ISO New England Responses to Questions and Comments
On ISO Presentation, at June 6, 2006 PAC Meeting
"Evaluations of Regional Greenhouse Gas Initiative (RGGI)"

ISO New England appreciates the questions and comments on ISO's RGGI Study. ISO is finishing a report on the study which will discuss the analysis in more detail and will be available shortly. These questions have helped the ISO to clarify and improve the study report. In the meantime, the ISO has prepared responses to the questions and comments where needed.

As an introduction, it is important to explain the objective of ISO's RGGI analysis: It was to simulate from a system perspective the CO_2 emissions from New England's RGGI generators over the next ten years to see if those generators in total would be able to emit less that the New England RGGI Cap of 26.5 million tons. The analysis did not examine whether any individual generator could comply or not as CO_2 allowance allocations for the generators have yet to be determined. ISO's RSP06 base case was used for the study which assumes no resource additions during the ten-year planning period 2006-2015. While this assumption is unrealistic, the case provides a conservative starting point. The simulation of CO_2 emissions for this base case was done for a range of CO_2 allowance prices representing the uncertain effect of the RGGI cap on CO2 allowance prices. The goal was to see at what allowance price the generators could meet the cap with energy growth. The analysis also examined cases of adding new alternative resources to see how they would help or hurt the region's ability to meet the cap, especially in the latter part of the planning period. The analysis shows that low or zero emitting resources will be needed to meet the increase in energy use without increasing the RGGI generators' CO_2 emissions.

ISO hopes that the responses provided here are understood in the context of the objective of the study. ISO has not responded where there was only a comment or observation.

Comments by Slide Number in the Presentation at the June 6, 2006 PAC meeting:

- **Slide # 5:**
  - The ISO staff study should account for CO_2 costs associated with MA 310 CMR 7.29 and consider other federal and state requirements on-the-books and on-the-way (CAIR or CAIR+, CAMR, BART).
  - *The ISO RGGI study did account for the CO_2 cost associated with MA 310 CMR 7.29 as explained in the response below for Slide 8. Although current emission rates of SO_2 and NO_x emissions were modeled in the study, we did not consider any other modifications to air emission regulations for CAIR, etc. that would affect SO_2 and NO_x since the objective was to examine only the effect of the RGGI cap.*

- **Slide # 6:**
  - For the RGGI generators general compliance strategy, what does "use risk management tools" mean?
  - *The generators intend to use risk management tools to manage their compliance similar to what they currently do for SO_2 and NO_x emissions compliance. They*

will use generation technology, fuel changes, contractual arrangements, and characteristics of the entire portfolio and other means to manage compliance.

- The participant informed Levitan of its concerns that there will not be enough allowances in the marketplace at any price under a RGGI scenario to continue unrestricted operation of existing fossil generation. Since offsets also are restricted, the only other option will be to back down generation.
- *The ISO has noted this as a potential reliability risk. We will need to wait until the RGGI rules are made final by the states to see if there will be an actual shortage of allowances.*

- Reliability impacts could be further aggravated by other federal and state requirements on-the-books and on-the-way. (CAIR or CAIR+, CAMR, BART)
- *The ISO agrees that these requirements would impact the generators and potentially system reliability.*

- **Slide # 8:**

  - Did the SO_2, NO_x and CO_2 emission allowance adders take into account other federal and state requirements on-the-books and on-the-way? If on-the-books and on-the-way are accounted for, would this change the adder values?
  - *No, these emission allowance adders didn't take into consideration other requirements on-the-books and on-the-way. If those requirements would be accounted for, the adder values would change. See response to Slide 5.*

  - The six plants subject to 310 CMR 7.29 are also subject to a historical absolute cap. Some facilities will be affected due to a lower than historic (overall facility) capacity factor. How was the absolute historical cap handled in the analysis since this requirement is expected to be contemporaneous with the rate cap?
  - *The CO_2 emissions from the six plants in ISO's simulations are compared with the historical absolute cap. Five of the plants simulated CO_2 emissions would be below the cap over the ten years. One plant exceeded the cap by a small amount. However, its historical capacity factor has been lower than the simulated capacity factor, so we assumed in the actual operation, the CO_2 emissions from that plant would be lower and could meet its absolute cap.*

    The CO_2 emission cost adders for the six plants subject to MA 310 CMR 7.29 are calculated using the following equation

    *CO_2 emission cost adders = (Plant emission rate – the rate cap) * $10/ton emission allowance*

- **Slide # 9:**

- How was the 8,889 Heat Rate for the typical Base Load – Coal Plant derived? Shouldn't this be higher to reflect the installed coal generation base?
  - *The table on slide #9 is intended to show how the CO_2 emission cost adder would affect the dispatch cost for three specific but typical plants. The heat rate is a full load heat rate of a representative coal plant in our database, not the weighted average of coal plants in New England..*

- How was the CO_2 allowance price derived? Why isn't the allowance price higher, that is closer to the 310 CMR 7.29 trigger price of $6.50 or the RGGI trigger price of $7.00? As observed in the RPS market, market prices for the commodity tend to rise just below the trigger prices (or alternative compliance payment price). Why doesn't ISO-NE think the same thing will happen here?
  - *In the ISO study, three different CO_2 allowance prices were arbitrarily simulated in the different cases to study the uncertain impact of CO_2 allowance prices on the RGGI generators CO_2 emissions. These prices correspond well with a recent forecast for the range of CO_2 allowance prices[1]. The ISO study did not try to model CO_2 allowance market dynamics.*

- How were the SO_2, NO_x and CO_2 adder values derived? Should those change over time as additional federal and state requirements kick in?
  - *The emission adders are derived by multiplying the emission rates and assumed allowance prices. The SO_2 and NO_x allowance prices were February 2006 forward market price projections for 2008 from an emissions broker. Since the focus of the RGGI analysis was on CO_2 impacts, the SO_2 and NO_x allowance adders were held constant as we varied the CO_2 price. If additional federal and/or state requirements have an impact on the allowance prices, these adders would change.*

- Assuming a $0 cost for CO_2 produced by imports and non-RGGI units is likely to be unrealistic given that three out of the four current leakage proposals under RGGI consideration involve the assignment of additional CO_2 cost to imports.
  - *The treatment of leakage is still under development by RGGI so the ISO did not have any basis other than zero cost for estimating leakage from imports. See the response to the last sub-bullet under Slide 13.*

- Reduce demand and indirectly avoid leakage: Will likely require additional expenditures on DSM and EE to reduce demand. The current 2006 CELT Report (April 2006) shows an average of 1.8% load growth between 2006 and 2015, or 4,875 MW (adjusted load). How does that compare to what DSM and EE reductions in demand have been able to accomplish to date?
  - *The draft RSP06 report (Table 3.4) projects that DSM would reduce summer peak loads by 1,500-1,700MW over the next 10 years and that the energy*

[1] *http://www.synapse-energy.com/Downloads/SynapsePresentation.2006-01.Forecasting-and-Using-Carbon-Prices-in-a-World-of-Uncertainty.pdf*

saved would range from 8,000 to 8,500 GWh. ISO's demand response program has reached over 500 MW and responded well on the peak day August 2, 2006.

- ❖ Do not control leakage but offset it in the future – Will involve future unavoidable cost that cannot go unrecognized.

- ❖ Assign leakage responsibility to Load Serving Entities (LSEs) – LSEs will likely need to procure allowances to cover load imports through the auction process they consistently have advocated for generators.

- ○ **Slide # 13:**

  - ➢ "Results show that RGGI CO_2 emissions go down with the increase in CO_2 allowance price":

  - ❖ What is the mechanism by which this happens? Units back down or retire? More imports?
    - *Keeping other parameters constant (no unit retirements), the increase in CO_2 allowance price makes some generation from the RGGI units, which have a higher cost, to shift to the non-RGGI units and imports. Therefore, the RGGI CO_2 emissions go down.*

  - ➢ "With no resource addition in New England, the New England RGGI units would be able to meet the New England RGGI cap through 2015 assuming CO_2 allowance price at $5/ton or higher":

  - ❖ How will New England RGGI units meet the cap given restrictions on offsets at 3.3% per 3 year compliance period and insufficient market allowances based on established cap levels below what the existing New England generation base needs to account for load growth between 2005 and 2009?
    - *ISO's evaluation assumed that 100% of the RGGI states' allowances would be available to the RGGI generators through direct allocation and buying them from the market. ISO's study did not consider the availability of offsets for meeting the cap (see the response to the 2nd bullet of Slide 6 above) so there is some conservation in the study results regarding there being sufficient allowances and offsets.*

  - ❖ What amount of additional DSM and/or renewables by 2015 is required (associated with just four states)?
    - *RGGI does not "require" DSM or renewables per se, but would indirectly encourage them. Renewables are required by the state renewable portfolio standards (RPS). The RSP06 estimates that the four New England states with RPS growth requirements[2] will require about 10,000 GWh of new renewable energy by 2015. DSM requirements are usually set by state policies regarding*

[2] CT, MA, RI and VT

conservation and load management in conjunction with the utilities who will implement those policies. Generally these are implemented by budgets to spend on the various DSM programs.

- ❖ What is the impact to marginal oil units and fuel diversity under this scenario?
  - *In the simulations, with the increase in CO2 allowance prices, the energy imports from the neighboring control areas increases while the usage of fossil fuel used in New England (oil, coal and gas), decreases (See Slide #20).*
- ❖ Does this assume zero leakage cost imports?
  - *Yes, imports into New England have zero leakage cost in the simulation. The increase in CO_2 emissions related to the energy imported from New York because of the RGGI cap is not leakage since New York is a RGGI state. The energy imported from Canada is hydroelectric, nuclear and fossil in its source. Until the treatment of leakage is fully developed we can not estimate the impact on meeting the RGGI cap. The Canadian commitment to the Kyoto Agreement potentially may have some moderating effect on the treatment of leakage.*
- ➢ "With new zero-emission or low emission resources additions, study results indicate that the generating units will meet the RGGI cap in the four RGGI states"

- ❖ Under a four New England RGGI state (ME, VT, NH, CT) scenario, what is the percentage of fossil fueled generation compared to MA?
  - *In the base case with no RGGI cap, and with price-responsive imports from HQ and NB, the New England fossil fueled generation comprises 61.3% of the total New England energy in 2015. Similarly, fossil generation in MA is 28.6%. In the base case with the RGGI cap and a $10/ton CO_2 allowance price, and with price-responsive imports from HQ and NB, the total New England fossil generation drops to 60.3%, while the fossil generation in MA increases to 31% .*

- ❖ How much is the assumed amount of new zero-emission or low emission resource additions in just these four states?
  - *All of the 1,000 MW is assumed in the RGGI states. 500 MW is added in 2012, and 500 MW is added in 2015. In the scenario of the queue resources they in are assumed to be in the state where proposed.*

- ❖ Based on the draft RGGI Model Rule, it is unlikely that renewable generators will be able to gain financial benefit from both the RGGI and REC market. Given today's REC prices and projected prices for CO_2 allowances/offsets, it would seem unlikely that renewable generators will be able to provide generators with offsets under prevailing market economics. Does this change the conclusion of this bullet?
  - *ISO's RGGI evaluation did not consider RECs or offsets, so this would not impact the conclusions.*

- ○ **Slide # 14:**

- Do projected CO_2 emissions account for load growth during 2006-2009? Or does the RSP'06 forecast assume a decline in load or increase in imports?
  - *The RSP06 energy and peak load forecast was used. The summer peak load grows at an average rate of 1.9% per year to 2015.*

- **Slide #s 15 & 16:**

  - Need more clarification on what these slides represent and imply.
    - *These slides are intended to show the impact on CO_2 emissions from RGGI generators of five alternative cases of resource additions to the system assuming CO_2 allowances are $5/ton. Slide 16 is merely a "zoomed in" version of Slide 15.*
    - *The case NUC_5 adds a total of 1,000 MW of nuclear generation and reduces both RGGI CO_2 emissions and New England emissions the most of all the scenarios by 2015. This result is as expected since the nuclear generators have low dispatch costs and no CO_2 emissions.*
    - *Adding 1,000 MW of IGCC (IGCC90_5) with 90% CO_2 Capture and Storage (CCS), also reduces the RGGI generators emissions, since these advanced coal plants would have only 10% of the IGCC's CO_2 emissions, and lower dispatch costs than the existing fossil generators. The other generators in New England would reduce their output and the total CO_2 emissions decrease.*
    - *However, adding 1000 MW of IGCC without any CCS (IGCC0_5), increases RGGI CO_2 emissions significantly due to the CO_2 emission rates of these new IGCC plants and assuming no CO_2 sequestration. RGGI CO_2 emissions increase about 3 million tons by 2015, the most of all the case.*
    - *Adding 1000 MW of Natural Gas Combined Cycle (NGCC_5), the CO_2 emissions from RGGI generators increase slightly over the base case and the CO_2 emissions in New England decrease slightly as the new NGCC generators have lower CO_2 emission rates than the existing NGCC fleet, and would operate more.*
    - *In the ISO Queue case (Queue_5), a representative mix of projects in the ISO Queue (969 MW gas units, 497 MW wind generators and 170 MW nuclear upgrades) was modeled. Compared with the base scenario results, the RGGI CO_2 emissions decrease since about 40% the resources (nuclear and wind) have zero CO_2 emissions and the remaining amount have low CO_2 emission rates. In summary, these slides show the relative benefit of adding different resources to lower future CO_2 emissions in the New England RGGI states.*

- **Slide # 17:**

  - It is not clear how energy exports increase CO_2 emissions. Need further clarification.
    - *Energy exports increase the generation in New England, and, correspondingly, increase CO_2 emissions associated with that generation, most of which would be fossil gas being on the margin.*

- **Slide # 20:**

  - This slide illustrates that leakage is a significant issue starting in 2009 (and is cumulative over time: 32-40 million TPY).
    - *Leakage under the New England CO_2 cap is defined as the change in CO_2 emissions from non-RGGI units in New England and Canadian imports, caused by the RGGI cap. So, in this slide the total emissions for the non RGGI units are shown for the base case and with the cap at $10/ton allowance price. The leakage shown is the difference between these two cases or about 4 million tons per year. This slide does not include the CO_2 emission leakage associated with the imports which is explained in the response to the question on Slide #13, 5th subbullet (on Page 5).*
  - Not sure what the 2006 through 2008 numbers represent, since the program does not start until 2009.
    - *Since the ISO study used RSP06 assumptions, the simulation of CO_2 emissions covers from 2006 to 2015. The CO_2 emission prices are in effect with the cap starting in 2009.*

- **Slide #s 21 and 22:**

  - The percentage of New England CO_2 reductions achieved by RGGI is unrealistic to the extent it assumes leakage at zero cost for CO_2 emissions associated with imports. (See Slide 12 comments).
    - *See the answer to questions on Slide #13 on Page 4 and 5.*

- **Slide # 24:**

  - More emphasis needs to be placed on the conclusions of this slide. That is, "New England still cannot meet the cap from 2012 to 2015 even 1,000 MW new resource with zero CO_2 emissions are installed in the system".
    - *This slide presents conclusions for the case if MA and RI join RGGI. These show a worst case for compliance with a six-state RGGI cap than the four-state RGGI cap.*

  - Since it appears that emissions would exceed the six state cap in 2009, considerably more discussion is required on what it means to "exceed the cap" and the implications to New England reliability, since there are no commercially available back end controls for CO_2. Generators will not exceed what they cannot procure in allowances or offsets.
    - *This analysis is intended to provide information as a starting point to show whether as a system the RGGI generators can meet the cap. ISO believes these results are useful to the generators to see how collectively the system might operate under the RGGI cap. ISO provided comments on the Model Rule supporting more flexibility in the use of offsets. Further discussion is needed with generators on their compliance strategies before ISO can*

consider any further analysis of the impact from how generators would comply with the cap.

- **Slide # 25:**

  - This slide suggests that as CO_2 allowance prices increase, CO_2 in the region goes down due to additional zero-cost leakage. Is this realistic? (See comments on Slide 9.)
    - *See the answer to questions on Slide #13 on Page 4 and 5.*

- **Slide # 26:**

  - Need more clarification on what this slide represents and implies.

    - *This is similar to Slides 15 and 16 but assumes that MA and RI are also under RGGI. The slide shows the CO_2 emissions for RGGI units in the six states assuming various new resources installed in New England. In these cases, a CO_2 allowance price of $5/ton was assumed to be consistent with the new resource addition scenario set for four RGGI states. Similar to those cases for the four-state RGGI, adding low emission resources will reduce the CO_2 emissions in New England greatly. However, New England still cannot meet the cap from 2012 to 2015 even if 1,000 MW of new nuclear units with zero CO_2 emissions are installed in the system.*

- **Slide # 27:**

  - Although 0 imports may not be a realistic scenario, this provides a good illustration of the compliance gap that could occur if imports must account for associated CO_2 emissions.

- **Slide # 28:**

  - Not enough information regarding the future predicted four state CO_2 emissions is given to verify the statement that, "The New England RGGI units would be able to meet the New England RGGI cap through 2015 assuming CO_2 allowance price at $5/ton or higher".
    - *Recognizing the assumptions for ISO's analysis, this is a correct statement (See Slide #15 and Slide #16).*

  - Is it realistic to expect that new resources will have zero or low CO_2 emissions to maintain New England RGGI emissions below the cap after 2015? If not, how does this impact ISO-NE reliability and fuel diversity from the existing fleet?
    - *With a RGGI cap new resources will need to be zero or low emitting or acquire enough allowances to operate so increases in New England energy use do not increase CO_2 emissions. If with these new resources the RGGI*

generators violate the cap, there may be reliability issues to deal with if units reduce their output to meet the cap. Fuel diversity is probably of less importance. Fuel diversity will most likely be improved with lower or zero emitting CO_2 resources unless they are gas plants.

- ISO-NE's analysis should emphasize and make clear that since the RGGI cap will tend to promote purchases from external sources which will result in an increase of CO_2 emissions leakage from non-RGGI units, it should be expected that regulators will address this issue. Current leakage mechanisms under consideration should be included in ISO-NE's analysis along with their impact on the existing fleet, system reliability and fuel diversity.
  - *Our response to Slide 13 (5th subbullet) has attempted to estimate, the leakage from the MA and RI units with the New England cap. It is premature to assess the impact of leakage until RGGI's proposed treatment is clearer. Canadian leakage can not be estimated.*

- "If MA and RI join RGGI, compliance could be an issue as early as 2010" and "Offsets will likely be needed". The Participant believes this will be an issue in 2009. Offsets are limited to 3.3% per three year compliance period and are insufficient to bridge the shortfall. If coal and oil generation cannot procure enough allowances and offsets to meet their expected generation needs, irrespective of price, the only remaining option is to back down generation.
  - *Based on our analysis ISO agrees. The ISO believes that offsets are an important issue for compliance flexibility as our comments to RGGI stated.*

- The level and timing of required reductions in the cap level are not set in a way to allow a realistic and feasible penetration of lower emitting and non-emitting generation into the region. This is likely to compromise the region's ability to maintain fuel diversity, electricity reliability and economic competitiveness. The RGGI modeling - and now ISO-NE modeling - clearly demonstrates that a significant amount of lower emitting and non-emitting generation (and/or imports) will be necessary in order to reduce CO_2 emissions to meet the desired 10% reduction by 2018. However, the RGGI modeling contains a number of unrealistic assumptions that may overestimate the penetration of such generation over the time period modeled and underestimate the potential cost of the program. The 10% reduction requirement proposed over the period 2015-2018 is likely to be unrealistic as this timeframe is not long enough to accomplish the fossil fueled fleet turnover that would be needed to meet this requirement.
  - *ISO agrees that the timely additions of low or zero emitting new generation is critical for the region to meet the RGGI cap, especially in the latter part of the ten- year planning period. RGGI will review the program in 2012 so this could lead to adjustments in the program.*

- Neither RGGI nor ISO-NE studies account for the fact that renewable generation will most likely not be allowed to generate RGGI offsets and RPS RECs

contemporaneously. Due to the potential REC and RGGI Offset market price differential, any renewable generation will most likely seek the REC market financial benefits rather than the RGGI offset market.

- Additional federal and state requirements on-the-books and on-the-way that will confront existing fossil fueled generation are not accounted for in ISO-NE's analysis. A thorough analysis of how these combined issues will affect system reliability and fuel diversity is warranted. The Participant suggests that a study be initiated to ensure that New England's reliability is not compromised with the CO_2 cap level and other aspects of RGGI (such as offset restrictions and other hurdles). Other environmental programs, such as 310 CMR 7.29 (NOx, SO_2, mercury), CAIR, CAIR+, CAMR, PM and BART, should be integrated into the analysis.