section 8: Case Study – a Successful Community Project

While completing research for this paper, I had the opportunity to interview a school board engineer (he wishes to remain anonymous). He was responsible for installing eleven 10kW solar PV systems at eleven schools across Ontario.

The program was first initiated by the Ministry of Education under the Green School Pilot Initiative. It was developed under the Renewable Energy Standard Offer Program which then subsequently switched to the FIT program in 2009 following the announcement of the Green Energy and Green Economy Act.

The project received funding from the Ministry of Energy and Infrastructure (MEI) and the school board received funding from the Renewable Energy Funding (REF). A total of four Green initiative projects were launched, of which Solar PV system was one.

In order to evaluate each bidder, the school board followed a rigorous checklist that contained 30 check points. Suppliers were required to be on the qualified vendor list before they could bid on a contract.

The checklist evaluated each contractor in many categories, including price competitiveness, financing ability, technical knowledge, construction experience, reference check, and adequate insurance coverage, compliance to government certificate, applicable licences and maintenance plan. The full lists of criteria are as follows:

Competitive and reasonable pricing – The contractor must demonstrate that parts, supplies and workmanship meet minimum quality requirement. Price quoted must be competitive and reasonable.

Comprehensive submission – The tender document must contain detailed information including specifications and supporting documents for the manufacturer design and functionality evaluations.

Operation and maintenance plan – Since the FIT contract has a 20-years term, considerations regarding long-term operation and maintenance are necessary.

Commissioning plan – The contractor must provide a workable commissioning plan with independent certification provided to confirm that the commissioning plan is workable and achievable.

Warranty – The contractor and manufacturer of the solar system must provide an acceptable warranty package to minimize risks for the school board

Integrity and professionalism – As solar installation is a new field, the contractor must demonstrate that they have the knowledge and expertise in solar energy construction. Representative from the school would conduct a comprehensive evaluation and reference check of the contracts ability and knowledge.

Production Capacity – the bidder must have sufficient capacity to carry out the work subscribed in the most efficient manner.

Compliance – Contractors submitting bids must meet health and safety standards, follow the school board health and safety guidelines and possess a current clearance certificate issued by the Workplace Safety and Insurance Board.

Insurance – Contractor must carry valid and sufficient coverage of liability insurance and construction bonds. In addition, the school board must be named as additional insured for the policy.

Financial Ability –The contractor must demonstrate financial strength and stability prior to offering any contract. A bank reference letter and an acceptable credit rating report from Dun and Bradstreet are required.

The aforementioned school board representative stated that the biggest risk for the school board in investing in solar PV system was "*the integrity and professionalism of the solar integrator. Solar installation is a fairly new field and is still prone to 'renegade' contractors. In addition, without the FIT program, the payback period would be too long and the technology would not thrive with the present cost of electricity."*[61]

Investors who are interested in investing in a solar PV system should follow similar due diligence procedures stipulated by this board of education to ensure that they do not become victims of fraud. A practical checklist to assist in choosing a qualified project developer and services provider is essential and is provided in Appendix D for investors interested in pursuing opportunities in this industry.

[61] *Personal interview and Email communication with author,* May 9, 2011

Section 9: IFA Role in Solar Energy Venture

Solar energy ventures are an emerging business sector that is being enhanced continually by evolving standards and regulations. New technology and research is being developed among many universities and research centres. Energy generation (solar energy included) is highly regulated by many laws and regulations under various government agencies and ministries, each with its own agenda and sphere of authority. Professionals engaged in investigations involving the solar industry must possess skills to think "outside of a box". They must have investigative skills and investigative mindset, must understand the essence of the business engagement and must be familiar with possible motives of individuals committing the fraudulent activities. Investigative and Forensic Accountants (IFA) are equipped with these skills to take up these engagements.

In accordance with the Standard Practices for Investigative and Forensic Accounting Engagements (SP) SP100.08,[62]

"Investigative and forensic accounting engagements" are those that:

(a) Require the application of professional accounting skills, investigative skills and an investigative mindset; and

(b) Involve disputes or anticipated disputes, or where there are risks, concerns or allegations of fraud or other illegal or unethical conduct.

The Standard Practices further illustrate that "investigative skills" require the following sub-components: SP100.10,[63]

[62]CICA, *Standard Practices for Investigative and Forensic Accountant Engagements,* Nov 2006, SP100.08
[63] Ibid, *SP100.10*

(a) an understanding of the context within which the engagement is to be conducted (for example, the Tribunal process, laws, regulations, contracts or policies relevant to the engagement);

(b) the ability to identify, obtain, examine and assess information relevant to the engagement;

(c) the ability to analyze and compare various types and sources of information;

(d) an understanding of the types of information that would assist in establishing motivation, intent and bias;…..

With respect to "investigative mindset", in accordance with SP100.14,[64]

"In dealing with dispute-related engagements, the investigative mindset is employed to assist in determining and evaluating procedures, findings and conclusions. In consulting engagements, the investigative mindset is applied to determine and evaluate the procedures that need to be performed…to develop fraud prevention policies… to establish the process for determining ways in which policies could be violated."

Therefore, not only can IFAs engage in dispute and litigation matters, but IFAs can also be involved in planning and development. Accountants who possess an investigative mindset are already engaged in establishing assumptions, determining the FIT contract rate and monitoring application for funding. Examples of this are the involvement of accounting firms in the establishment of assumptions and the contract rate of the Ontario FIT program.

[64] Ibid *SP100.14*

Another accounting firm is appointed as the funding manager to review applications for funding submitted to the Community Energy Partnership Program.[65]

9.1 Planning, Prevention and Processing

IFAs must adhere to a rigorous standard of Rules of Professional Conduct established by the Provincial Institutes and adhere to any other regulatory and legal requirements. The Standard Practices are designed as the minimum standard practices that should be met by all chartered accountants conducting IFA engagements.[66] Therefore, engagements carried out by IFAs will be required to meet this high standard.

9.1.1 Assumptions and Contract Rate

IFAs can provide consulting services to government. This would include: an assessment of financing model, projection of interest rates movement and evaluation of lending conditions imposed by financing institutes and researching capital cost of different type of solar system to establish these assumptions. Based on these financial factors, ultimately, IFAs can help to develop a reasonable and acceptable pricing policy for a FIT program to balance the interest of both the public and the investors. IFAs can continuously be engaged to monitor and to adjust the pricing policy when the conditions change.

9.1.2 Establishing Guidelines and Policies

IFAs are trained to possess an "investigative mindset" and are capable to evaluate a process to identify areas that may be prone to fraud. Different types of fraud and mitigation measures to prevent frauds are covered in Section 6 and 7 of this paper. IFAs are equipped to understand the impact of laws and regulations, have abilities to identified key players

[65] OPA (n.d.) *Community Energy Partnerships Program, Who is the Program Manager?,* http://www.communityenergyprogram.ca/AboutCPCEPP/faqs.aspx#2
[66] Ibid, *SP100.02*

involved and how each of the key players may be affected by the issues. Based on the potential for fraud identified and inter-activities among the key players, IFAs can assist government in establishing guidelines to prevent abuses of the FIT programs.

9.1.3 Program Management

FIT programs should be operated in accordance with the laws and regulations specified in section 5 of this paper. IFAs possess professional accounting skills to understand how business activities are documented, recorded, managed and controlled. They have the ability to identify, obtain, examine and evaluate the relevancy of the information, to quantify the financial impact and to interpret the analysis of information.[67] These abilities make IFAs ideal candidates in program management.

9.1.4 Due Diligence

IFAs can apply their professional skills to perform evaluation of potential projects, using reasonable assumptions and conditions, appropriate methodologies, feasible projections, collaboration with relevant experts and unbiased findings. IFAs can also perform background checks on suppliers and business partners to identify parties with dubious backgrounds.

9.1.5 Engagement of Other Experts

During an IFA engagement, IFAs may determine that there are areas that require other individuals' expertise[68] relevant to the engagement. IFAs are responsible to evaluate the nature, knowledge, capabilities and professional reputation of the other experts. Solar energy ventures may require further expertise in technology, engineering and litigation. If

[67] Ibid, SP100.09
[68] Ibid, SP100.14

the engagement demands procedures outside of the expertise of IFAs, clients can be confident that these procedures will be performed by relevant experts accordingly.

9.2 Investigation and Testifying

In chapter 1of Forensic and Investigative Accounting, Crumbley states that a "*fraud auditor – a specialist who would ferret out deception in financial statements and reporting. Gradually the definition of forensic accounting expanded from the accountant who testifies in court to the investigative accountant as Peloubet chronicled. The forensic accountant learned to detect fraud itself, not merely to testify about it."*[69]

As identified in section 4, since solar energy venture involve many players, IFAs are professionals equipped with the analytical skills and mindset to conduct investigation pertaining to disputes and fraud activates among these players.

9.2.1 Investigation of irregularities

According to the GEA, the OPA is mandated to monitor the performance of FIT program. Anyone with a deceitful or fraudulent intention to abuse the FIT program or investor should be investigated thoroughly in a systematic manner. IFAs can apply their investigative mindset[70] for OPA to identify, pursue, analyze and evaluate all areas with the potential for fraud in section 6 of this paper. Solar energy production follows a typical PV path of bell shaped output and IFAs can use techniques such as regression analysis, data mining and data analysis software to identify and investigate irregularities falling outside of this pattern. Domestic content requirement is another significant and unique characteristic of the Ontario FIT program; the domestic content requirement and designated activities for each

[69] Crumbley, Heitger, Smith, *Forensic and Investigative Accounting*, 3rd edition, 1061
[70] Ibid, SP100.11

type of solar PV system are provided in Appendix D. IFAs can ensure the compliance to this unique requirement (see section 6.7).

9.2.2 Expert Witness

IFAs can be called to be an independent expert witness to testify in court in case of dispute and litigation. The expertise witness's report must be fair, objective, non-partial and pertinent to the matter. According to the case R. v. Mohan, the expert witness's role is to provide an opinion within the area of their expertise. They cannot usurp the responsibility of court. It is necessary for the triers of facts to the extent that without it, they will fail to form a reasonable conclusion and he or she must be a proper qualified expert.[71]

9.2.3 Fund tracing and asset recovery from illicit activities

IFAs can assist a private person or government to perform fund tracing and asset recovery for money gained through illicit activities by the fraudster. Fund tracing involves following the money and identification of assets purchased or liabilities repaid using the misappropriated funds. The ultimate goal of fund tracing has two-folds; one is to recover assets gained through illicit activities and the second to confirm that the fund was used for such an intended purpose.

Legal constraints that IFAs may utilize to recover assets gained through illicit activities include:

Anton Pillar – This allow IFAs to enter alleged individuals' or companies premises to search and to retrieve evidence. It also forces the alleged parties to answer questions.

Mareva Injunction – This is a temporary order to freeze assets pending further orders or resolution by the court. The purpose of the Mareva Injunction is to restrain removal of assets outside of the jurisdiction.

[71] R. v. Mohan, [1994] 2 SCR 9

Norwich Pharmacal Order – To order the disclosure of information from a third person that may lead to the identification of the alleged party. A typical example of a situation requiring Norwich Pharmacal Order is the obtainment of banking information from financing institute to complete fund tracing.

Section 10: Conclusion

According to a report on sustainable energy produced by National Resources Canada in 2007, "*Canada is not a leader in developing and producing current-generation solar PV technologies. … However, there is a key opportunity for research in this area. Canada's strengths in nanotechnology and materials science could enable researchers to significantly reduce the cost and increase the efficiency of solar cells".*[72] Since the release of this report, University of Toronto has "looked specifically at conjugated polymers that are believed to be one of the most promising candidates for building efficient organic solar cells"[73].

Many universities around the world have developed new technologies such as quantum-dot[74] solar panels to improve the efficiency in harnessing the sun's energy and another project to turning windows into power plants[75]. With innovation and funding, solar energy will reach parity sooner rather than later.

While it is still uncertain how the Feed-in-Tariff program will evolve in Ontario with the possible government change, Nova Scotia is planning her Feed-in-Tariff forum scheduled for September 2011. Nova Scotia is hoping to become a leader in Canada with a goal that by

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[72] National Resources Canada, *Powerful Connections – Priorities and Directions in Energy Science and Technology in Canada*, 2007.

[73] Luke, Kim (2009, Jan 16). *U of T chemistry discovery brings organic solar cells a step closer*, Retrieved from http://www.news.utoronto.ca/science-and-technology/post-1.html

[74] Innovative Research and Products, Inc. (2011, Mar 27). *Quantum Dots Could Make Solar Panels More Efficient*. Retrieved from http://nanopatentsandinnovations.blogspot.com/2011/03/quantum-dots-could-make-solar-panels.html

[75] Chandler, David (2011, April 15) *Turning windows into power plants*, Retrieved from http://www.photonicsonline.com/article.mvc/Turning-Windows-Into-Power-Plants-0001?atc~c=771+s=773+r=001+l=a

2015, twenty-five percent of electricity in Nova Scotia will be produced by renewable sources.[76]

The global demand on energy has increased significantly, personally, I believe solar energy will become the choice of energy source for tomorrow – it is clean and infinite. We can envision turning rooftops, windows and buildings envelope to becoming energy generators for household and commercial use.

Based on the prior European experience, OPA developed a robust monitoring system and integrated many mitigation measures for fraud prevention discussed in this research paper. With the lower than anticipated interest cost, decreasing production cost for solar panel, the FIT contract rate can be reduced to provide a balance benefit for rate payers, employments and investors. Ontario as a front runner in North America is at an advantageous position to become a true leader in solar energy development.

I came across a touching story about how a group of amateur teams of youth from one of Nairobi's toughest slums benefit from solar energy. The Marthare Football for Hope Centre received a donated solar system so that youth between the ages of eight to eighteen could play in the field during the dark evening. The football league is just part of the program using sport to promote gender and social equality in disadvantaged areas.[77]

Even if solar energy reaches parity, fraudsters motivated by greed will still seek opportunities to deceive and to defraud the public or any person. Only when we promote equality and integrity and control and execute with due diligence and objectivities, can we constrain opportunities for fraud.

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[76] Government of Nova Scotia, (2010, May 30) *2010 Renewable energy plan*. Retrieved from http://www.gov.ns.ca/energy/renewables/renewable-electricity-plan/

[77] Kimutai, Aileen AFP (2011, Apr 6) AFP. *Solar power brings night-time soccer Kenya slum,* Discovery News, Retrieved from http://news.discovery.com/tech/solar-power-brings-soccer-kenya-slum-110406.html,

Section 11: Appendices

Appendix A: Abbreviation

Abbreviation	Full Name
CAE	Capacity Allocation-Exempted
CanSIA	Canadian Solar Industry Association
DSC	Distribution System Code
ESA	Electricity Safety Authority
FIPPA	Freedom of Information and Protection of Privacy Act
FIT	Feed-in-Tariff
GEA	Green Energy and Green Economy Act (2009)
IESO	Independent Electricity Systems Operator
IFA	Investigative and Forensic Accountant
LDC	Local Distribution Company
MEI	Ministry of Energy and Infrastructure
MOE	Ministry of the Environment
OEB	Ontario Energy Board
OPA	Ontario Power Authority
PV	Photovoltaic
REA	Renewable Energy Approval
TSC	Transmission System Code

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Appendix C: Overview of Feed-in-Tariff (FIT) Program

Background

The FIT program was enabled by the Green Energy and Green Economy Act, 2009. The Ontario Power Authority (OPA) is responsible for implementing the FIT program.

Purpose

The program provides a contract to anyone interested in developing a qualifying renewable energy project with standardized program rules and price. Prices are designed to cover project costs and allow for a reasonable return on investment over the contract term.

Eligibility

Qualify renewable fuel resources include: Solar PV (ground-mounted and rooftop), wind, water, biogas, renewable biomass and landfill gas.

Domestic content requirement

The FIT contract requires wind and solar projects to include a minimum of goods and services that come from Ontario. For wind project, the minimum domestic content level with milestone date for commercial operation date in 2009 to 2011 is 25%, for 2012 and later is 50%. For solar project, the minimum domestic content level with milestone date for commercial operation date in 2009 to 2010 was 50%, for 2011 and later is 60%. Domestic content grid for solar PV system is contained in Appendix C.

Aboriginal and community-based project

The FIT program contains two provisions to encourage the development of Aboriginal and community-based projects by reduced security payments and an additional price incentive.

My FIT home page

To apply for a FIT contract, each applicant is required to register for the FIT program on the OPA's FIT program website. The "My FIT home page" provides all necessary tools and features for participating in the FIT program includes: registration ID, FIT message from OPA, to create a new application, status of the FIT application, FIT program resources and FIT related documents.

Connection information

Before beginning the application process, applicant must contact local electricity distribution company (and/or transmitter) in the location of the project to determine how a connection can be made from the project site to the grid system. During this discussion, applicant should find out the current distribution system capacity, project-specific connection information, any existing plans to expand the distribution system and the potential connection costs that may be responsible.

Connection availability assessment

Part of the application review process is to determine if there is sufficient transmission and distribution capacity available to connect the project at the proposed connection point. When there is sufficient capability available for the project, the project will be offered a contract.

When the connection availability is insufficient to the project, the OPA will work with the ISEO, transmitters and distributors as appropriate to determine the transmission and distribution upgrades required. There are five process elements to identify connection availability.

1. **Transmission availability test** – this test is performed by OPA to determine if there is sufficient transmission capacity available to connect the project. This test will be performed on both transmission and distribution connected projects to assess the impact of the project to the capacity of the existing transmission system (i.e. the IESO controlled grid) and upgrades required.
2. **Distribution availability test** – this test applies to distribution-connected projects only and is carried out by a local distribution company once a project first passes the transmission availability test. The distribution availability test considers the capability of the existing distribution system and planned upgrades.
3. **Economic connection test** – if there is insufficient connection capability then OPA, transmitters and local distribution companies will work together to integrate transmission and distribution system planning. This test determines if the costs of the required system upgrades to allow renewable generation to connect are justifiable and can be included in grid expansion plans.
4. **FIT production line** – if the project passes the economic connection test and the required system expansions are deemed to be economical and the project will be included in transmission and distribution expansion. The project will be placed in the FIT production line.
5. **FIT reserve** – if the required expansions are not deemed to be economical at the review time then the project will be placed in the FIT reserve and will be re-evaluated in the next economic connection test, together with all other projects in the FIT

reserve and FIT production line. The project will be considered in future expansion plans.

Contract and milestones

1. **Contract offer and acceptance** - when OPA determines there is or will be sufficient connection availability on the transmission and/or distribution systems to connect the project by its milestone date for commercial operation, the FIT contract offer notice will be issued to the applicant. Applicant has 10 business days from the issuance of the contract offer by the OPA to accept the FIT contract and submit the required completion and performance security payment.
2. **Licences and approvals** – Renewable energy approval may be required for ground-mounted solar PV projects, wind projects and bioenergy projects. All projects greater than 500 kW requires a generation licence from Ontario Energy Board. A safety inspection conducted by Electrical Safety Authority is required for all projects. Municipal building permits may require depends on requirement for each municipality.
3. **Milestones** –
    a. The first milestone is 10 days after the FIT contract offer notice is issued. Applicants are required to provide the first completion and performance security before this first milestone date. The security requirements are: $50/kW for solar PV, $20/kW for all other projects, $5/kW for community-based or Aboriginal projects with greater than 50% participation levels.
    b. The second milestone is the Impact Assessment, all project greater than 10kW are required to obtain an impact assessment from the applicable local

distribution company or transmitter. Project connected to the distribution system must obtain a Connection Impact Assessment. Project connected to the transmission system must obtain a Customer Impact Assessment and a System Impact Assessment.

c. The third milestone is the Notice to Proceed, applicants are required to submit a notice to proceed request to the OPA if the applicant is able to provide evidence of the completed environmental assessment (if applicable), domestic content plan, financing plan and evidence of the completed impact assessment.

d. The fourth milestone is the Second completion and performance security, within 30 days after the Notice to Proceed has been granted by OPA, applicant are required another set of security. The requirements are: $50/kW for solar PV, $20/kW for all other projects, $5/kW for community-based or Aboriginal projects with greater than 50% participation levels.

e. The fifth milestone is Commercial Operation; all projects are required to be completed within certain time frame. Time frame is three years for wind, solar and bioenergy project, five years for waterpower. Once the project is in service and has completed the connection to the grid, the applicant must submit a declaration of commercial operation to the OPA for the FIT payment to begin. In this submission, the applicant must provide: metering plan, single-line electricity drawing that identifies the connection point, transmission and distribution facilities, independent engineer certificate and commercial operation declaration.

4. **Contract and settlement –** the contract is entered into between OPA and the project applicant. It requires the OPA to pay the contract holder (Supplier) for the electricity produced by the project. The contract term runs for a period of 20 years (the term for waterpower is 40 years). The contract may be terminated if information in the FIT program application is found at any time to be inaccurate in a material respect. Project connected to the distribution system, the LDC will make payments to the Supplier on a regular basis. Project connect directly to the transmission system are settled directly by the OPA and the IESO on a regular basis.

Source: OPA, FIT Program Overview

Appendix D: Domestic Content Requirement

Table 1: Domestic Content Grid – Solar PV system greater than 10 kW

	Designated Activity	Qualifying %
1.	Silicon that has been used as input to solar photovoltaic (PV) cells manufactured in an Ontario refinery.	11%
2.	Silicon ingots and wafer, where silicon ingots have been cast in Ontario and wafers have been cut from the casting by a saw in Ontario	13%
3.	The crystalline silicon solar PV cells, where their active PV layer(s) have been formed in Ontario	11%
4.	Solar PV modules (i.e. panels), where the electrical connections between the solar cells have been made in Ontario and the solar PV module materials have been encapsulated in Ontario	15%
5.	Inverter, where the assembly, final wiring and testing has been done in Ontario	8%
6.	Mounting systems, where the structural components of the fixed or moving mounting systems have been entirely machined or formed or cast in Ontario. The metal for the structural components may not have been pre-machined outside Ontario other than peeling/roughing of the part for quality control purposes when it left the smelter or forge. The machine and assembly of the mounting system must have entirely taken place in Ontario (i.e. bending, welding, piercing and bolting). Base on the update April 26, 2011 This designated activity does not include the actuator or motor for solar tracking systems and it does not include standard bolts, screws, nuts, washers or clamps, where the clamps are used specifically to secure the module to the mounting system. Non-metal materials in the structural components will also have to be formed or shaped in Ontario to qualify. Where the mounting system uses the module frame to secure it to a roof and the module has one single frame, only the non-module frame to secure it to a roof and the module has one single frame, only the non-module components will be considered as part of the mounting system components.	11%
7.	Wiring and electrical hardware that is not part of other Designated Activities, that has been sourced from an Ontario Supplier	9%
8.	Construction costs and on-site labour performed by individuals Resident in Ontario, provided that no more than 5% of the total person-hours of all such labour is performed by individuals that are not Resident in Ontario	18%
9.	Consulting services, including legal, technical and accounting performed by individuals Resident in Ontario, provided that no more than 5% of the total person-hours of all such services are performed by individuals that are not Resident in Ontario	4%
	Total	**100%**

Table 2: Domestic Content Grid – Solar PV system greater than 10 kW Utilizing Thin-Film PV Technology

	Designated Activity	Qualifying %
1.	Thin film PV cells where the active PC layer (s) have been fabricated (by methods including but not limited to vapour deposition, evaporation or sputtering) in Ontario. Where the manufacture of the module is inseparable from the manufacture of the cells, there shall be no separate requirement for the module.	35%
2.	Solar PV modules (i.e. panels), where the electrical connections between the solar cells have been made in Ontario and the solar PV module materials have been encapsulated in Ontario	10%
5.	Inverter, where the assembly, final wiring and testing has been done in Ontario	8%
6.	Mounting systems, where the structural components of the fixed or moving mounting systems have been entirely machined or formed or cast in Ontario. The metal for the structural components may not have been pre-machined outside Ontario other than peeling/roughing of the part for quality control purposes when it left the smelter or forge. The machine and assembly of the mounting system must have entirely taken place in Ontario (i.e. bending, welding, piercing and bolting). Base on the update April 26, 2011 This designated activity does not include the actuator or motor for solar tracking systems and it does not include standard bolts, screws, nuts, washers or clamps, where the clamps are used specifically to secure the module to the mounting system. Non-metal materials in the structural components will also have to be formed or shaped in Ontario to qualify. Where the mounting system uses the module frame to secure it to a roof and the module has one single frame, only the non-module frame to secure it to a roof and the module has one single frame, only the non-module components will be considered as part of the mounting system components.	11%
7.	Wiring and electrical hardware that is not part of other Designated Activities, that has been sourced from an Ontario Supplier	9%
8.	Construction costs and on-site labour performed by individuals Resident in Ontario, provided that no more than 5% of the total person-hours of all such labour is performed by individuals that are not Resident in Ontario	24%
9.	Consulting services, including legal, technical and accounting performed by individuals Resident in Ontario, provided that no more than 5% of the total person-hours of all such services are performed by individuals that are not Resident in Ontario	4%
	Total	**100%**

Source: FIT Contract, Exhibit D – Domestic Content and Update

Table 3: Domestic Content Grid – Solar PV system less than or equal to 10 kW

	Designated Activity	Qualifying %
1.	Silicon that has been used as input to solar photovoltaic (PV) cells manufactured in an Ontario refinery.	10%
2.	Silicon ingots and wafer, where silicon ingots have been cast in Ontario and wafers have been cut from the casting by a saw in Ontario	12%
3.	The crystalline silicon solar PV cells, where their active PV layer(s) have been formed in Ontario	10%
4.	Solar PV modules (i.e. panels), where the electrical connections between the solar cells have been made in Ontario and the solar PV module materials have been encapsulated in Ontario	13%
5.	Inverter, where the assembly, final wiring and testing has been done in Ontario	9%
6.	Mounting systems, where the structural components of the fixed or moving mounting systems have been entirely machined or formed or cast in Ontario. The metal for the structural components may not have been pre-machined outside Ontario other than peeling/roughing of the part for quality control purposes when it left the smelter or forge. The machine and assembly of the mounting system must have entirely taken place in Ontario (i.e. bending, welding, piercing and bolting). Base on the update April 26, 2011 This designated activity does not include the actuator or motor for solar tracking systems and it does not include standard bolts, screws, nuts, washers or clamps, where the clamps are used specifically to secure the module to the mounting system. Non-metal materials in the structural components will also have to be formed or shaped in Ontario to qualify. Where the mounting system uses the module frame to secure it to a roof and the module has one single frame, only the non-module frame to secure it to a roof and the module has one single frame, only the non-module components will be considered as part of the mounting system components.	9%
7.	Wiring and electrical hardware that is not part of other Designated Activities, that has been sourced from an Ontario Supplier	10%
8.	All on-and off-site labour and services. For greater certainty, this Designated Activity shall apply in respect of all Contract Facilities	27%
	Total	**100%**

Appendix E: A Practical Guide to Evaluate a Solar PV Venture

Choosing a qualified and experience project operator and services provider is crucial to reach the final milestone of a FIT program - Commercial Operation, a practical guide to appraise a project is summarized in below tables based on online resources provided by OPA and Suppliers who have successfully taking a project from concept to Commercial Operation.

Considerations to Prevent Fraud and Questions to Ask Project Operator	Score	Notes
Knowledge and reputation		
What is the operator's experience in completing the FIT application in Ontario?		
Does the operator able to follow the critical path and milestones of FIT program?		
What is the operator's knowledge to work with LDC and Transmitter for connection capacity allocation?		
Will the operator work with LDC to arrange for connection to the grid? This includes: - Preparing the connection configuration diagrams - Arranging for payment of the connection costs - Helping prepare the connection agreement with the LDC - Arranging for installation and testing of the meter		
What is the operator's knowledge about Renewable Energy Approval from Ministry of Environment? (if applicable) Will the operator obtain this approval?		
Is operator a member of Canadian Solar Industry Association in good standing?		
Is operator registered with the Better Business Bureau?		
Can the operator provide a list of past customers who would be willing to provide reference?		
How does the operator assess the property to ensure that the system is installed at the most optimal location?		
Will the operator arrange for all necessary approvals and permits? This includes: - building permits - authorization to connect from the ESA		
Domestic content		
Is operator providing written confirmation of the activities contributing to the domestic content level required by the FIT and microFIT program?		

Considerations to Prevent Fraud and Questions to Ask Project Operator	Score	Notes
Installation and construction		
Is operator qualified to install the project?		
What is the commissioning plan?		
Can the operator provide an independent certification of the flash test on solar panel?		
Does proposal contain complete information including specification and supporting document from manufacturer for evaluation?		
Does the operator has sufficient resources and capacities to complete the project as committed in an efficient manner?		
Operation and maintenance		
Does the operator provide operation and maintenance service?		
What is the operation and maintenance cost?		
Competitiveness and reasonable pricing		
How does the operator's scope of work compare with other bidder?		
What is the total cost for the installation?		
How competitive is the proposed price?		
Financial Ability		
Can the operator provide a bank reference letter?		
Does the operator possess an acceptable credit rating report from a credit bureau?		
Compliance with government		
Does the operator's health and safety standard in accordance to Health and Safety Act?		
Does the operator provide a current clearance certificate issued by the Workplace Safety and Insurance Board?		
Insurance		
Can the operator provide a performance bond?		
Does the operator carry valid and sufficient coverage of liability insurance to cover property damage or injury?		
Is there any pending or active legal judgment against the operator?		
Warranty		
What is the warranty provided by the manufacturer?		
What is the warranty provided by the operator on labour and material?		
Objectivity		
Is the efficiency of system claimed by the operator too good to be possible?		
Is the price too low to be deliverable?		

Questions to Ask Local Distribution Company	Notes
What is the connection point to grid from the project?	
What are the costs associated with connecting the project to the grid?	
What are the ongoing account fees or metering charges that will be associated with the FIT project?	
What is the expect timing to connect the project?	
Are there any technical or equipment requirements for connecting the project safely to the grid?	
What information does the LDC require on the connection request?	

Approvals and permits	Notes
Electricity Safety Authority	
What are the safety standards that apply to the project?	
What is involved in a safety inspection?	
What is the cost of a safety inspection?	
What is the expect timing for the safety inspection?	
Municipality	
What is the building permit requirement for the project?	
What are the costs of obtaining a building permit?	
What is the expect timing for obtaining the building permit?	
Ministry of the Environment	
Does the project require a renewable energy approval?	
What other statutes and regulations required to support the renewable energy approval?	
What are the typical costs of obtaining a renewable energy approval?	
What is the expect timing for obtaining the renewable energy approval?	

Source: OPA microFIT Program Review and interview with stakeholders of solar energy business

Appendix F: Comparison of Ontario and German FIT Program

	Ontario	Germany
General Provisions		
Policy framework	Haul coal use by 2014	30% renewable energy by 2020
Eligible technology	Wind, solar, hydro, biomass, biogas, landfill gas	Wind, solar, geothermal, small hydro. Biomass, biogas
Specified tariff by technology	Yes	yes
Program Inception	Since 2009	Since 2000
Contract term	20 years	20 years
Investor IRR target	11%	5-7%
Guaranteed purchase/payment	Yes	Yes
Maximum size	10MW (solar)	No
Domestic content	Mandatory	No
Pricing		
Peak FIT rate	80.2¢/kWh	€59.53¢/kWh (96.25¢/kwh in 2004 average exchange rate)
Periodic review	Yes, target every 2 years	Yes
State subsidy	Ratepayer supported	Ratepayer supported
Type and connection		
Build-in PV Incentive	No	2009
Grid connection	Capacity allocation-exempted for ≤ 500kW. Economic test & scheduling for > 500kW	Priority connection
Connection cost/grid upgrade	>500 kW born by project/shared with IESO	Born by utility
Comparative electricity rate		
Electricity rate (residential)	5.1¢/kWh to 10.7¢/kWh	€22¢/kWh (30.55¢/kWh using May 2011 average exchange rate)
Electricity rate (industrial-low volume consumer)	6.4¢/kWh to 7.9¢/kWh	€6¢ to €7¢/kWh (8.33¢/kWh to 9.72¢/kWh using May 2011 average exchange rate)

Sources: Deutsche Bank Group, DB Climate Change Advisors, *Paying for Renewable Energy: TLC at the Right Price*, December 2009 and http://d-bits.com/ontario-german-fit/