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Chapter 4

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Ozone Transport: Will Midwest and Southeast Utilities Have to Pay to Clean up Air in the Northeast?

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§ 4.01. Introduction.

The growth in population, cars, industry, and power plants has inevitably created increased levels of air pollution. Most of the country is finally reaping the rewards of undertaking air pollution controls for the past quarter of a century to achieve the federal ozone standard. The densely populated Northeast, southern California, and a few large urban areas, however, continue to endure unacceptable levels of smog-producing ozone. Such disparity in air quality has led to recent action by the northeast states and the Environmental Protection Agency (EPA) to shift the burden of costly controls on ozone sources to other regions of the country that already have taken measures to achieve compliance with federal ozone standards. This chapter explains how the acts and inaction on the part of the northeast

states and EPA have led to an unprecedented interstate conflict over the responsibility for the northeast's air quality.

§ 4. 02. The Ozone Problem.

Ozone occurs in two layers in the atmosphere. When found in the stratosphere (six to eight miles above the surface of the earth), ozone is considered "good" because it blocks ultraviolet radiation from the sun. Ozone in the troposphere or ground level ozone (within six miles above the surface of the earth) is considered "bad" because at high concentrations it can cause adverse health effects. Unlike most air pollutants, tropospheric ozone is not emitted from any specific source. Instead, it is a product of chemical reactions, called photochemical reactions, in the air that occur between sunlight, nitrogen oxides (NOx) and volatile organic compounds (VOCs).[1] Because the series of ozone-producing reactions are driven by temperature and sunlight, ozone formation varies hourly, daily, and seasonally.

There are many natural and manmade sources of these two precursors that produce ozone. Natural sources of NOx and VOCs include soil and vegetation. Manmade sources encompass motor vehicles, electrical power plants, the industrial (non-utility) sector, agriculture, as well as small businesses such as gasoline stations, dry cleaners, and bakeries. According to EPA, in 1994 the contribution to NOx levels from the transportation sector was approximately 45 percent; the electric utilities' contribution was 33 percent; and the industrial sector's contribution was 17.3 percent. With respect to the levels of VOCs, the industrial sector contributed 56.9 percent, transportation contributed 36.9 percent, and electric utilities contributed 0.2 percent.[2]

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[1] More precisely, ozone result when radiant energy interacts with nitrogen dioxide (NO_2) to create nitric oxide (NO) and an atom of oxygen that immediately combines with abundant molecular oxygen (O_2) to form ozone (O_3). In the absence of VOCs, O_3 can then react with NO to reform NO_2. In the presence of VOCs, ozone production is amplified by the formation of organic radicals ($+RO_2$ in this case) which react with NO forming NO_2 without the destruction of O_3. The breakup of this new NO_2 by sunlight then leads the production of more ozone.

[2] *Ozone Attainment, Proceeding in the Right Direction: Will Sound Science and Objectivity Prevail?* (Midwest Ozone Group) Dec. 1996 at 16.