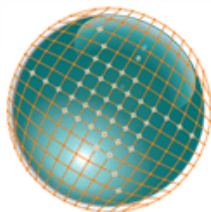


Ontario's Feed-in Tariff Program

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4th International Conference on
**Integration of
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December 6-10, 2010
Albuquerque, NM, USA

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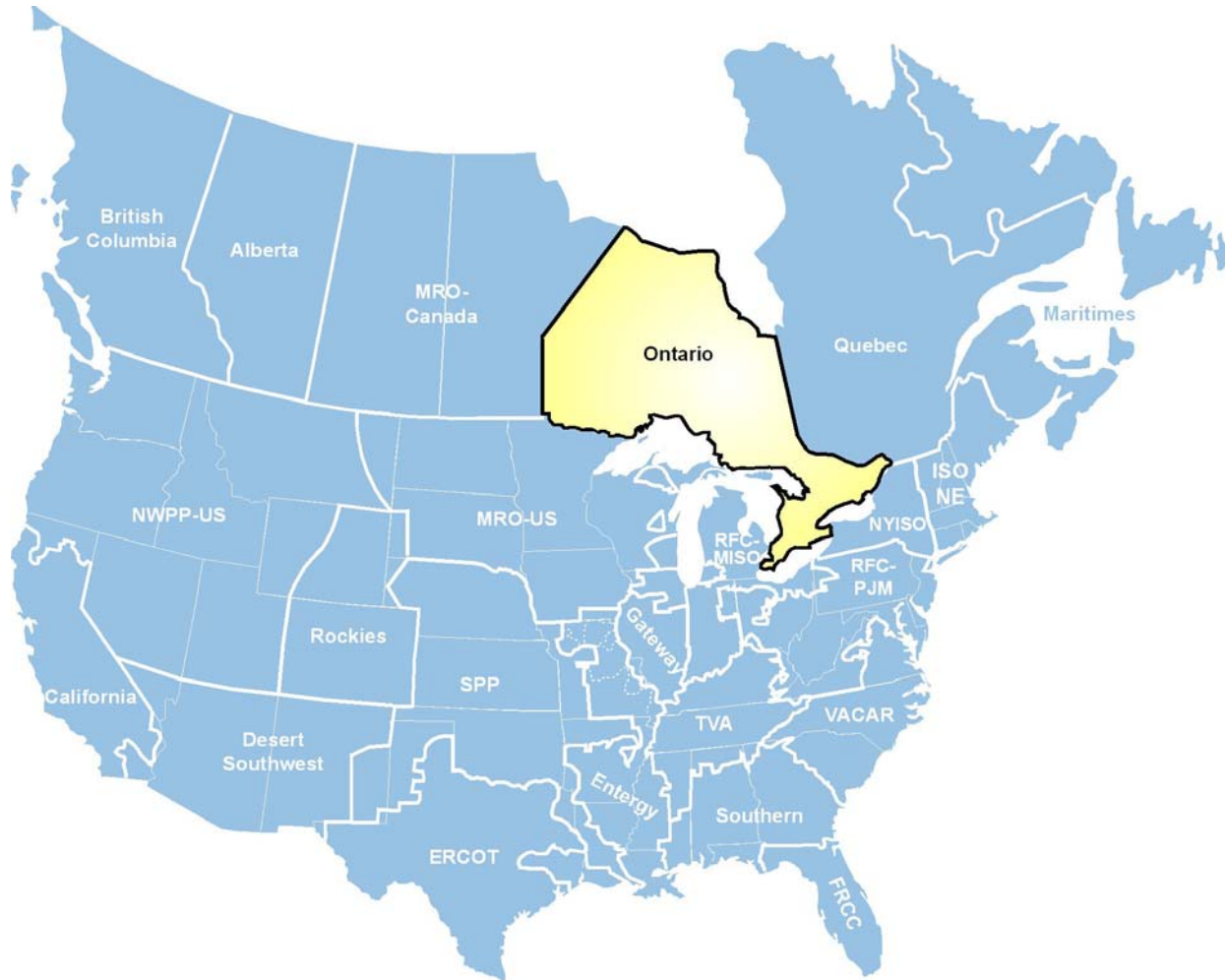
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Overview

- Ontario's Supply Mix
- Feed-in Tariff Program and Program uptake
- Integration of High Penetration of Renewables
- Roles of the IESO and OEB
- Program challenges and successes
- Future Tasks and conclusion

Ontario's Market



Highlights

- 12 million population
- Record peak load of 27,005 megawatts (MW) (2006)
- Operating capacity of over 35,000 MW
- 18,000 miles (29,000 km) of transmission lines
- Independent Electricity System Operator (IESO) operates the region's bulk generation and transmission system
- Electricity market restructured in 1998
- Average 2008 residential retail electric price of 10.8 Canadian cents per kilowatt-hour (kWh)

Ontario Power Authority

- **Mandate:**
 - Ensure reliable, sustainable electricity supply for Ontario
- **Key activities:**
 - Long-term planning
 - Procuring new supply
 - Coordinating conservation



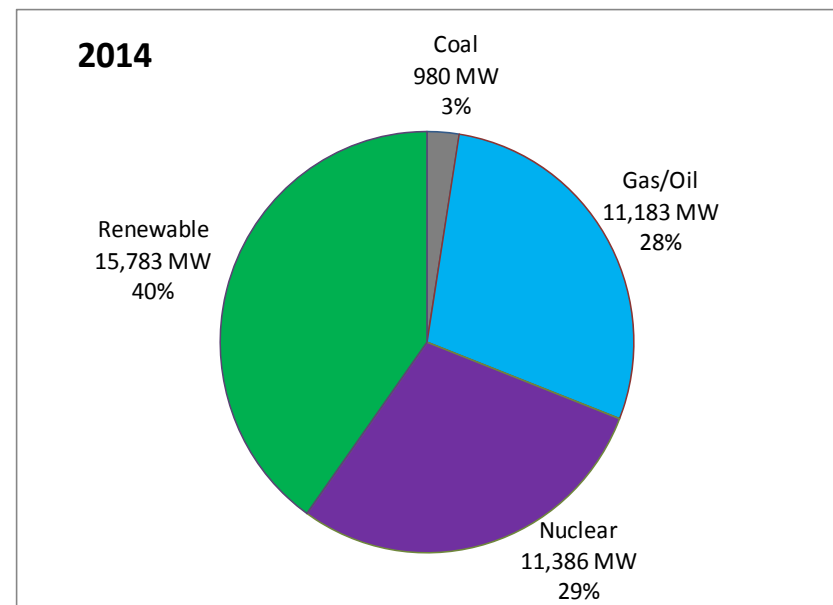
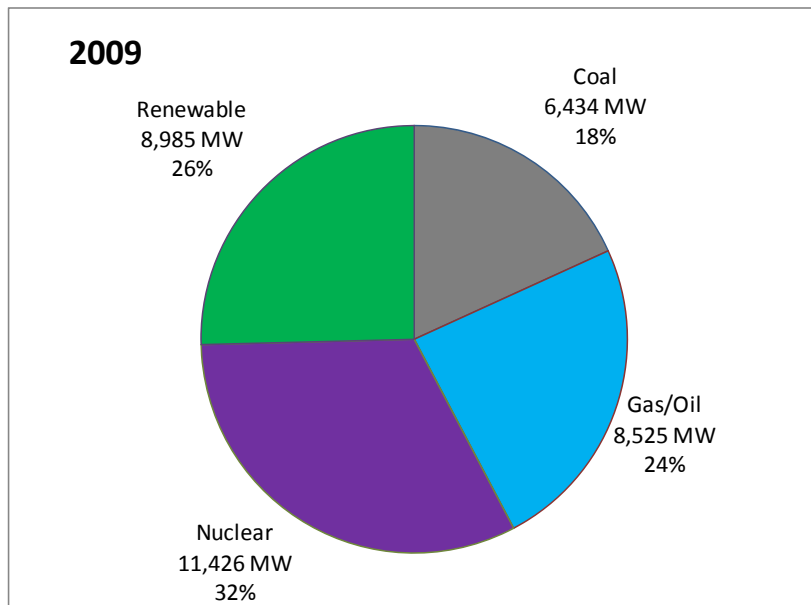
Ontario's Electricity Industry

- Current policy goals:
 - a cleaner electricity system
 - contribute to economic stimulus and job creation
 - revitalize aging infrastructure
 - improve environmental performance
 - phase out coal-fired generation by 2014
- Green Energy and Green Economy Act, 2009



Supply Mix

- The mix of generation is transforming to renewables, nuclear and cleaner natural gas



Ontario's Feed-in Tariff Program

What is a FIT Program?

- Generators of renewable energy – from homeowners to large developers – are paid a reasonable price for the electricity they produce over the term of the contract
- Allows generators to recover expected cost of the investment plus a reasonable profit
- Can provide a predictable and stable source of revenue to reduce risks

A FIT Program provides a simple way to contract for renewable energy supply

Ontario's FIT Program Price Schedule

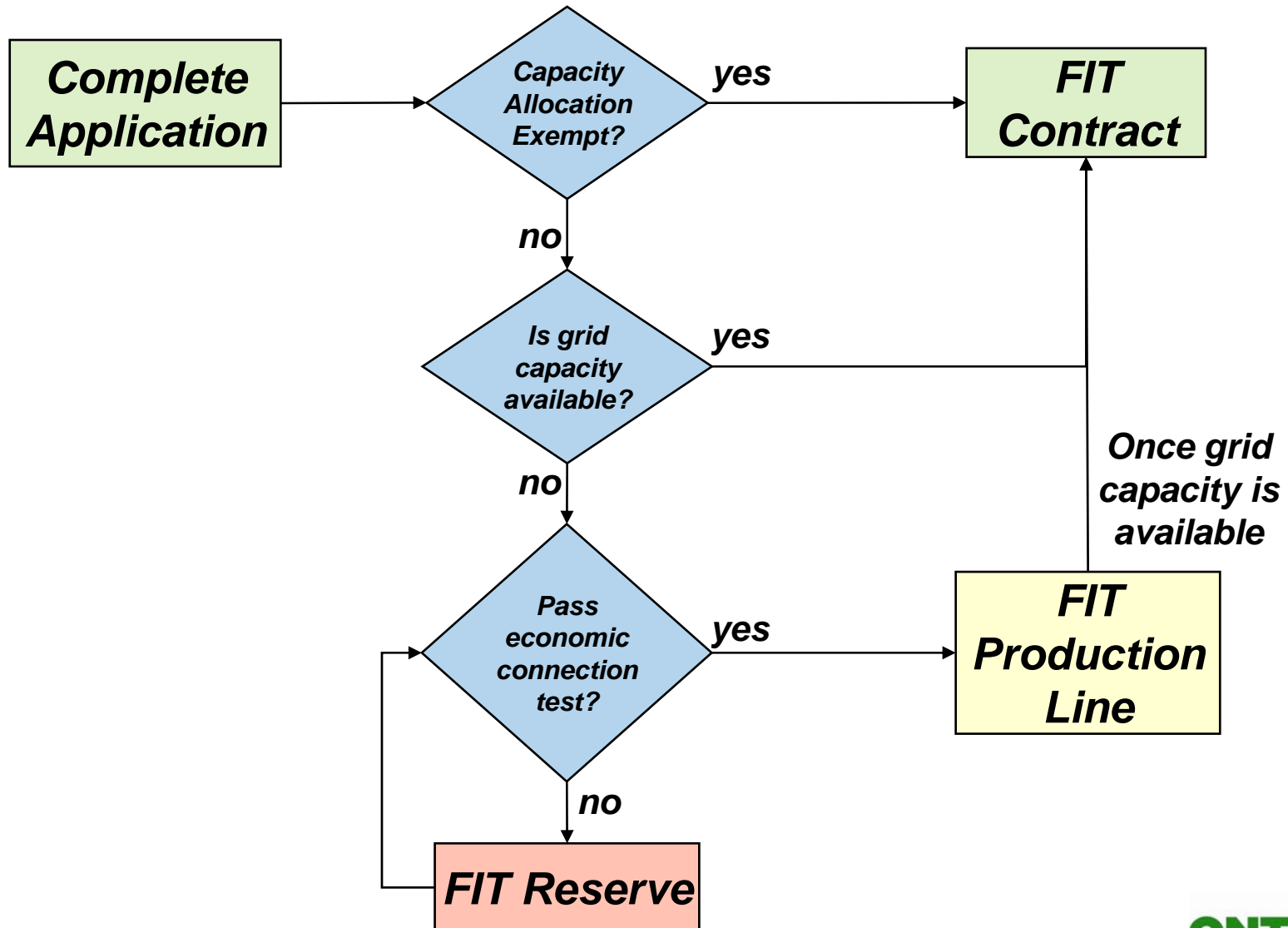
Renewable Fuel	Capacity Range	FIT Price (¢/kWh)
On Farm Biogas * ^	≤ 100 kW	19.5
On Farm Biogas * ^	> 100 kW ≤ 250 kW	18.5
Biogas * ^	≤ 500 kW	16.0
Biogas * ^	> 500kW ≤ 10 MW	14.7
Biogas * ^	> 10 MW	10.4
Biomass * ^	≤ 10 MW	13.8
Biomass * ^	> 10 MW	13.0
Landfill gas * ^	≤ 10 MW	11.1
Landfill gas * ^	> 10 MW	10.3
Rooftop Solar PV	≤ 10 kW	80.2
Rooftop Solar PV	> 10 kW ≤ 250 kW	71.3
Rooftop Solar PV	> 250 kW ≤ 500 kW	63.5
Rooftop Solar PV	> 500 kW	53.9
Ground Mounted Solar PV	≤ 10 kW	64.2
Ground Mounted Solar PV *	> 10 kW ≤ 10 MW	44.3
Waterpower * ^	≤ 10 MW	13.1**
Waterpower * ^	> 10 MW ≤ 50 MW	12.2**
Off-shore Wind *	Any size	19.0
On-shore Wind *	Any size	13.5

*Price Adder: priority participants (Aboriginal and Community-based) are eligible for extra payments

^ Paid On/Off Peak Price: 135%/90% of FIT Price

http://fit.powerauthority.on.ca/Storage/102/11128_FIT_Price_Schedule_August_13_2010.pdf

FIT Program Process



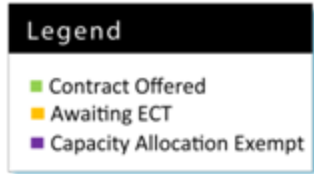
Domestic Content

- Local content requirements for solar and wind projects
- FIT requirements based on Milestone Date for Commercial Operation, not in-service date
 - microFIT requirements based on in-service date
- Potential challenges
 - Timelines for project development
 - Timelines for local manufacturing

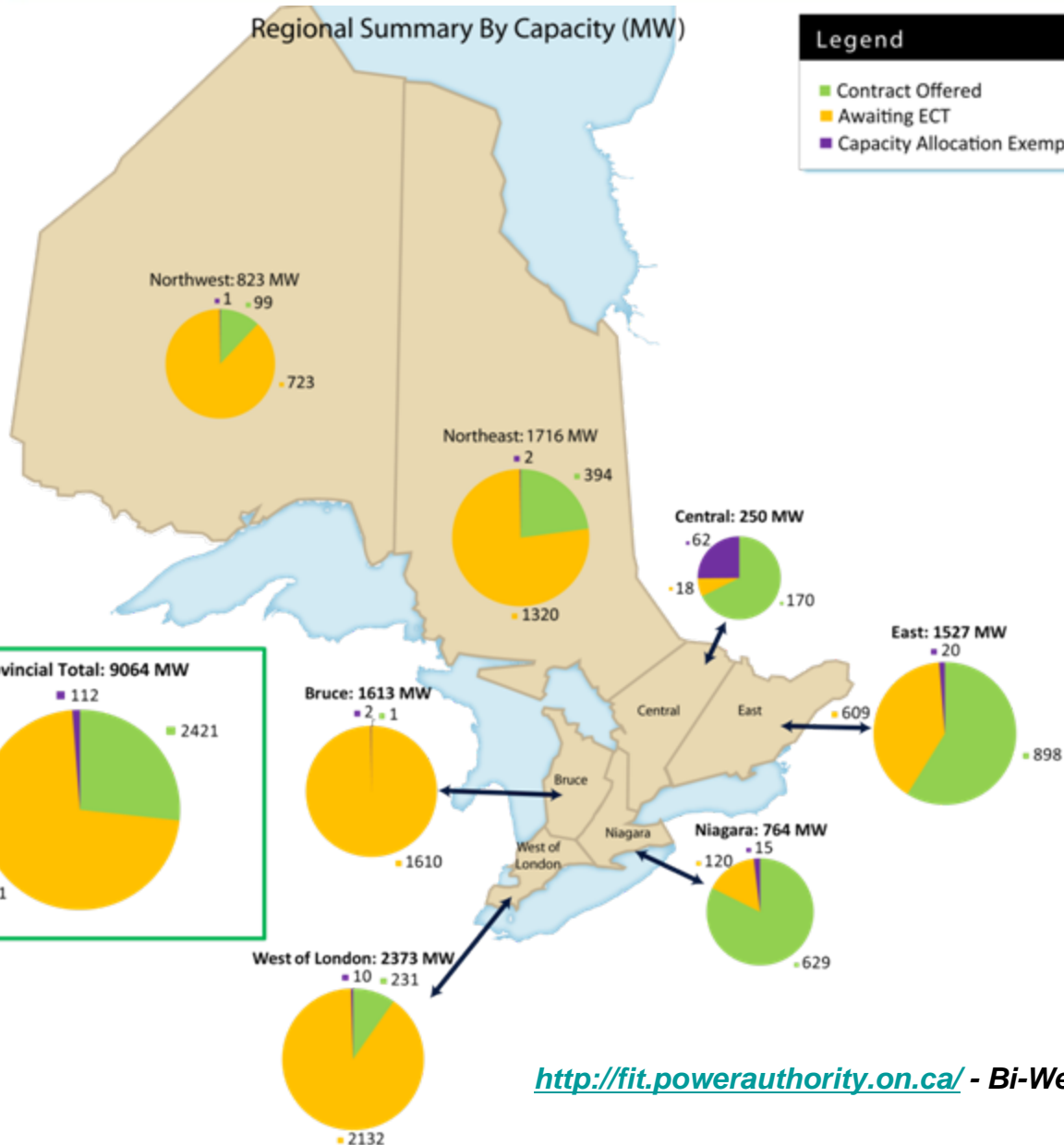
Domestic Content Requirements	
Wind	
2009-2011	25%
2012 and later	50%
FIT Solar (>10kW)	
2009-2010	50%
2011 and later	60%
microFIT Solar (\leq 10kW)	
2009-2010	40%
2011 and later	60%

Program Uptake: Program Launch

Regional Summary By Capacity (MW)



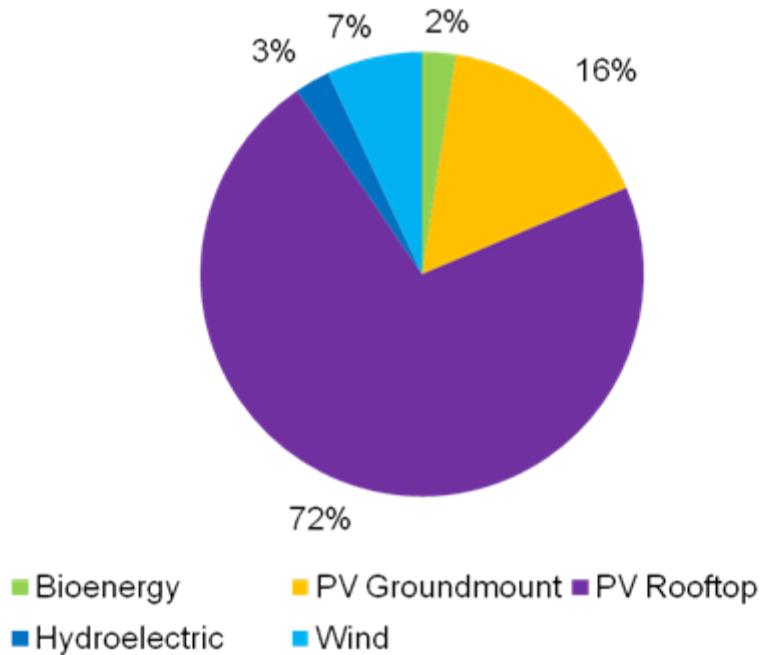
Technology Breakdown		
Fuel Source	No. Of Apps	Sum of MWs
Provincial	184	2421
Bio-Gas	7	16
Bio-Gas on Farm	0	0
Biomass	2	19
Landfill gas	4	15
Solar Ground	76	651
Solar Rooftop	1	1
Water	46	192
Wind (On-shore)	47	1229
Wind (Off-shore)	1	300



<http://fit.powerauthority.on.ca/> - Bi-Weekly Reports

FIT Program Uptake: Oct 1 2009 – Nov 9 2010

Count of Applications

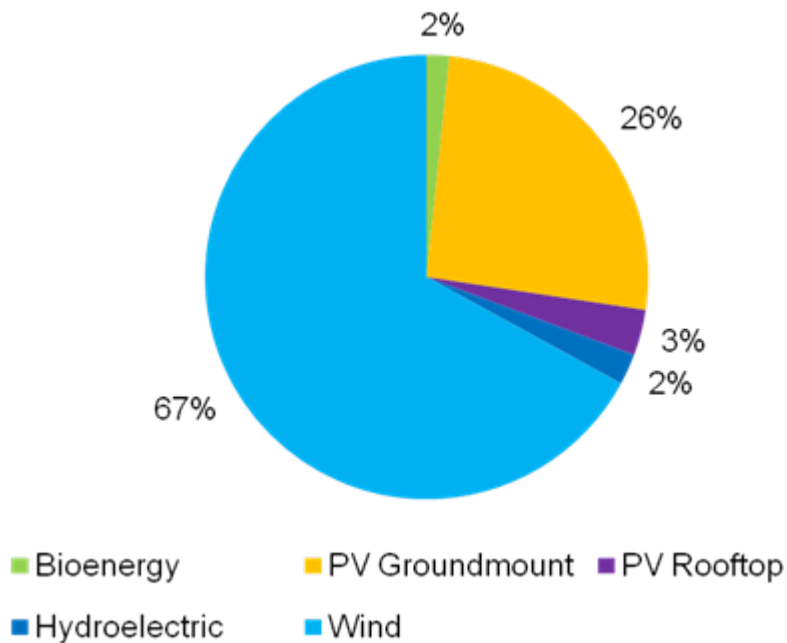


Energy Groups	Applications	Executed Contracts
Bioenergy	89	41
Solar PV	3203	1112
Hydroelectric	94	48
Wind	253	54
Total Applications	3639	1255

Technology	Executed Contracts
PV Ground mount	101
PV Rooftop	1011

FIT Program Uptake: Oct 1 2009 – Nov 9 2010

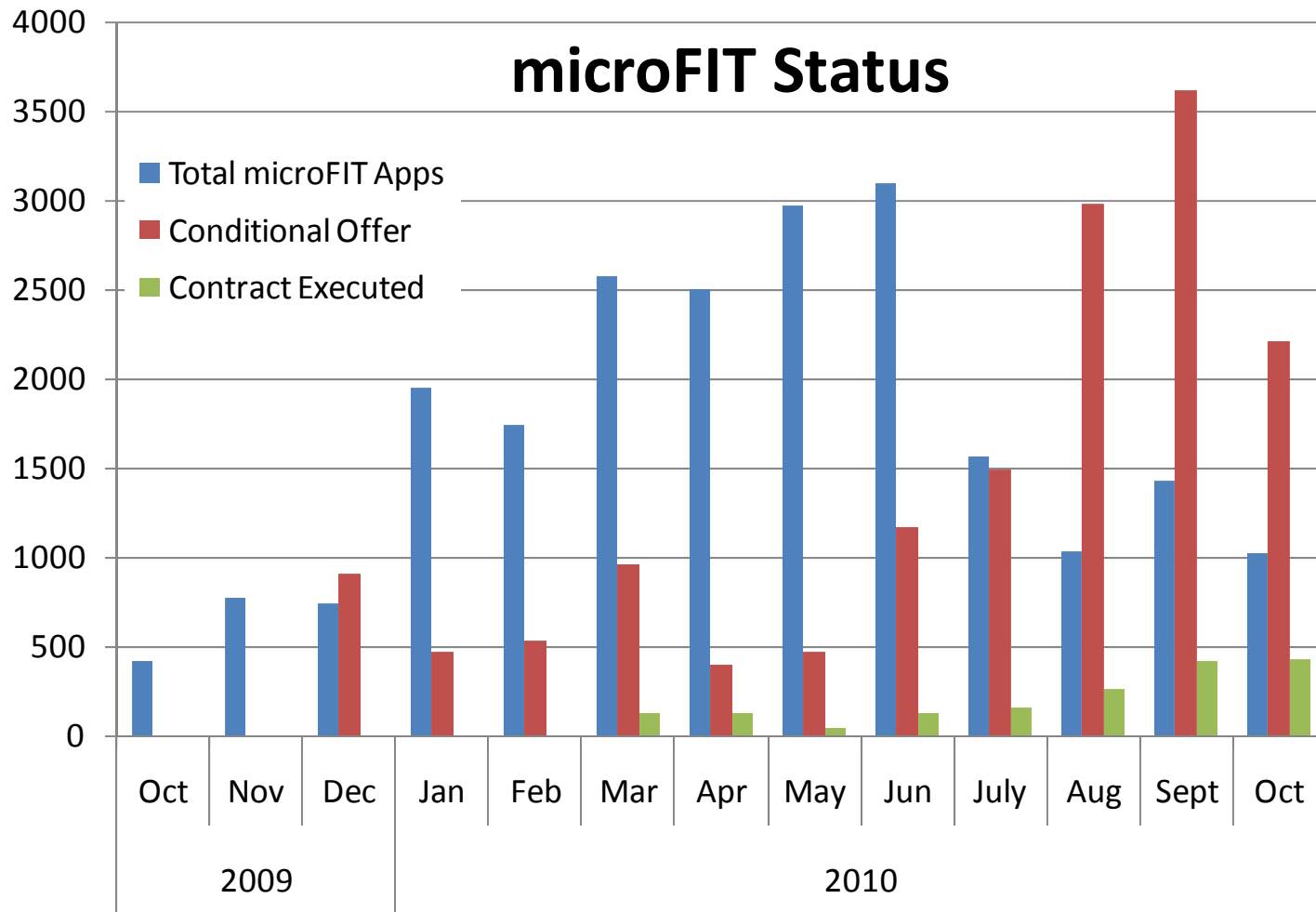
Sum of Applications (MW)



Energy Groups	Applications	Executed Contracts
Bioenergy	260	56
Solar PV	4616	846
Hydroelectric	356	188
Wind	10641	1530
Total MWs	15874	2620

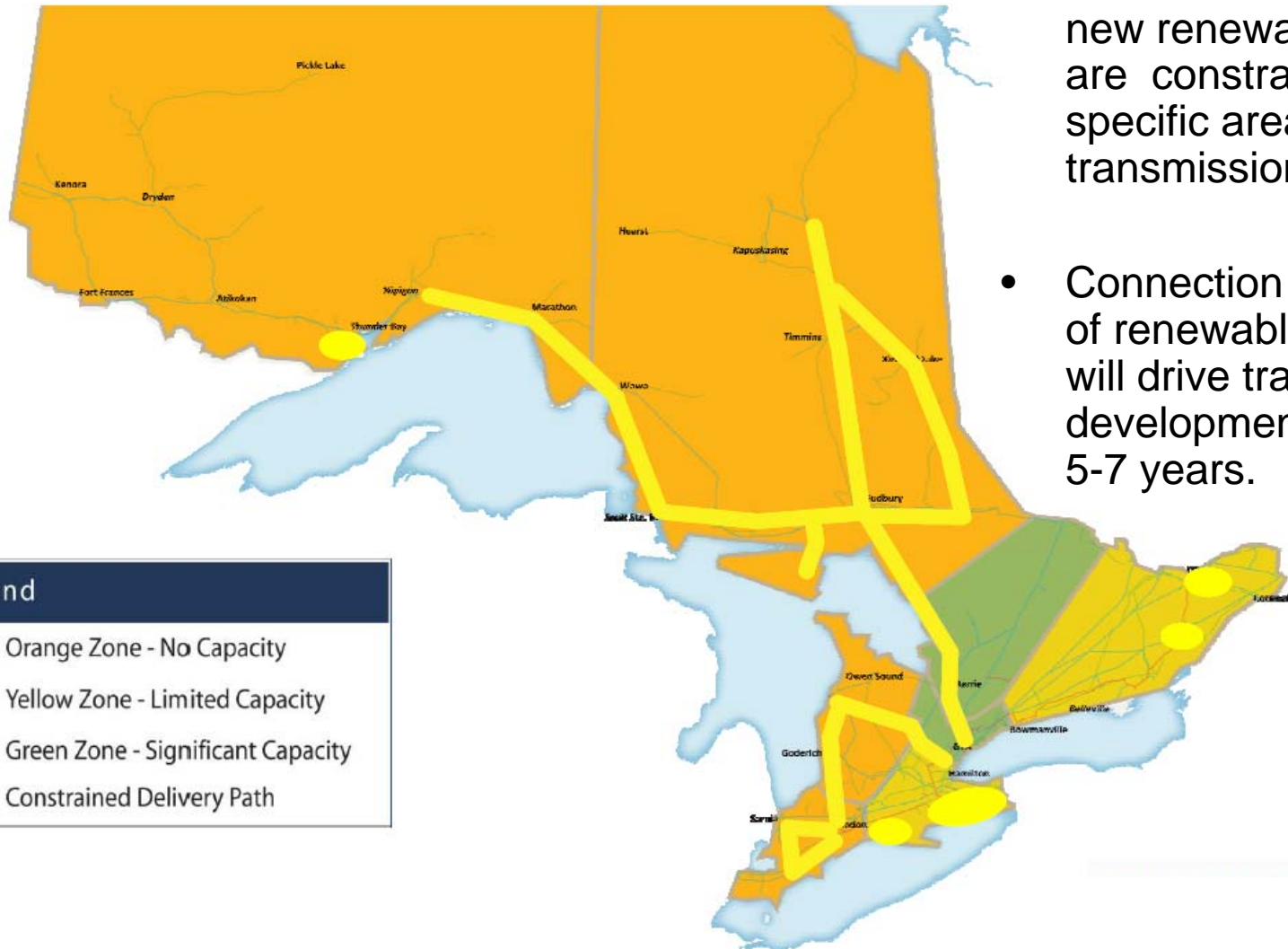
Technology	Executed Contracts
PV Ground mount	645
PV Rooftop	201

microFIT Status



Transmission Availability (Capacity Zones)

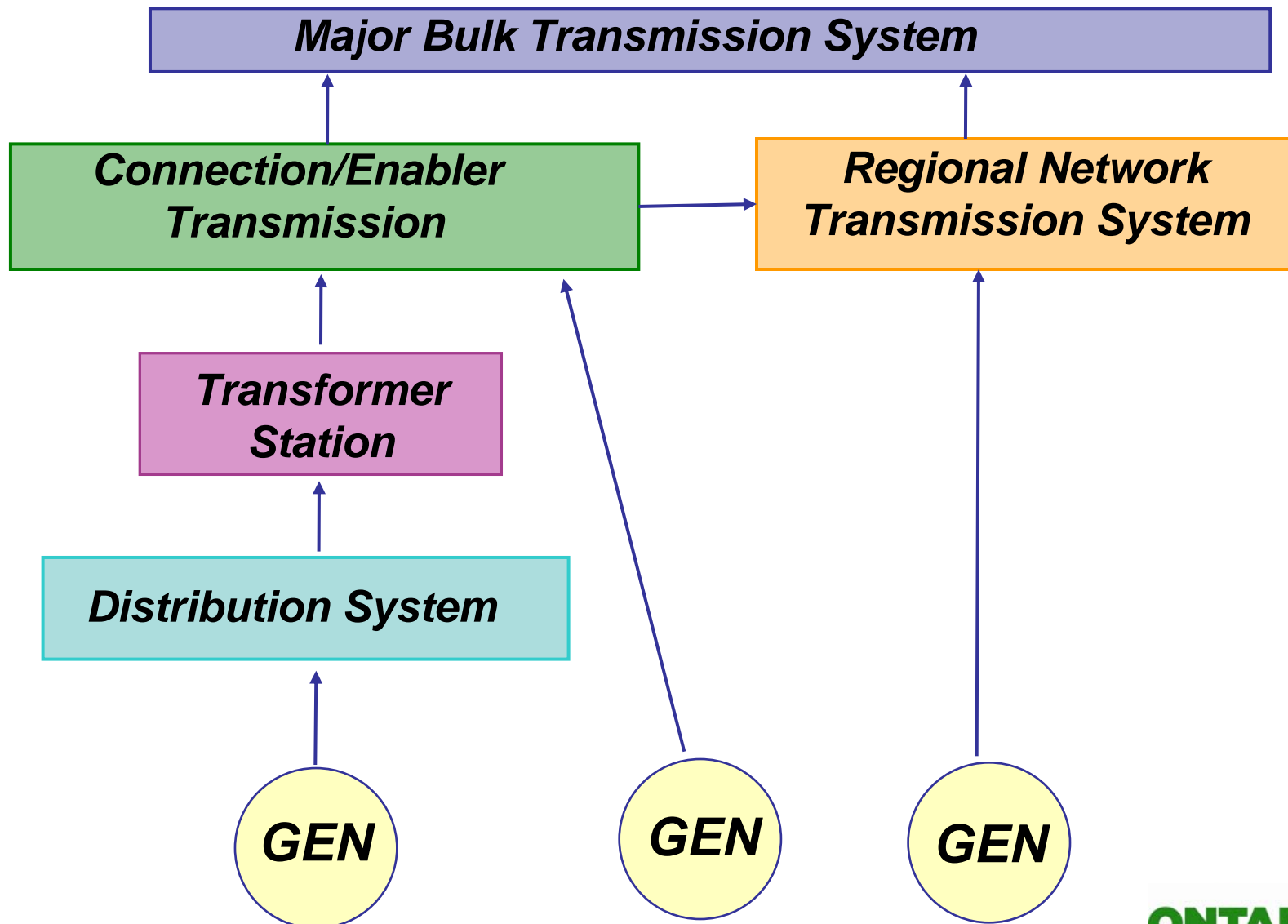
- After recent programs, new renewables projects are constrained in specific areas due to transmission bottlenecks.
- Connection and delivery of renewables projects will drive transmission development for the next 5-7 years.



Legend

- Orange Zone - No Capacity
- Yellow Zone - Limited Capacity
- Green Zone - Significant Capacity
- Constrained Delivery Path

Expansion Process Must Consider all Levels of the Delivery System



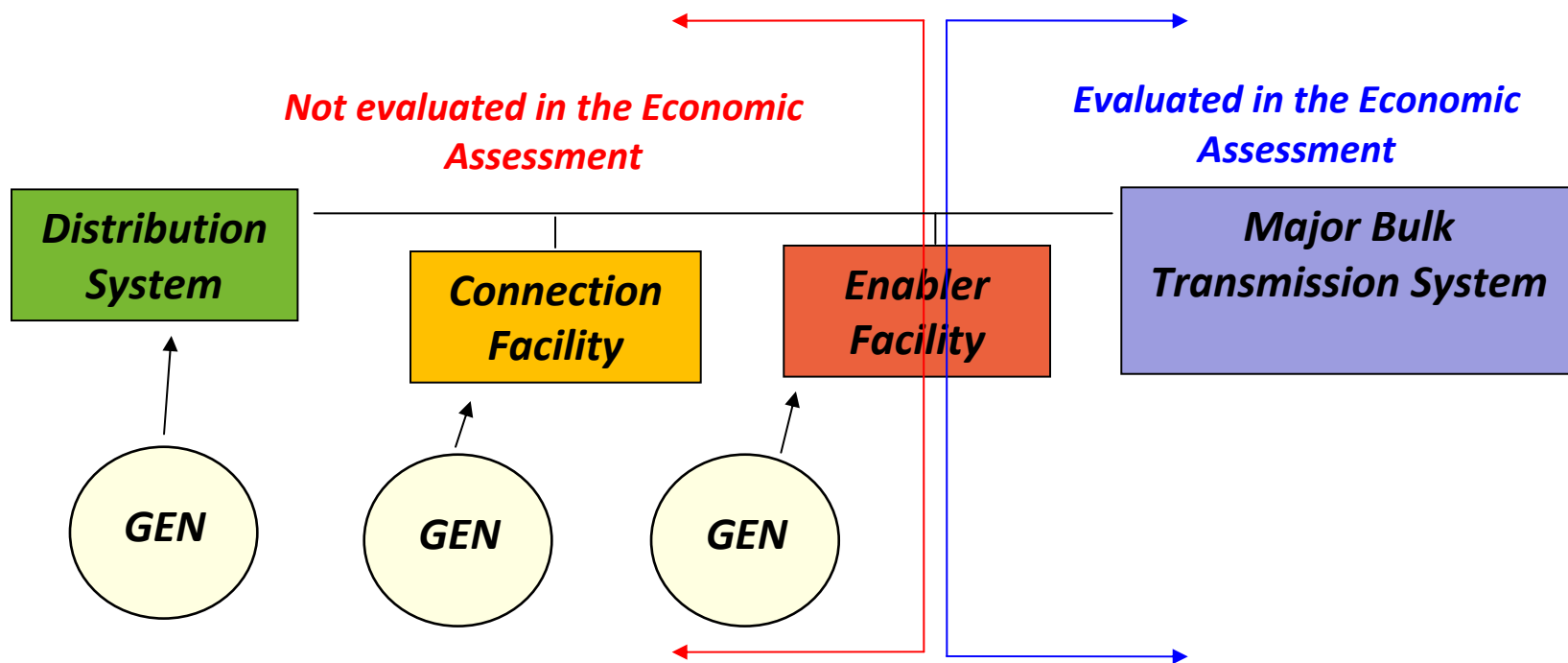
FIT Program – Economic Connection Test

- The ECT process will identify economic transmission expansion projects
 - Enable additional renewable generation
 - Trigger development work for Transmitter's under regulatory oversight
- The ECT process intends to:
 - Balance the right-to-connect and the provincial ratepayer impact of transmission investment
 - Prioritize economic expansion projects
 - Coordinate transmission and distribution expansion
- ECT is an ongoing process of assessment

Overall Approach to Economic Assessment

- Three basic steps to economic assessment:
 1. Examine FIT Projects in the Reserve
 2. Design transmission expansions needed to connect projects in FIT Reserve while maintaining a “generally uncongested” system (i.e. 5% of the time or less on critical transmission paths)
 3. Apply an economic test to determine if identified transmission expansion is reasonable

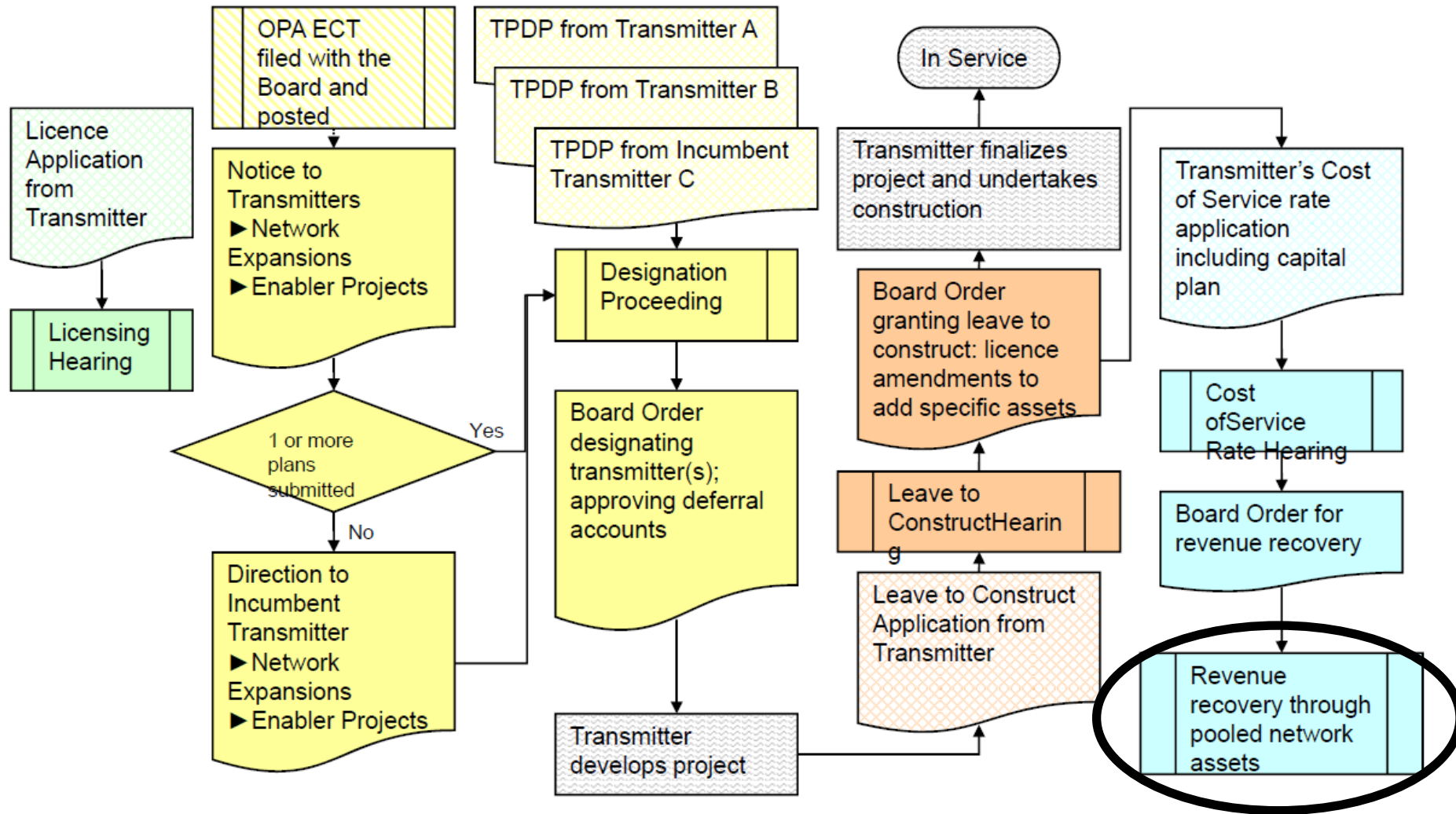
Only Ratepayer Funded Transmission Facilities are Considered in the “Economic Assessment” of \$/MW consideration



Role of the Ontario Energy Board (OEB)

- **Board Policy**
 - help transmitters to move ahead on development work in a timely manner;
 - encourage new entrants to transmission in Ontario bringing additional resources for project development; and
 - support competition in transmission in Ontario to drive economic efficiency for the benefit of ratepayers.
- **Process to designate a transmitter for projects identified in the ECT.**

Illustrative Diagram of OEB/OPA Interaction



Role of the Independent Electricity System Operator (IESO)

- The IESO is responsible for the day-to-day operation of Ontario's electrical system
- A current main focus for the IESO's the integration of renewable generation within the market
 - Dispatchable versus non-dispatchable generation
 - Market rules for large scale renewable generation in local areas
- Input into system operation limitations and analysis for FIT connection assessment and ECT expansion scenarios

FIT Program Key Issues

- Mass number of applications
 - Both for FIT and microFIT applications
 - Lack of sophistication of applicants causes difficulties
- System constraints identified by Utilities
 - Short-circuit limitations
 - Distance limitation on long rural feeders
- Small and micro-generation uptake
 - Micro-generation groundmount solar
 - Commercial capacity allocation exempt rooftops

FIT Program: Learning Lessons

- Clear and transparent application requirements
 - Manage expectations through communication and enforcement
- The market will follow the path of least resistance
 - One successful gap can be multiplied many times over
- Clarity on the “right to connect”
 - Subject to technical, economic and other jurisdictions
 - Complexity of electrical system muddles ability to foresee risks

FIT Program: Learning Lessons

- Difficulty in setting a price for initialization of a FIT Program
 - Start of any program can require early balancing
 - Pace of sector should drive pace of program adjustments
- Improve ability to clearly forecast changes to the FIT Program
 - Avoid uncertainty in the market where possible
- Program success will further be measured in terms of existing FIT contracts meeting contract milestones and reaching commercial operations
 - How many of the 20,000 microFIT applications will be installed?

FIT Program: Future task

- Sustainability of the FIT Program
 - Balance short-term success with long term prospects
- Planning and operating the system
 - Large amount of new intermittent supply requires different resource mix
- 2-year Program Review
 - Adjustment of pricing, rules and contract
 - Ability to tackle both temporary and long term issues

Conclusion

- Since launch on October 1, 2009 program has been an overwhelming success
 - number of applications/contracts and MWs
- Current projects are moving forward
 - Domestic Content Plans and Commitment Letters
 - Notice to Proceed
 - Commercial Operation
- Program Review begins in early 2011
 - Pricing can be a throttle; shouldn't be seen as a start/stop button

Information and Resources

Information Available

- Questions and answers
- Tools and information
- Past session materials
- Application materials
- Rules, contracts and program guidance

Web Resources

Feed-in Tariff

- <http://fit.powerauthority.on.ca>
- fit@powerauthority.on.ca

microFIT

- <http://microfit.powerauthority.on.ca>
- microfit@powerauthority.on.ca
- Program call centre: 1-888-387-3403

Green Energy and Green Economy Act (Bill 150)

- www.mei.gov.on.ca.wsd6.korax.net/english/energy/gea/
- More resources and information on the legislation

RENEWABLE ENERGY FACILITATION OFFICE

(Ministry of Energy)

For questions regarding getting started with renewable energy, renewable energy approvals and permitting,

Website:

www.mei.gov.on.ca/en/energy/renewable

Email: REFO@ontario.ca

Phone: 1-877-440-REFO (7336)