



Utility Sponsored Conservation & Demand Management: **The Nega Watt Power Plant**

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المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

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1. Unbundling Ontario Hydro, 1999



Ontario Hydro



1. Unbundling Ontario Hydro, 1999

- OPG to divest part of its 90% generating capacity
- Hydro One to strengthen inter connections-by 2000 MW
- LDCs consolidated from about 300 to 90.
- Unbundled electricity prices into separate components:
 - Transmission
 - Energy
 - Distribution Prices

2. Electricity Market



- Market Opened on May 1, 2002
- Market Closure three months later
- Legislation capped retail prices at 4.3 cents per kWh
- OPA, Created in 2014
 - to encourage new electricity supply,
 - promote energy conservation,
 - provide stable prices at a level reflecting the true cost of electricity RPP.



2. Electricity Market

- The Market re-opens on 1 May 2005
- Currently, the sale of electricity is open to supply **MW** and demand reduction **NW**.
- Transmission and distribution remains regulated.

2. Electricity Market Participants



- **Must Participate:** Transmission Grid connected supply and demand including LDC
- **Can Participate:**
 1. Facilities with physical assets connected to the distribution network
 2. Other market participants:
 - Power traders & Demand aggregators
 - Interconnections
- Participants can also choose to buy or sell energy through bilateral contracts.

2. Electricity Market Participants

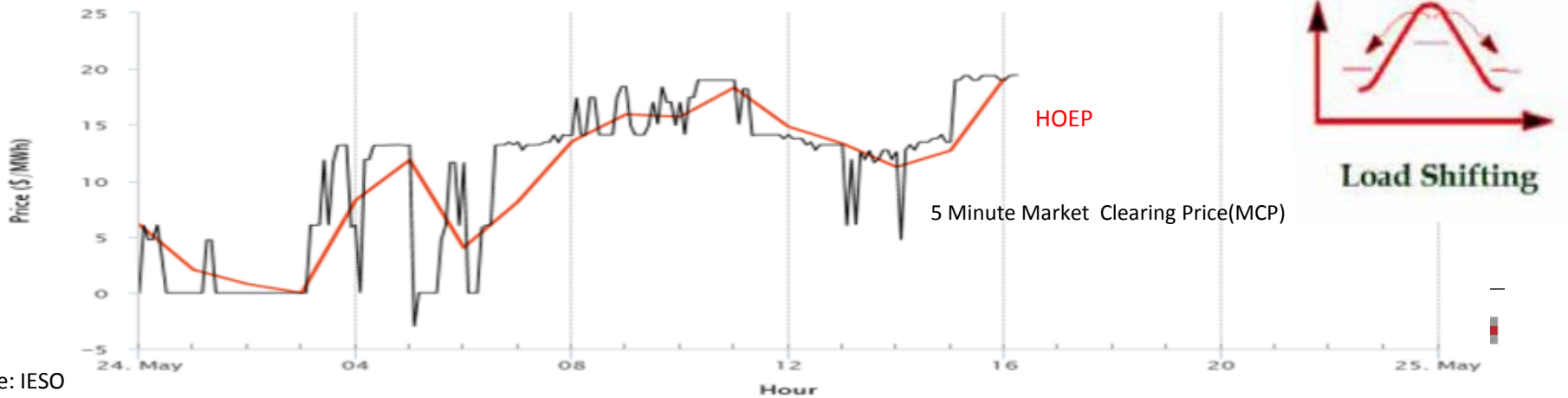
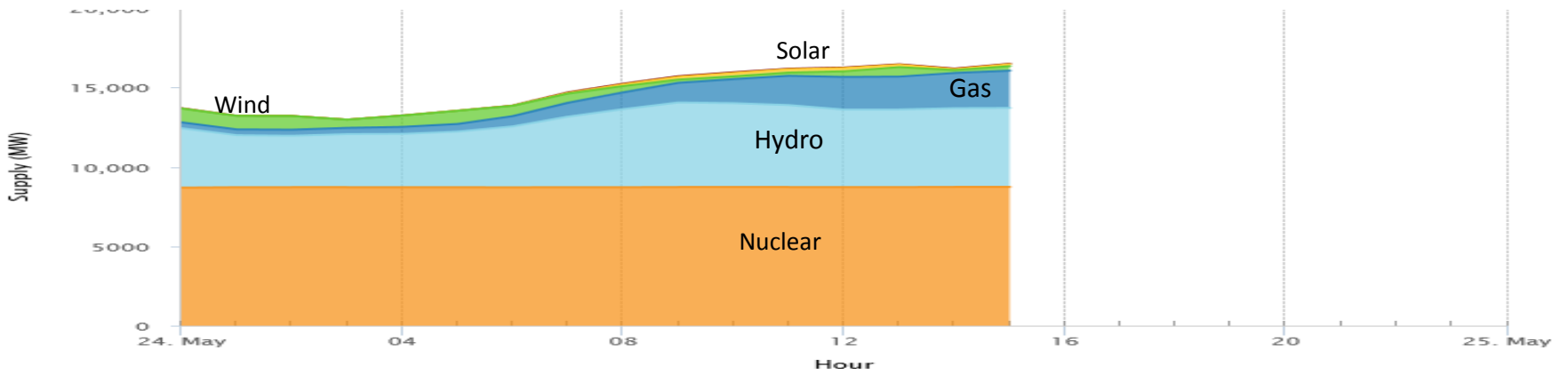
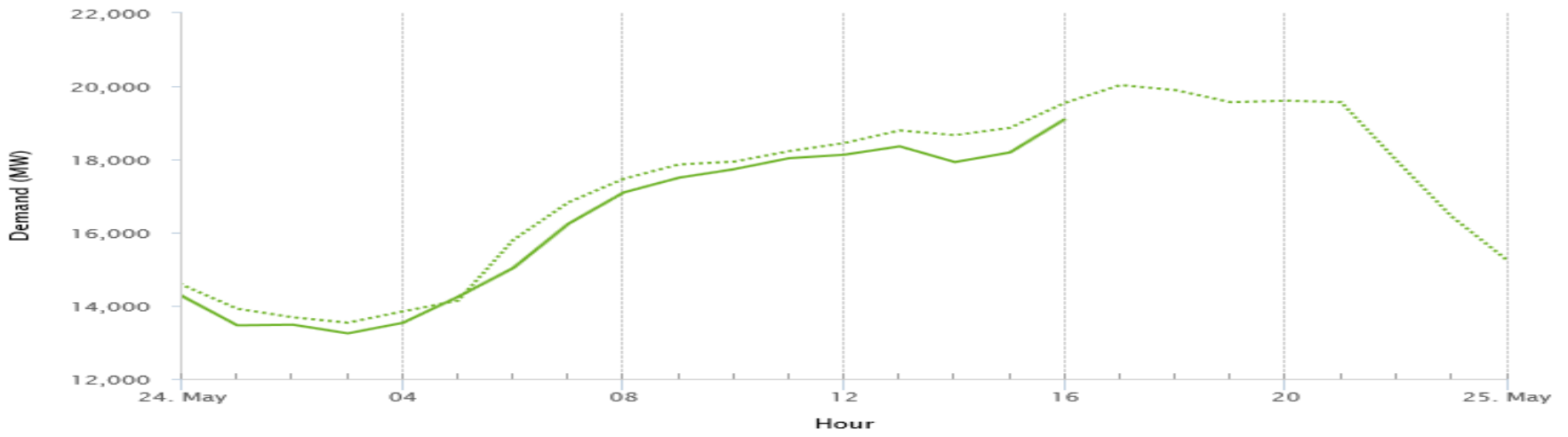


- **Dispatchable market participants** bid into the market and receive dispatch commands every five minutes
 - Generators
 - More than 1 MW on the demand reduction
- **Non-dispatchable market participants** Pricetakers, who accept to produce or consume power at real-time and be paid or charged at the hourly price prevailing at that time.

2. Electricity Market Clearing Price



- Market Clearing Price (MCP)
 - every five minutes.
 - applies to dispatchable market participants
- Hourly Ontario Energy Price (HOEP).
 - hourly average of five-minute MCPs
 - HOEP is applicable to non-dispatchable participants.



3. Time of Use Pricing



2004	Introduce TOU& Smart Meters
2007	800,000 smart-meter installations
2010	complete coverage
2008	Data Centre starts operating
2013	SME and Data Centre 79¢/month
2014	4.8 million smart meters installed, 45% of all electricity consumed

Split into 3 segments & 3 seasons

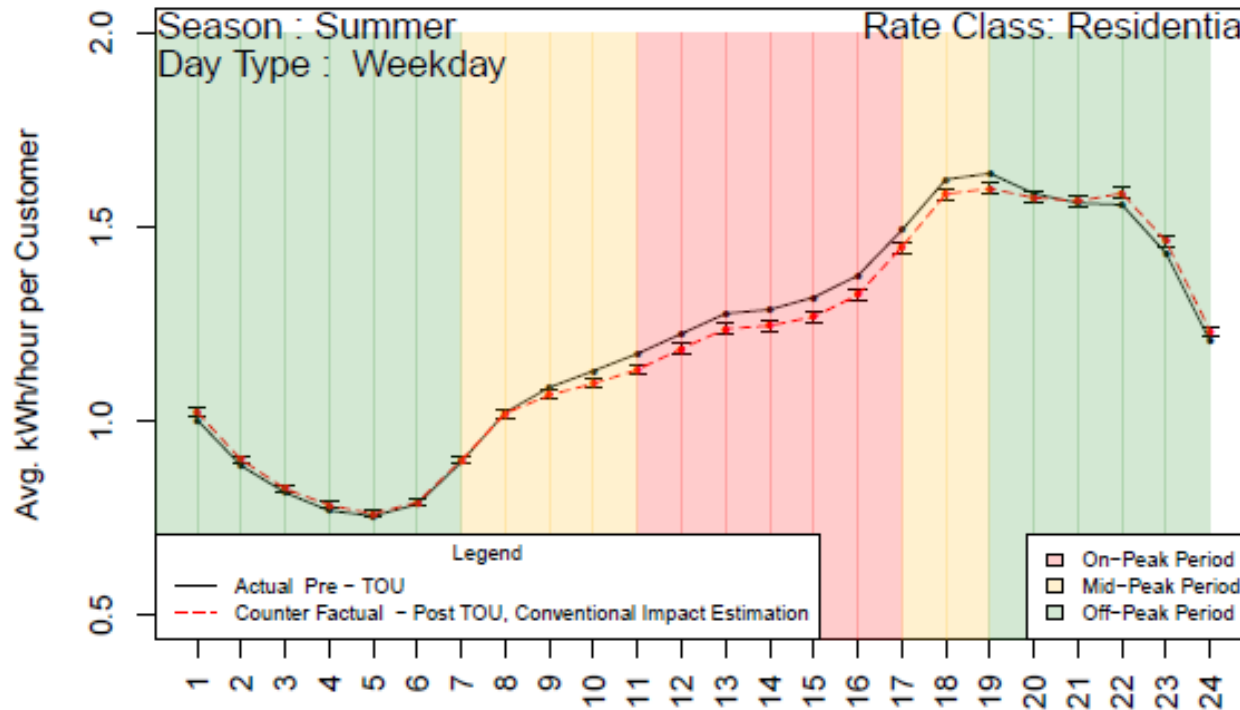


17.5¢
per kWh

12.8¢
per kWh

8.3¢
per kWh

3. Unbundling Tariff Structure



TOU pricing resulted in estimated residential summer weekday On-Peak reduction, 3.3%.

Source: TIME OF USE RATES IN ONTARIO, PART 1: IMPACT ANALYSIS, Navigant Consulting Ltd (2013)

4. Conservation and Demand Management Programs



Third Tranche

2005-2007

- Conservation programs delivered by electricity distributors
- Programs delivered in a fragmented way
- Costs recovered from distribution rates

Agency Coordination

2008-2010

- OPA responsible for organizing and funding conservation programs
- Programs delivered by 3rd parties, including some distributors

CDM Framework*

2011-2014

- Targets of 1,330 MW and 6,000 GWh savings
- LDCs the face of conservation and deliver conservation programs as a condition of licence

Conservation First

2015-2020

- Target of 7TWh L
- DCs to deliver conservation programs
- LDCs provided with long term stable funding, more accountability for program development

* 1.7 \$billion program cost, 6,553 GWh savings, and 928 megawatts MW at 4 cents/kWh vs. to 8 cents for new capacity

5. DR Programs



1. IESO Dispatchable Load (2002-ongoing):

- Large industrial loads can bid a portion of their electricity demand into the energy Market
- Compensated when dispatched on market prices.

2. Northern York Region Demand Response (2006-2012)

- 20 MW procurement in Northern York Region provided insurance against shortages during the development and construction of gas plant.

3. DR-1 (2006-2010) & DR-2 (2007-2014)

- Permanent load shifting program.
- Participants shift load from on peak to off peak hours every weekday
- 106 MW for fixed contract terms

4. DR-3 (2008-ongoing)

- About 400 MW under contract for 5 years.
- Firm commitment by participants to deliver demand reduction when notified.
- Enforced through penalty provisions and baseline methodology.
- Both aggregators and direct participants permitted.
- 4 hour events, up to 100 hours participation per year.

Source: IESO

5. DR Programs



5. Industrial Conservation Initiative (2010- Ongoing)

- Introduced class A customer having a peak demand greater than 5 MW(approx. 300) giving them incentive to minimize their contribution in Ontario demand peaks
- In 2015 expanded the initiative to include 100,000 customers (3 -5 MW) to allow them to opt in as class A customers

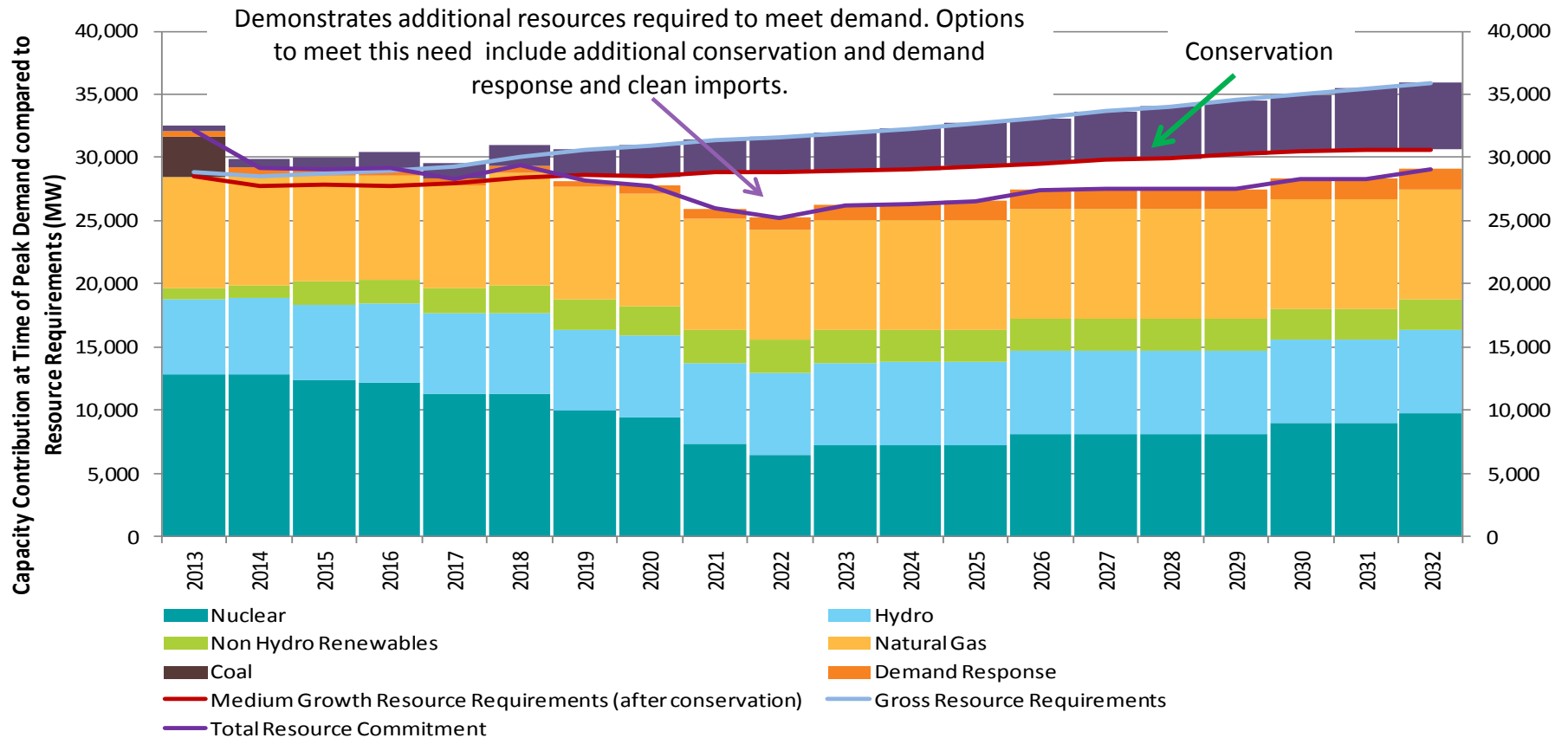
6. Demand Response Auction (2015-ongoing):

- Demand response (DR) in the wholesale market is being transitioned from a contract-based program to an annual DR Auction
- Large consumers, such as dispatchable loads & Aggregators
- The successful DR providers will be integrated into the electricity market along with generators

7. Demand Response Pilot (2015-Ongoing)

- This is used to better understand the capabilities of DR of large users to follow changes in electricity consumption and help balance supply and demand, services that are currently provided by generators and other suppliers.
- 80 megawatts (MW) of DR from five companies under contract

6. C&DM in Long Term Energy Plan (LTEP)



Source: Ontario Ministry of Energy

8. Capacity Auction Market

Made in Ontario for Ontario



Forward Auction to meet a near-term demand projection

- 1, 3 or 5 years ahead of when the capacity is required
- for total capacity or just for its incremental capacity needs
- for a single year or multiple years in length

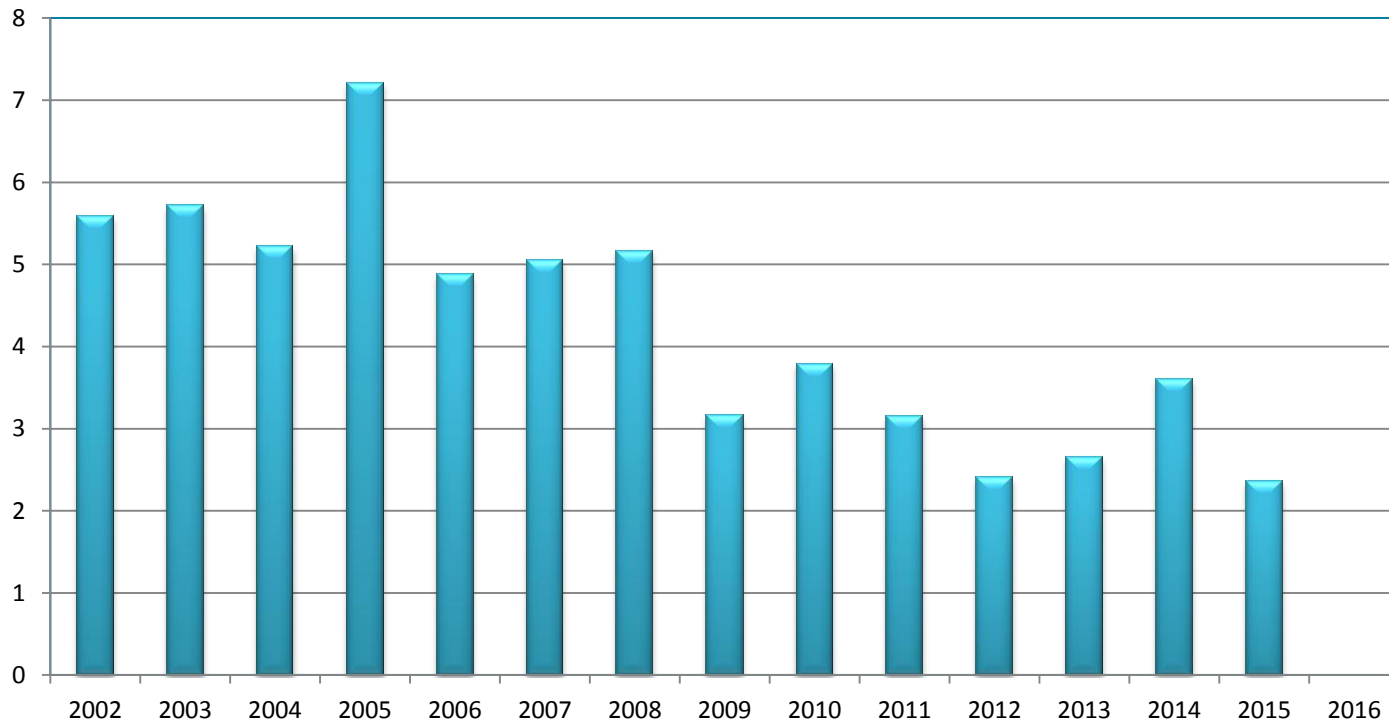
Benefits:

- Can unlock the potential of demand side resources
- Repowering or extending the life of existing assets
- Deferring the need to build new facilities
- Stimulating greater integration with neighbouring markets
- Emergence of new technologies and new types of participants
- Lessen the need for centrally planned decisions on resource entry

It allow the most efficient and least expensive resources on the supply or demand-side to be developed to meet reliability needs, at the right price and over the right timeframe.

8. Conclusions

Average Weighted Hourly Price (¢/kWh), GA?

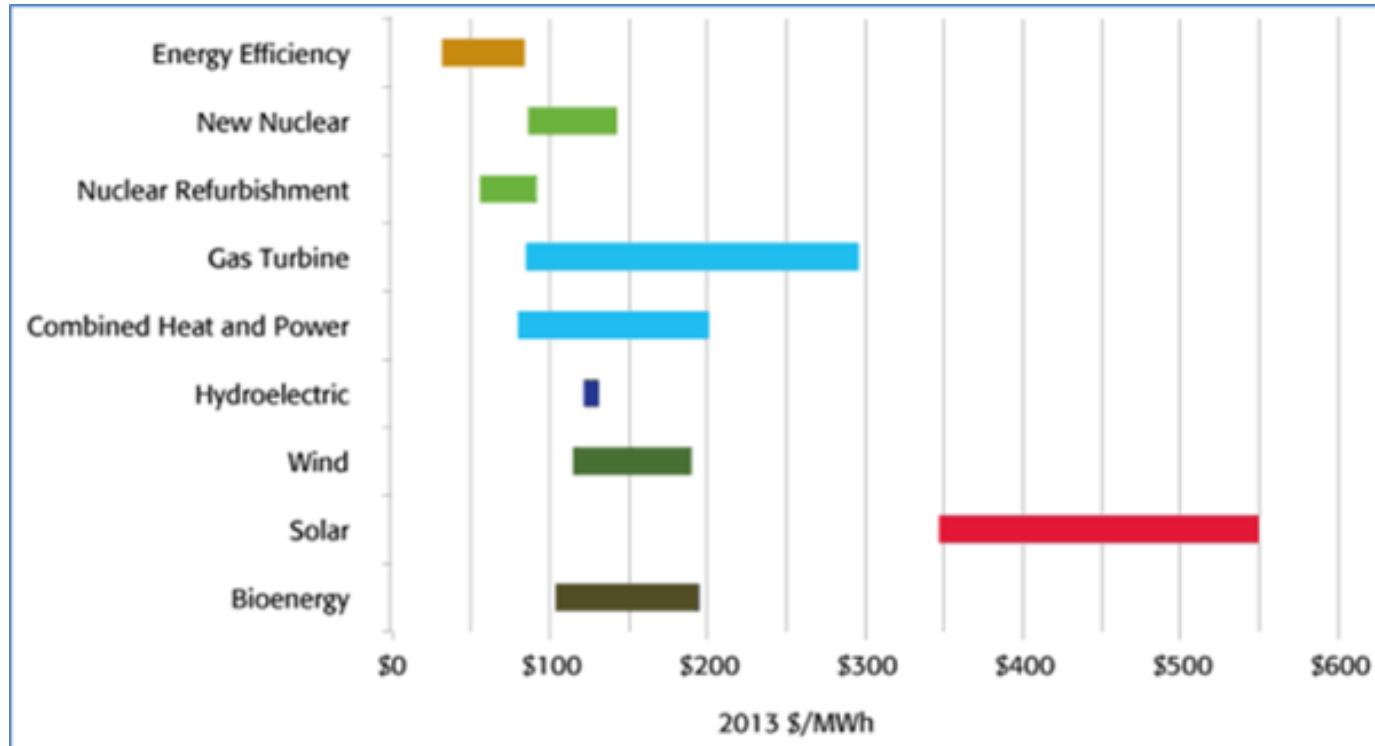


Note: This is only to illustrate that electricity market works, though due to old contracts and other inefficiencies somewhere else in the system caused GA to increase to offset such benefit

Source: IESO

8. Conclusions

Relative Cost of Electricity



8. Conclusions

Triple Win

Impacts	Mega Watt Power Plant	Nega Watt Power Plant
	Highly capital intensive, mainly paid by government or with sovereign state guarantees (Equipment and construction etc.)	Capital costs are mainly incurred by end users Economic
	Long Lead time is required	Implementation is fast and can be done in phases, reducing waiting period
	OPEX depends highly upon the price of fuel	OPEX does not depend upon fuel prices
Social	Percentage of Jobs created locally is low since most jobs are low-skilled and created during the construction period.	Market creation for EE can have direct and indirect long term employment (both high and low skilled)
	Jobs created mostly abroad	Jobs created locally
Environmental	Increase in CO2 emissions if fossil fuel technology used	Energy Efficiency allows for CO2 reduction

8. Conclusions

How far the Arab countries can follow such approach?

No one structure fits all

Such approach can still be used by vertically integrated utilities. It is possible to move on three parallel tracks:

1. Starting the journey of a preparing for a competitive capacity market by:

- unbundling the power sector,
- unbundling the tariff structure,
- ensuring competitive market
- enforcing the interconnections,
- and developing the market roles

2. Utility sponsored C&DM programs through distribution companies

3. Demand Side Management and Demand Response programs similar to what was presented



Thank you

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