

IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

Northeast Gas Association
Regional Market Trends Forum

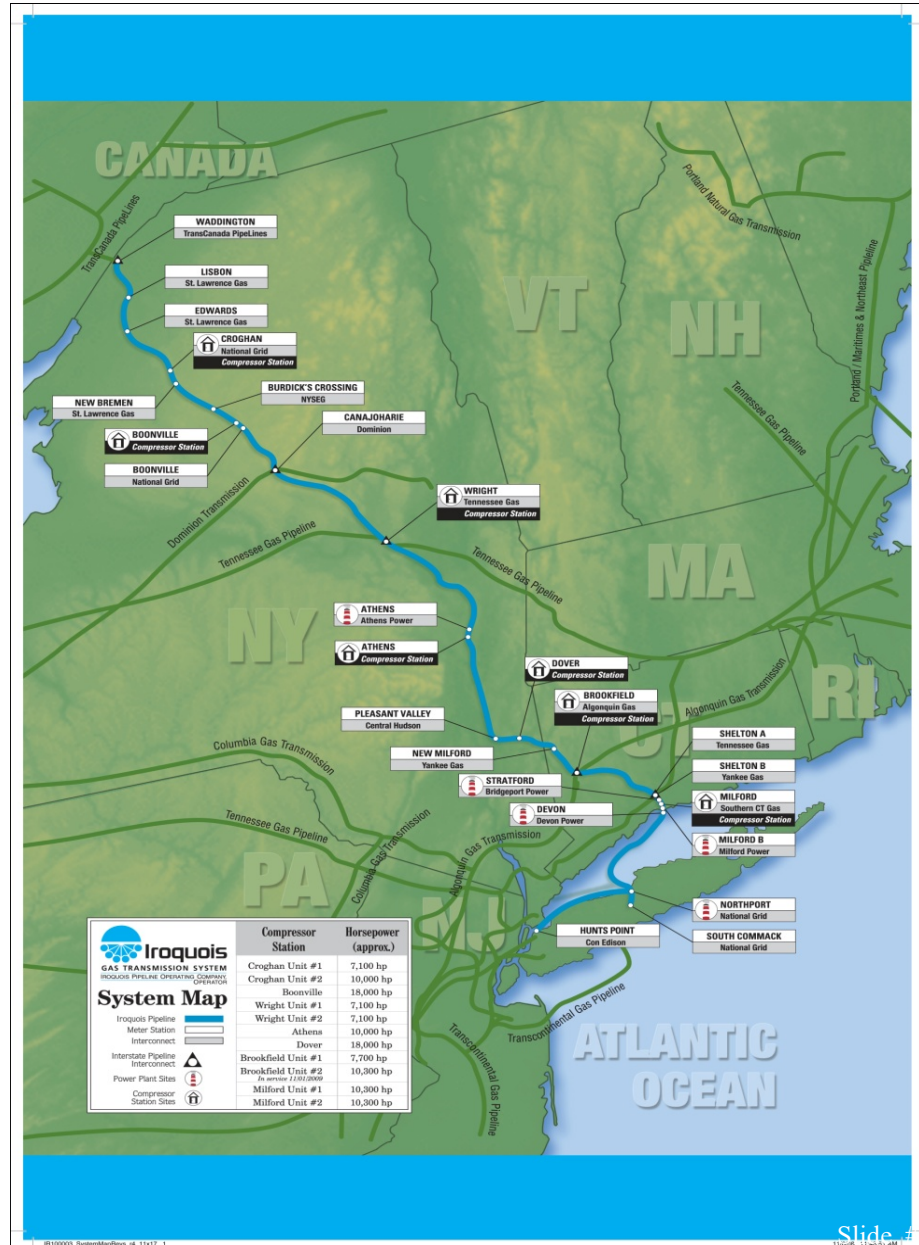
Natural Gas Projects & The Green Revolution

April 25, 2019

Hartford, CT

Iroquois Gas Transmission System

- Commenced Operations in 1991
 - Headquarters in Shelton, CT
 - 80 employees (20 field operating personnel)
- Primary Markets
 - Connecticut
 - Long Island
 - New York City
- 1.7 Bcf/d Physical Receipt Capability:
 - TransCanada = 1.2 Bcf/d
 - Algonquin = 0.4 Bcf/d
 - Dominion = 0.1 Bcf/d
 - XNG = 0.02 Bcf/d
- Piping
 - 416-mile of 30" and 24" pipeline
 - MAOP = 1440 psig
- Pipeline Interconnects:
 - TransCanada
 - Dominion
 - Tennessee (200 and 300 lines)
 - Algonquin



Iroquois – Projects Past

- Little Opposition - comparatively
- Short Timeframe – 3 years
- Work-stays, Legal Injunctions – unheard of
- Pace Environmental Litigation Clinic, Sierra Club, Stopthepipeline.org – silent/non-existent
- Coordinated effort by Federal and State Governments for environmental review
- Local towns welcomed Projects and of course tax revenue & community grants



Iroquois – Projects Today

- Protests, Sit-ins, Disruption, Legal Injunctions – the new norm
- Timeframe – 5+ years
- All roads to New England travel thru New York
- Who bears the risk/cost of delays
- Protesters Arguments
 - Keep it in the ground
 - Destroying the environment/
Poor use of land
 - Carbon Free Society



Products derived from Natural Gas (and Oil too)

FOOTBALLS LIFE JACKETS BOXING GLOVES
SKATES FACE MASKS CROSS COUNTRY SKIS BUOYS
SOCCER BALLS TACKLE BOXES CLIMBING ROPES
TENNIS BALLS **HELMETS** ARTIFICIAL TURF
INFLATABLE RAFTS SURF BOARDS PROTECTIVE GEAR
SNOWBOARDS **GOLF BAGS** FISHING RODS
WATER SKIS PADDLES SLEEPING BAGS CRASH PADS
HOCKEY PUCKS TIRE PATCHES WRESTLING MATS
SKATE BOARDS BASKETBALLS CANOES
BIKE TIRES TENTS **TENNIS RACQUETS** YOGA MATS
HANDLEBAR GRIPS KAYAKS GOALIE PADS
WINDSURFERS SPRAY SKIRTS **SPEED BOATS**
PAINT PATIO FURNITURE **STORAGE TUBS**
GARAGE DOORS GLUE PROPANE WADING POOLS
PESTICIDES **ELECTRICIAN'S TAPE** TOOL BOXES
AWNINGS LAWN CHAIRS NYLON ROPE
AIR MATTRESSES **SAFETY GOGGLES**
HOSES BEACH BALLS INSECT REPELLENT
FERTILIZERS **GARDENING TOOLS** EXTENSION CORDS
RAIN BARRELS **VINYL SIDING** POOL LINERS
LAWN MOWERS PLAYGROUND EQUIPMENT AND TOYS
RECYCLING AND GARBAGE BINS PATIO UMBRELLA
ASPHALT SHINGLES IRRIGATION PIPING

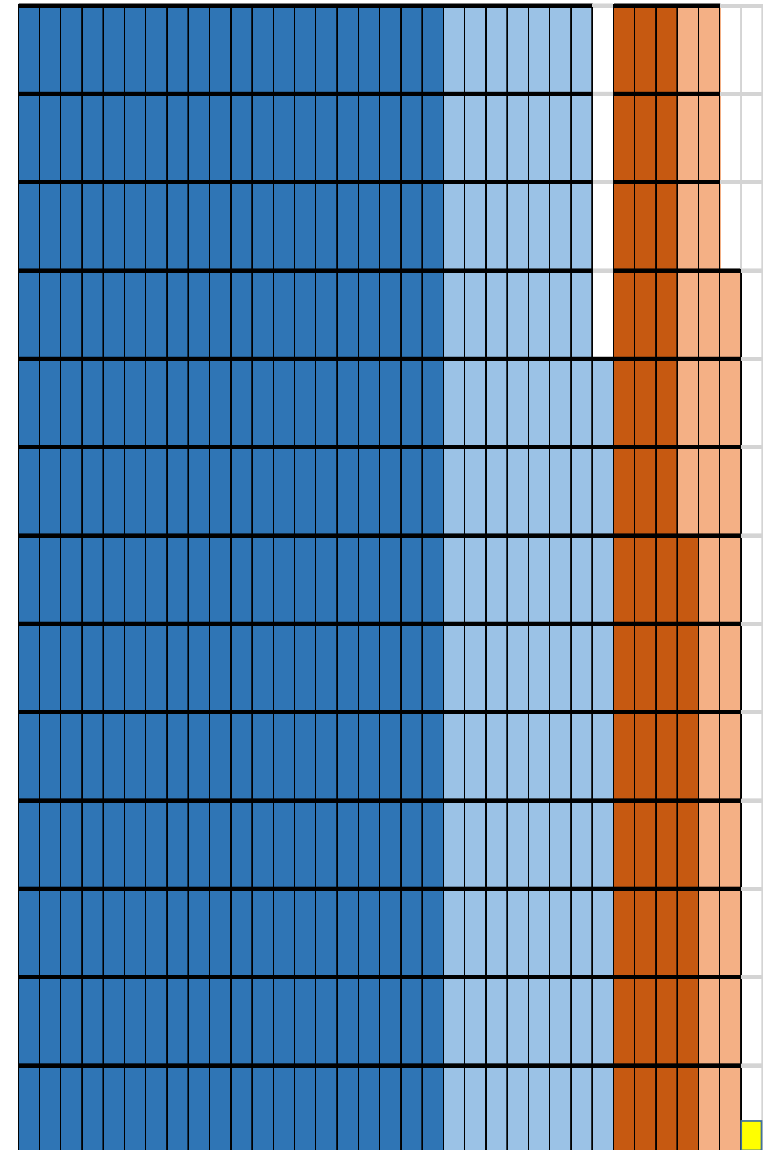
TOOTHBRUSH CONTACT LENSES
MAKEUP **TOOTHPASTE** COLOGNE **SOAP**
LIP BALM
SHAMPOO **MOISTURIZER** **COMB**
SHAVING CREAM DEODORANT **ASPIRIN**
VASELINE
NAIL POLISH HAIRBRUSH **TOILET SEAT**
CLEANING SUPPLIES GEL **SHOWER CURTAIN**
HAIRBRUSH **EYE GLASSES** EYELINER **HAIR SPRAY**
SUNSCREEN MASCARA BOTTLES **FOUNDATION**
EYESHADOW **CONDITIONER** HEARING AIDS **DENTURES**
BODY LOTION **ACCESSORIES** MAKEUP REMOVER

GPS DEVICES CAMERAS **DVDS** MONITORS
TELEVISIONS **HEADPHONES** KARAOKE MICROPHONES
WEARABLE TECH LAPTOPS **TABLETS** CABLES
TONER CARTRIDGES POWER BARS
SPEAKER BASES **TWO-WAY RADIOS** **EAR BUDS**
DVD PLAYERS **PHONES** GAME CONTROLLERS
ELECTRIC PIANOS **WATERPROOF CASES** SCANNERS
CLOCK RADIOS KEYBOARDS **DVD JEWEL CASES**
COMPUTERS VIDEO GAMES CAMCORDERS
PROJECTORS **ELECTRIC GUITARS** **HANDHELDS**

Source: www.oilandgasinfoca.com

Land requirements for 1,000 MWs

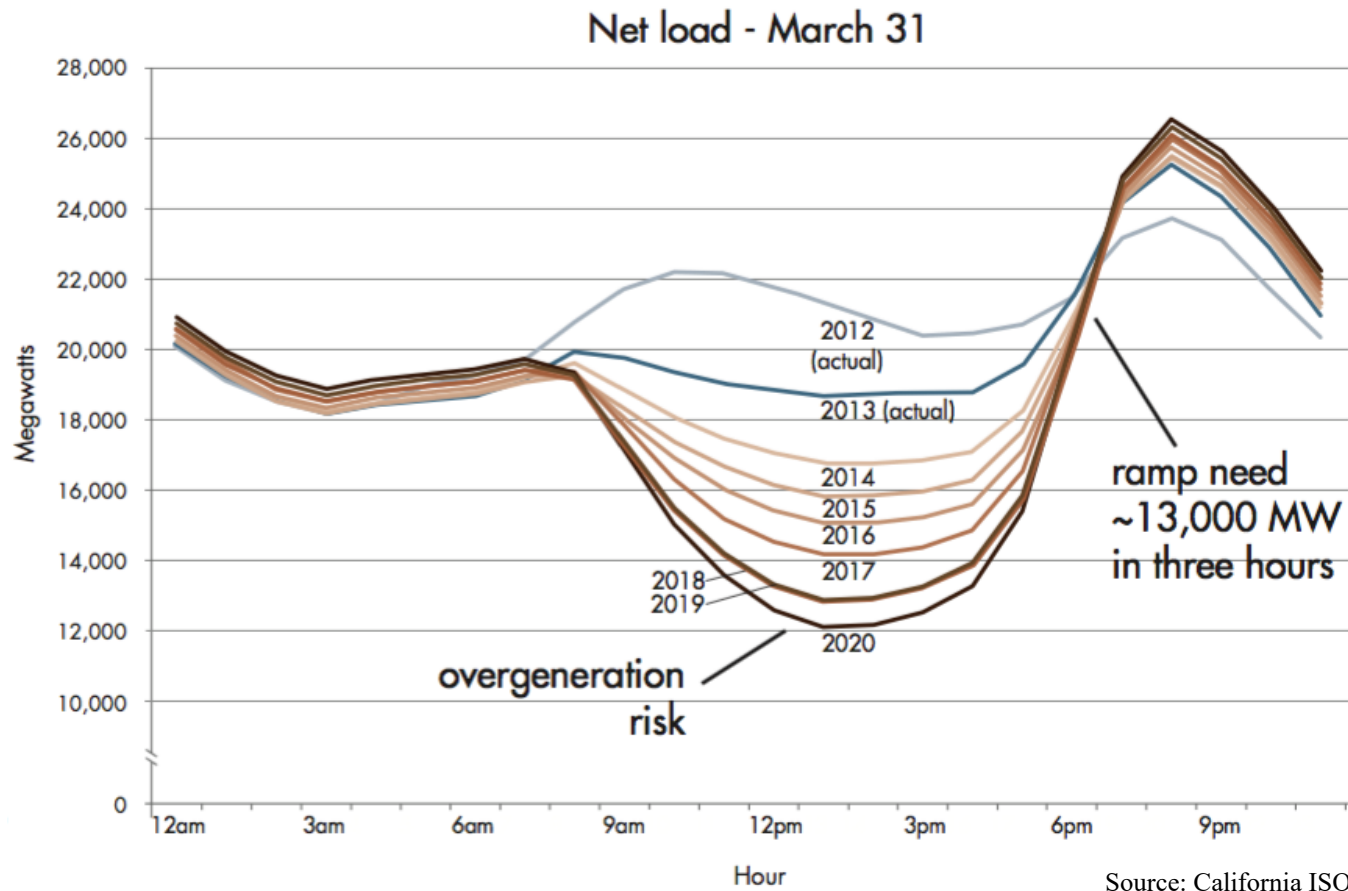
- Wind Farm
 - 133 square miles, BUT...
 - Capacity Factor of 37% - 50%
MEANS...
 - 260 – 360 square miles
 - Alta Wind Energy Center, CA (1,548 MWs)
- Solar Farm
 - 14 square miles, BUT...
 - Capacity Factor of 17% - 28%
MEANS...
 - 45 – 75 square miles
 - Topaz Wind Farm, CA (550 MWs)
- Combined Cycle natural gas plant
 - Cricket Valley Energy Center, Dover, NY
 - 1,100 MW, Capacity Factor = 90+%
 - 193 acres
 - 0.3 square miles



Source: Nuclear Energy Institute, www.Cricketvalley.com

The Solar Duck Curve

Figure 2: The duck curve shows steep ramping needs and overgeneration risk



- Mismatch between Production and Consumption
- Need flexibility & storage
- Germany's Energiewend led to negative pricing and the need for 10 GW of coal fired generation

Lessons learned to developing Projects

- Develop brownfield (as opposed to greenfield) Projects
- Take a top-down approach to Stakeholders as early as practical
- Evaluate green technologies (e.g. – Solar) as part of Project
- Educate, educate, educate
- Natural Gas Development = Economic Growth, though not all can appreciate it
- You can't color natural gas molecules (or electrons)
- Most protestors don't know why fracking is bad - or good
- Protecting the environment is paramount, regardless if you're pro-gas or pro-green

