



LONDON
ECONOMICS

London Economics International LLC

Defining and addressing energy poverty in varying geographic and industry evolution contexts



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Hockley Valley Resort, Orangeville, Ontario, Canada

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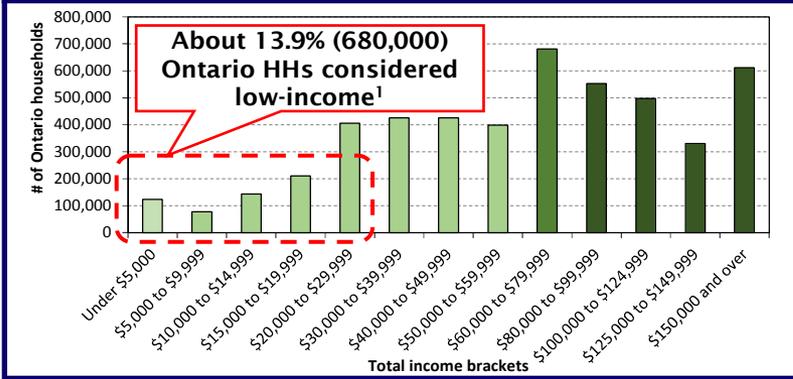
Definitions of energy poverty vary, and energy encompasses more than just electricity

- ▶ World Economic Forum defines energy poverty as *“the lack of access to sustainable modern energy services and products”*
- ▶ International Energy Agency (“IEA”) defines energy poverty as *“a lack of access to modern energy services. These services are defined as household access to electricity and clean cooking facilities (e.g., fuels and stoves that do not cause air pollution in houses)”*
- ▶ Ontario Low-Income Energy Network (“LIEN”) defines energy poverty as *“disproportionate burden of electricity, natural gas and other utility costs on low-income households which reduce the funds available for food, clothing, medicine and other basic necessities”*
- ▶ The UK Department of Energy & Climate Change (“DECC”) defines “fuel poverty” as *“a household living on a lower income in a home which cannot be kept warm at reasonable cost”*
- ▶ Organizations in Canada and Europe (e.g., Co-operative Housing Federation of Canada and Ontario Non-Profit Housing Association, UK DECC, and the International Network for Sustainable Energy (“INSOFRE”)-Europe) have used the definition for energy/fuel poverty as *energy/utility costs are more than 10% of a household’s income*

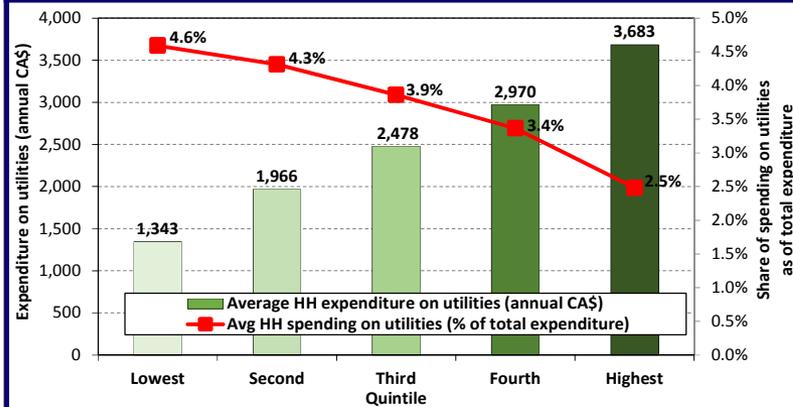
Energy poverty is not the same as lack of willingness to pay

While few North American consumers could be considered to be in energy poverty, there may be geographic pockets of similarly situated low-income customers

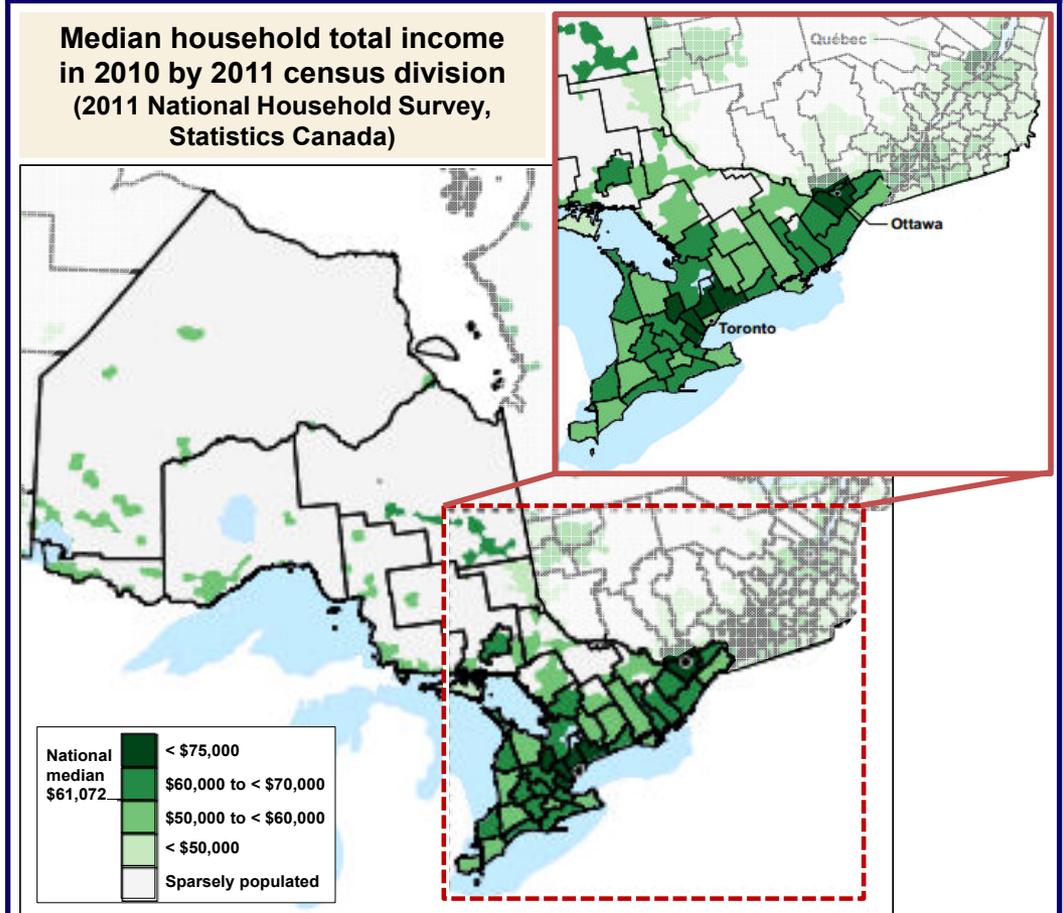
Distribution of Ontario household (“HH”) total income in 2010



Ontario HH average expenditure on utilities (by quintile²)



Map of Ontario income distribution



In rural areas, incomes may be lower and energy costs higher due to fuel transportation costs and lack of economies of scale

¹ Based on after-tax low-income measure (“LIM-AT”): a HH has low income if its income is < ½ of the median income of all HHs. ² Each quintile is about 980,000 households (2011 NHS); about 70% of the lowest quintile considered low-income. Sources: StatsCan 2011 National Household Survey (“NHS”); StatsCan Survey of Household spending (“SHS”), CANSIM Table 203 0022

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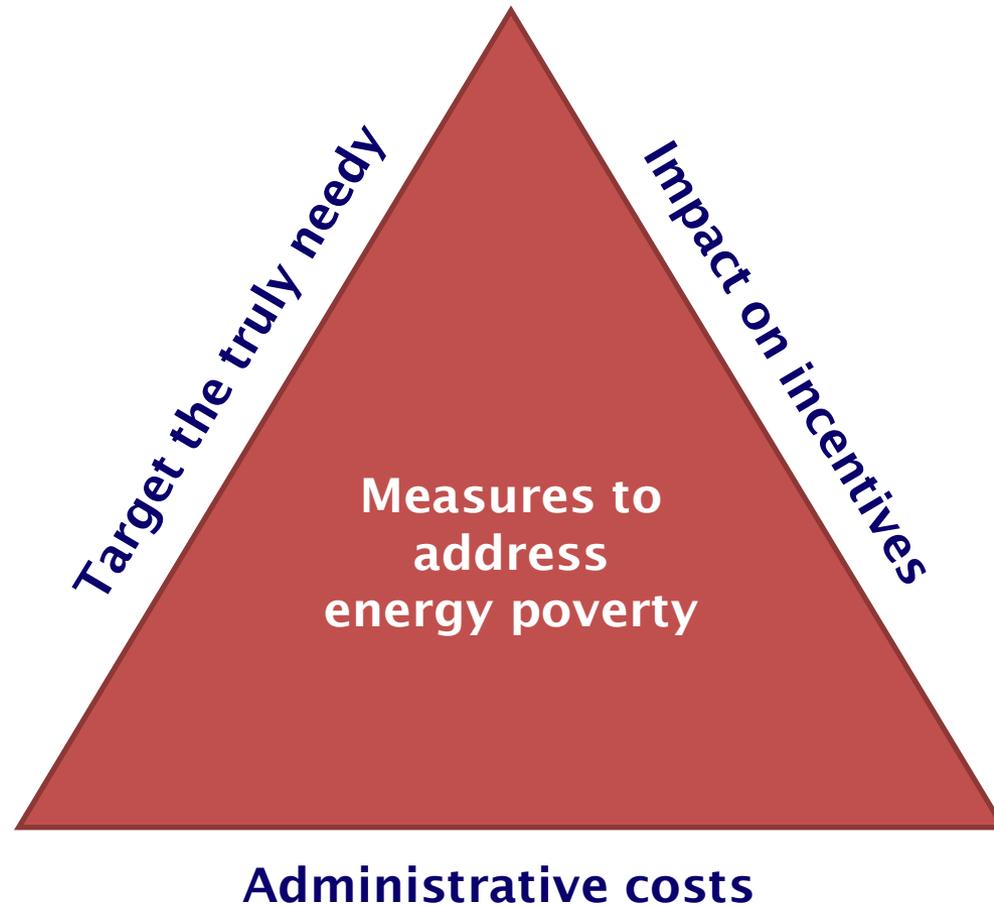
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Measures to address energy poverty need to triangulate between ability to target the truly needy, costs, and impact on incentives



Numerous approaches can be used to make electricity affordable; not all are efficient

- ▶ Lifeline tariffs
- ▶ Energy discounts
- ▶ Methods to promote the use of energy efficient materials and equipment
- ▶ Across the board energy subsidies (unwise)
- ▶ Discounts or subsidies provided on the basis of occupation, medical history, or age
- ▶ Compensation for energy expenditures up to a certain benchmark
- ▶ Cash or voucher payments to poor households
- ▶ Lower connection charges and/or fixed charges for poor households
- ▶ Improved energy infrastructure in energy poor areas

Examples of policies to make electricity affordable

Massachusetts (US): customers must qualify under “financial hardship” (income less than 200% of federal poverty level), and be ill, have an infant, or be between Nov. 15 to March 15, to qualify for financial assistance

Johannesburg, S. Africa: customers must consume less than 1,150 kWh and earn less than R800 per month to qualify for lifeline – no service charge, free 50 kWh per month, and reduced energy charge

United Kingdom: Vulnerable customers should not be disconnected, are eligible for prepayment meters and customer education about energy efficiency, as well as grants

Electric power sector is an inefficient delivery mechanism for social policy

- ▶ The concept of affordability is often used to justify *distortions in pricing and sector organization*
- ▶ Leads to under-investment if returns suppressed, and over-consumption if pricing is suppressed
- ▶ *Conditional cash grants and other lump sum payments or vouchers delivered directly to the poor likely better way to reduce poverty*
 - Examples include conditional cash grants like the Bolsa Familia in Mexico, or even the Manitoba experiment with minimum incomes for all
 - While US SNAP (Supplemental Nutritional Assistance Program, commonly known as “food stamps”) is not perfect, an energy equivalent can be imagined
 - Countries using pre-paid meters can also provide vouchers for meter payments, though resale of vouchers is always a possibility
- ▶ Lifeline tariffs sometimes directed at *favoured groups rather than the poor*
- ▶ Concept just as problematic for other utilities like water, where concept of affordability distorts price signal
- ▶ Lifeline tariffs for industry are an even more *questionable way to foster*

Poor households in developing countries often have a high willingness to pay for quality utilities, and already pay through opportunity cost of labor

Just as cell phones undermined universal service charges collected from landlines, distributed generation may further reduce ability to offer lifeline tariffs

- ▶ As battery technology improves and solar costs decline, more **well-off customers may flee the grid**
- ▶ Planners may significantly over-estimate extent to which residential customers value “reliability”
- ▶ Poor customers will not have the option of leaving the grid, and may face **costs spiraling upwards** as network costs are spread across fewer customers
- ▶ Some argue net metering favors richer customers over poorer ones

Telecommunications Universal Service Fund

- In 1934, when only 40% of US households had access to telephone service, Congress passed the *Communications Act* founded on the principle of **universal service** - that all Americans should have access to communications services at rates that are affordable and relatively uniform
- *Telecommunications Act of 1996* established **Universal Service Fund** (“USF”) to implement four programs: low-income support (aka Lifeline program), support in high-cost (aka Connect America Fund) and rural areas, and for schools and libraries (“E-rate” program)
 - USF was based on interstate and international **long-distance** revenues of telephone companies
 - However, **growing wireless substitution and bundled services were eroding traditional revenue base for USF** and increased USF contribution burden of wireline carries
 - USF is now based on interstate and international **end-user** revenues of all telecommunications service providers (including both wireline and wireless) and certain other providers of telecommunications
- Universal service was reformed between 2009 and 2011, resulting in **National Broadband Plan** (February 2011), from supporting telephone service to supporting deployment and boosting adoption and utilization of broadband and voice in high-cost areas and for low-income Americans

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Policies designed to protect the poor may in fact be paternalistic and condescending

- ▶ **Technological change is increasingly allowing customers to choose differentiated levels of reliability in return for payment**
 - While some utility executives and consumer advocates argue that this in some way “exploits” the poor, why shouldn’t these customers – like all other customer classes – have the right to provide demand response services?
 - Although focusing on principal-agent problems in energy efficiency investments in multi-family dwelling is sensible, targeting energy efficiency programs to low-income households may be inefficient, given relatively small proportion of demand attributable to these customers
- ▶ **Extended payment plans and level billing programs may be as important as low prices in making energy costs manageable for low income households**
 - Seasonality (and Ontario bimonthly billing practices) can exacerbate affordability issues
 - Financing programs at utility’s cost of capital are likely among the cheaper sources of capital available to low income households
- ▶ **Addressing affordability through the tariff can lead to long term distortions**
 - Tennessee Valley Authority (“TVA”) no longer serves predominately poor rural farmers
 - Free power to farmers in developing countries has been difficult to eradicate, and led to significant waste among groups who were not particularly poor
- ▶ **None of this is to suggest that policymakers should ignore issues of energy poverty and willingness to pay; rather, these issues should be dealt with but without distorting the tariff structure, and ideally through vouchers or minimum income payments**

Ontario electricity policy should be focused on long run least cost arrangements, with income sufficiency dealt with through other mechanisms

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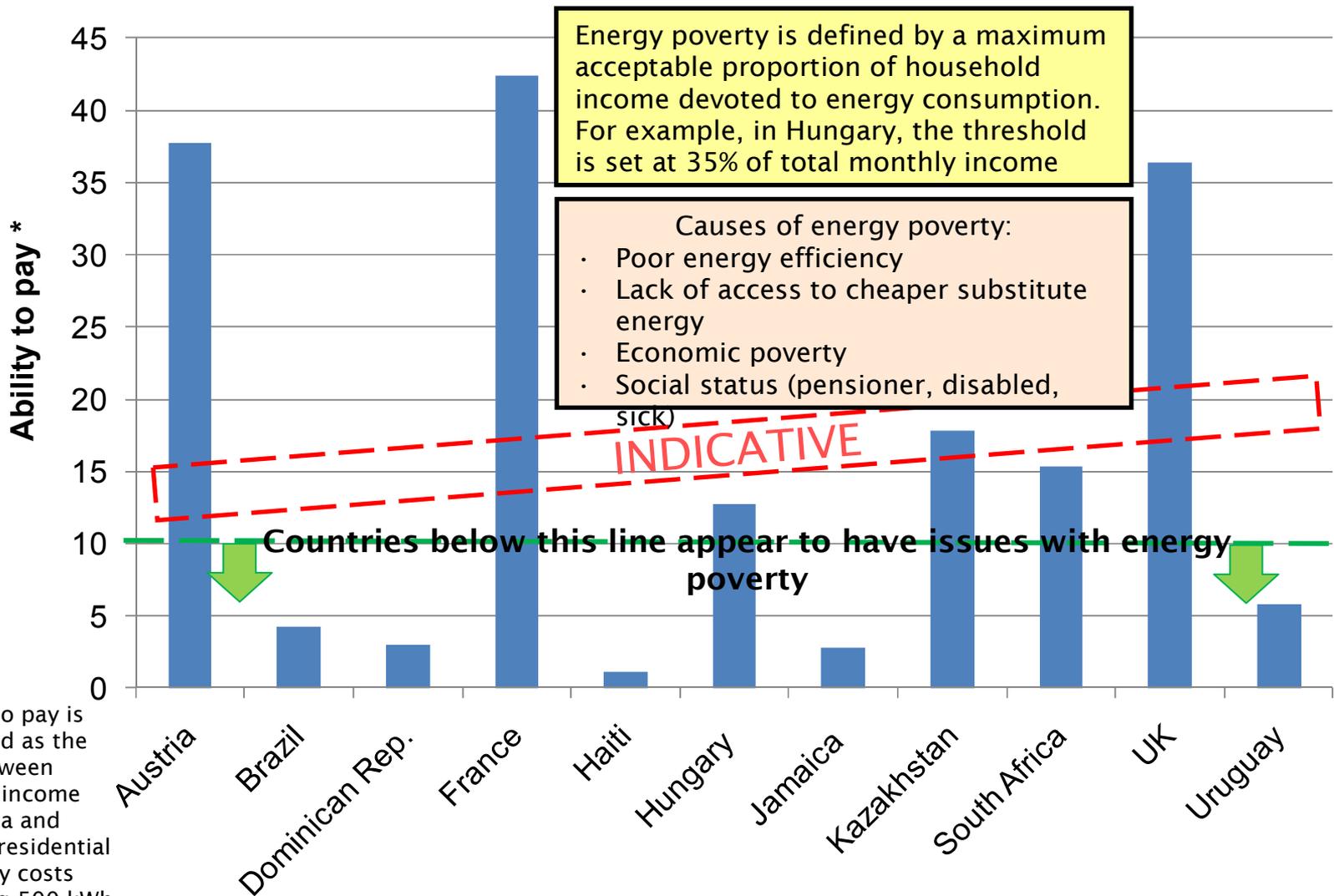
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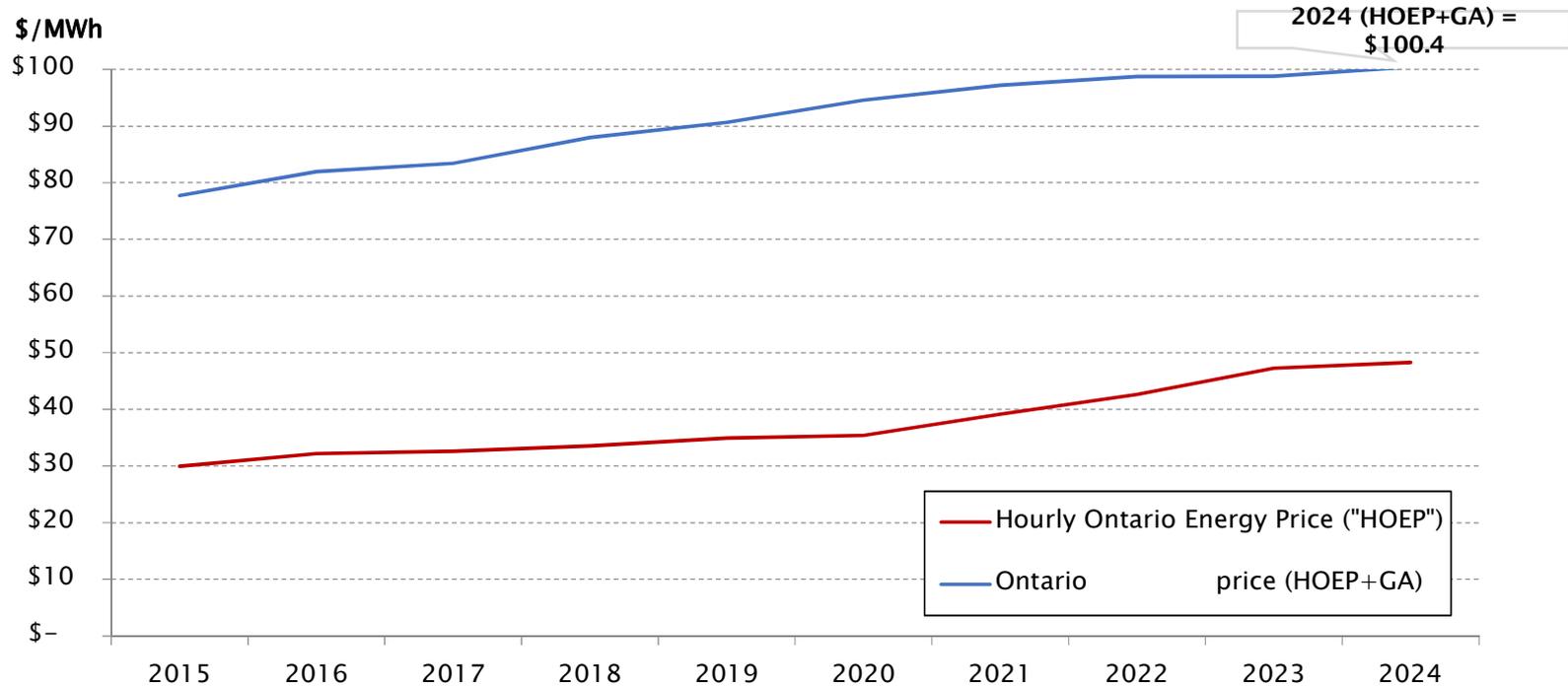
In some economies, affordability is an issue for some customer groups



*Ability to pay is calculated as the ratio between monthly income per capita and average residential electricity costs assuming 500 kWh of consumption

LEI models Ontario as a uniform price market with interconnections with Quebec, NYISO, and MISO

Forecast Hourly Ontario Energy Price (“HOEP”) and Global Adjustment (“GA”) (LEI indicative 10-year price forecast for Ontario, 1st Quarter 2014 release)



► **Key assumptions include:**

- **demand forecasts:** based on OPA’s LTEP 2013 long-term demand and conservation outlooks; gross peak demand grows at compound annual growth rate (“CAGR”) of 1.0%, while modeled peak demand (net of conservation) grows at CAGR of 0.6%
- **nuclear refurbishment and retirement schedules:** follow the nuclear refurbishment schedules outlined in the LTEP 2013 and that Pickering would retire after 2020; Pickering assumed to retire two units a year over 2021-2023
- **natural gas price projections:** based on a combination of Henry Hub gas price market futures and estimates from *EIA AEO 2014 (Early release)*, plus a transportation adder; projected Dawn Hub gas prices increase at CAGR of 4.4%.



AJ Goulding, President of London Economics International, has two decades of experience in economic consulting



Education		Professional Experience		Key Projects - Ontario
1997	Masters in International Business, Columbia University (New York, NY, USA)	1999 - present	President, London Economics International LLC	<ul style="list-style-type: none"> • Led multiple engagements advising Ontario government, electricity market regulators and utilities on market and tariff design, incentive regulation, and asset valuations • Developed blueprints for potential capacity market in Ontario by assessing ways in which Ontario electricity sector could be improved to increase economic efficiency and reduce long-run consumer costs • Led \$1.5 million engagement focusing on design of second generation performance-based regulation in Ontario • Wrote testimony related to the alternative ratemaking approaches available regarding conservation and demand management, and addressed innovative alternatives and compared and contrasted various schemes in the Ontario context
1991	Bachelor in Economics, Earlham College (Richmond, IN, USA)	2003 - present	Adjunct Assistant Professor, Columbia University	
		1998 - 1999	Senior Consultant, London Economics International LLC	
		1994 - 1995	Energy Consultant, USAID	
		1991-1993	Analyst, ICF Resources	
Background		Industry Competence		Methodological Competence
<ul style="list-style-type: none"> • Citizenship: US • Languages: English (fluent), French (conversational), studied Hindi and Japanese • Years of experience: 23 		<ul style="list-style-type: none"> • Electricity • Renewable energy design • Natural gas • Water and wastewater 		<ul style="list-style-type: none"> • Report underlying the issuance of Renewable Energy Procurement Ontario hydro portfolio • Regulatory economics, PBR & market design • Asset valuation & market analysis • Expert testimony & litigation