

Atlantic Energy Strategy and Futures
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Getting Infrastructure Right

- + The main issue today *is how to get infrastructure right*
- + Electricity used to be 50% of total capital spending
- + Dramatic decline in the last 2 decades in electricity sector
- + *"Impossible" to marshal capital and sustained commitment*
- + *Large long-term payback projects just don't get started....*

Managing Around Gas

- + Natural gas is the swing fuel
- + The fuel of last resort
- + The marginal cost fuel for electricity
- + Volatile swings—too cheap to too expensive
- + Encourages delaying decisions
- + Shale gas exacerbates the problem

We run out of gas; and then find more.

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Broader Bottom Line

- + North America is losing its technology lead
- + The electricity industry still fights competition and change
- + A combination of
 - + Mixed signals
 - + Short-term priorities
 - + Regulatory uncertainty
 - + Financial limits

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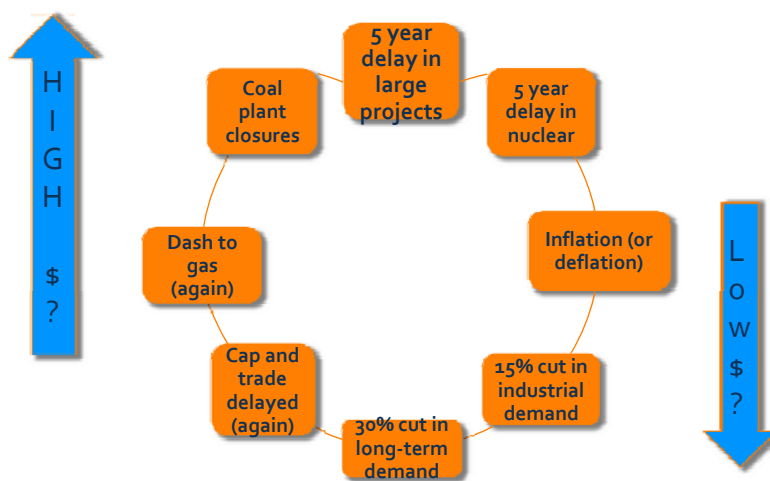
Incentivizing

- + We have failed to make necessary investment in traditional or green technology
- + And we make it too hard for new entrants
 - + We need more global scale enterprises
 - + Establish "leveler" playing fields
 - + Maximize efficiency incentive
 - + Price dynamically

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Current Factors



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Specific Issues

- + Renewable short-falls
- + Low generation margins due to low natural gas prices
- + Delays in new baseload demand
- + Vague undeliverable smart grid promises
- + Growing nuclear costs
- + Drumbeat against coal growing

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Today's Goal

- + Identify Atlantic Canada energy options and success strategies
- + Meld vision and reality
- + Meld long-, medium- and short-term strategies
- + Identify responsibilities—who pays, who plays
- + Understand the macro-economic impacts of bad decisions
- + Stimulate discussion and T-up actions

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North American and Global Energy

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In the Foothills of a Revolution...

- + ***Widespread commercialization of***
 - + Plug-in hybrid cars
 - + Smart appliances and homes
 - + Green buildings
 - + Solar electric and hot water collectors
 - + Solar, wind, and bio mass and other renewables

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Opening Our Minds



Energy in an Algae Bag—Craig Venter

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Pair of ACR-1000s

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Regional Transmission

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Wind and Renewables

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More electrification-electric cars

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Scenario Example

- + Rapid expansion of renewables
- + Rapid phase-out of coal
- + Nuclear renaissance
- + Smart grid
- + Major increase in gas turbines, fuel cells, etc.

Low growth Scenario

- + Low economic growth persists
- + Low deflationary prices
- + Advances in storage
- = No need for significant baseload additions?

A likely scenario?

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Trade-Off Source Options

- + Renewables.....Natural Gas
- + Coal.....Natural Gas/Nuclear
- + Large Hydro....."Real" Renewables
- + Large Hydro.....Fossil/Nuclear
- + Nuclear.....Natural Gas

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Trade-off Strategic Options

- + Centralized Continental Grid.....Decentralization
- + Utility-ownership.....New Players
- + Low Cost..... Higher Cost
- + Government Subsidies.....Bigger Bills
- + Long-term Life Cycle Investment.....Faddish Investment

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Climate

- + North America is not ready to let climate drive
- + Cap and trade buys time and avoids the toughest actions
- + Cutting waste and inefficiency can be incentivized
- + Climate is only one of the drivers for change

The biggest effect of the global warming debate:
It has numbed our judgment

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Environmental Questions

- + How much will cap-and-trade affect generation?
- + Will free allowances protect old coal?
- + How will it affect natural gas generation?
- + Will the impact be continentally even?
- + Will it give a pop to nuclear?

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Inconsistencies

Ontario closing coal plants—Ohio building new ones

Texas achieving its RPS goal—Many markets doing nothing

Advanced meters underused—Most markets deferring

No nuclear north of the "Mason-Dixon" line—except Ontario & NB

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Natural Gas

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Natural Gas

- + Assumed cap on North American natural gas production is gone
- + Shale gas and new technology increases supply
- + No "need" for LNG imports
- + Production costs should keep gas in low price range
- + Uncertainty is ramp-up and size of electricity demand

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Natural gas

- + "Too cheap" today, "too expensive" tomorrow?
- + The fuel of choice, or the only choice?
- + Over-abundant or premium?

Shale Gas

1978—Gas is in short supply

1998—Gas surplus bubble is finally gone

LNG imports needed

2004—North American production has peaked forever

2008—Shale gas supplies in the US and Canada are "endless"
and economical

Prices remain soft—for now

Atlantic Canada

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Atlantic Canada

- + Offshore expansion
- + Lower Churchill
- + Nuclear
- + Renewables
- + LNG
- + Clean coal
- + Biomass, etc.

Emerging Decisions

- + Large regional infrastructure
- + Global fuel prices
- + Penetration rate of renewables
- + Implementation of dynamic pricing
- + Transmission network expansion
- + Industry and regulatory structure

Transmission

- + Who pays for expanding the grid?
- + Who decides what gets built, where and when?
- + How do utilities protect their interests?
- + And how much does the customer pay?
- + Is there a better way?

Uncertainty...

- + Lack of leadership and consensus making
- + Financial challenges
- + Low energy prices under-incentivize investment
- + Broken Balkanized regulation

Technology Questions

- + How much wind and solar can we build?
- + Can we launch multi-billion projects?
- + How much more efficiently will we transmit electricity?
- + How many plug-in cars will we have?
- + How much storage will we have?

Financial-Regulatory Questions

- + Will customers pay for new investment?
- + Will utilities build in rate base?
- + Will regulators enable dynamic pricing and higher bills?
- + Will there be consolidation to get economies of scale?
- + Will utilities remain government-controlled?

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