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Comments
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5 October 2007

TO: Jaclyn A. Brilling, Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

FROM: Janice M Whipple, BCE(Syracuse 1951), NYSPE Lic(33988, retired), PhD(RPI)
PO Box 185
Springfield Center, New York 13468-0185 (Otsego County)
phone 315.858.2368

RE: CASE 06-E-1424 - In Support of Petition of Towns of Warren and Stark for Re-hearing by the New York State Public Service Commission Regarding the Jordanville Wind Project (Herkimer County)

... Wind-turbine-generators (WTGs) DO NOT USE or CONSUME, ADD HEAT TO, or TOUCH our ground and surface water resources during their operation. On this project, there will be minimum or no contact with aquifers during construction.

...ENERGY DEMANDS ON WATER RESOURCES, a recent report to Congress by US Dept of Energy notes: "thermoelectric power generation accounts for 39% of all fresh water withdrawals and 20% of all nonagricultural water consumption in the United States." Constant Population Growth underlies a continual demand for more water, while high-tech WI-FI and even A/C lead the demand for continuous delivery of high quality electric power.

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...In this area, there have been recent open conflicts between water-users, eg Hinkley Reservoir re Utica and suburbs' water supply and filling Erie Canal locks. On nearby Lake Ontario, there are demands for water on both Canadian and New York State shores; the latter includes three nuclear thermoelectric plants ~~which~~ at the east end of the Lake, which require vast amounts of cooling water.

THIS IS NOT A GOOD TIME TO CUT BACK ON ANY ENVIRONMENTALLY BENIGN GENERATING PROJECT. A 1600MegaWatt nuclear plant has been proposed for the east end of the Lake, but its prototype in Finland is having some real problems now; two of the other plants have been"re-licensed" and they are aging. Help from that area will take a long time , and it would still be using water and creating heat. Additional area problems are the drought of 2007 and the floods and landslides of 2006.

THIS IS NOT A GOOD TIME TO DELETE 19 WTGs from the original project. The 2 MW WTGs fit in closely to the power grid with no need for those argument-provoking 765kilovolt longdistance lines that involve the State and Federal governments. The general populace is very outspoken against them, and has sometimes turned to violence. To some, however, the sight of a 2 megawatt WTG is pleasing or at least acceptable. These people have probably viewed actual WTGs in the field. The visual center-of-gravity is at the nacelle and hub, 262 feet above ground--the point at which the rotor is employed. If one of the blades is vertical, the tip height is 399 feet. Opponents choose the 400 foot dimension to quote, as a maximum.

...It appears that the deletion of these 19 turbines is based upon complaints of disturbances in a viewshed; the turbines themselves are not themselves within any historic district. Those complaints are based on the theory of imagination, the ideas that "400 foot tall turbines will be seen" or "towers as tall as a 40-story building....", with the implied assumption that the atmospheric conditions are constantly very clear.(PRACTICAL PERSPECTIVE was first presented Jun 29,2006, at a SEQR hearing.) ...NEGLECTED, however, IS THE TRUTH OF THE MATHEMATICAL LAWS OF LINEAR (SCIENTIFIC) PERSPECTIVE; THESE LAWS DESCRIBE THE DECREASE IN VISUAL APPARENT HEIGHT(SIZE) of ANY OBJECT WITH INCREASING DISTANCE FROM THE OBSERVER. (See The DEC Policy System Program Policy, Department ID: DEP-00-2,"Assessing and Mitigating Visual Impacts"; issuance date 7/31/00.) Even on a clear day, an object 400foot tall (if the width is sufficient for clarity) would appear, at arm's length, to be 3/16 inch max, at a distance of 15 miles. At 10 miles, it would appear to be 3/8inch; at 0.9-almost one mile, it would appear to be 3 inches tall. ..and so on. The WTGs at 10 and 15 miles would occupy a minute % of the total scene, a minimal impact that might even require use of binoculars. (see encl)

WITH THE EVER INCREASING PRESSURES ON SUPPLIERS OF ELECTRIC POWER AND POTABLE WATER, CAN WE AFFORD THE LUXURY OF DELETING THESE 19 POWER PROVIDERS AT THIS TIME--BASED ON THEORETICAL VISUAL DISTURBANCES?

...Old-fashioned common sense says that ANY deletion of wind-turbine-generators COULD BE DONE AFTER THEY HAVE BEEN IN PLACE AND ARE PROVED TO BE CAUSING HARM. An offending structure could be simply dismantled (not demolished); any income from the high-quality scrap material could offset money spent on employing a work force for that job. This approach would obviously require a certain time period for testing and the agreement of the Company, landowners and the Towns. This approach could prevent any embarassing afterthoughts of "why didn't we?" and WOULD BE BASED ON FACTS FULLY MANIFESTED OVER TIME.

.....

This communication is in addition to a general letter to the Commission dated 26 September 2007 which contains enclosures pertinent to this topic.

I, Janice M Whipple, am not employed by the Company, the landowners, the Towns, etc., nor am I, by this letter, engaging in the practice of professional engineering or law. I speak as a retired hydrologist, as an individual concerned for the greater good, as we all should be.

Janice M Whipple
5 Oct 2007

26 September 2007

TO: New York State Public Service Commission
Attention: Jaclyn Brilling, Secretary
Three Empire State Plaza
Albany, New York 12223-1350

FROM: Janice M Whipple, BCE(Syracuse) 1951; NYS P.E. lic no 33988(retired); PhD(RPI)
POBox 185
Springfield Center, N.Y. 13468-0185 (Otsego County)
ph 315.858.2368

RE: Jordanville Wind project in the Towns of Warren and Stark, Herkimer County

...The writer wishes to comment on 1) the relation of wind-turbine generation of electric power to our natural ground/surface water resources; 2) the visual aspect of wind-turbine generators in the landscape; 3) the urgent need for farmers to be able to (continue to) produce food in the future; 4) the use of history-oriented tourism as a socio-economic tool.

1)..As a retired hydrologist, I like the generation of electric power by wind-turbines. In operation, THEY DO NOT USE or CONSUME, ADD HEAT TO, OR EVEN TOUCH OUR GROUND and SURFACE WATERS! Whereas turbines are taken to task for being "down" when the wind isn't blowing at a particular site, no one notices that large steam-turbine generating plants (both nuclear and fossil-fuel) use large amounts ofsurface water for cooling and subsequently large amounts of heat are released to that water and/or to the atmosphere.

....A recent US Dept of Energy report to Congress, ENERGY DEMANDS ON WATER RESOURCES ...notes that "thermoelectric power generation accounts for 39% of all fresh-water withdrawals and 20%of all nonagricultural water consumption in the United States..." Also noted is "As population has increased, demand for energy and water has grown... Competing demands for water supply are affecting the value and availability of the resource." (see encl)

...In our area, Lake Ontario, which provides cooling water for many plants along the New York State shore, is under increased pressure from the city of Toronto, Canada for more cooling water. It is reported that the Great Lakes in general have an increasing surface water temperatures. In the Utica, New York area, there is heated conflict over the use of Hinckley Reservoir water to refill the Erie Canal locks as well as to provide drinking water to the City of Utica (and environs/new suburbs?).

...In passing over the seen/unseen issue of the wind-turbine "down time" in no wind (which brings an estimated "efficiency" to 30%), compare that with "traditional" power generation. (See POWER GENERATION TECHNOLOGIES, BY Paul Breeze,2005) p62: "The production of electricity from fossil, biomass or nuclear fuels is an inefficient process. While some modern plants can achieve nearly 60% energy conversion efficiency.

most operate closer to 30% and smaller or older units may reach only 20%. The USA, which has a typical mix of fossil-fuel-based combustion plants, achieves an average power plant efficiency of 33%." The writer would like to point out that this figure may not include mining and transport of fuel and certainly does not address the safetty factor from within or from without, such as "terrorist" attacks.

2) As a civil engineer trained in photogrammetry and surveying, and with later experience in sketching "geometrically-correct" mountain landsape pictures, I have considerable background in "landscape appreciation". I was also influenced by the book WIND POWER IN VIEW -Energy Landscapes in a Crowded World - (see encl)
...I presented my first draft of"PRACTICAL PERSPECTIVE - A Rule of Thumb to Estimate & Predict Apparent Heights at Distance" on June 29,2006 at the first SEQR hearing for the Jordanville Wind project. There was a full house, pros and cons. (see incl)
..."Practical Perspective" deals with the issue of Linear/Scientific/Mathematical Perspective which is noted (among other topics by the NYS Dept Env Cons "DEC" in the publication "The DEC Policy System, Department ID:DEP-00-2, Title: Assessing and Mitigating Visual Impacts....."issue date 7/31/00. Linear/Scientific perspective is the decrease in apparent height of an object with distance. It is the skeleton upon which atmospheric perspective is draped. It is hidden among other factors in the computer programs used to create the small photosimulation images found in the Environmental Impact Statements for the SEQR process. That makes it difficult to determine if a picture is "true".
...Although there has been continued talk/writing about "seeing 400-foot"or"x-storied buildings" in the distance, none of the objectors have modified their statements to include decreasing apparent height.

3) There is an urgent need to keep farmland and its EXPERIENCED FAMILY FARMERS (including a large Amish population) in business. Dairy prices are set by others and give next-to-zero profit for the farmers. Developers are waiting at the doorstep for new spaces to subdivide and "develop". Developments usually cost the community more in the long run. Food prices are already up because of the corn-for-ethanol industry. Imported food is becoming less desirable , not only for fair-trade and fuel-for-transport reasons, but for the repeated findings of toxins in the food.
...Wind-turbines can harvest the wind as a crop, with the market coming to it. The communities - towns, county, school ditrict- will also get some profit from financial agreements with the developer. We need to be ready, in view of current world conditions, for possible disaster conditions. There are many, many people who cannot grow their own food, an increasing number at that. See also the book "THE LONG EMERGENCY" by James Kunstler.

4) It appears to the writer that tourism to Historic Sites/Buildings/Regions is desirable in order to help regional economies, (as well as educate people in history).What are the jobs associated with tourism? Pumping Gas?--not even environmentally kind! What about a life of cleaning motels, or carrying out trash? As for being docents or guides, a good number of historic and cultural intitutions rely on unpaid senior-citizen volunteers. What kind of jobs will inspire the young people of today to find interesting, environmentally friendly work that will inspire them to action for the benefit of future communities?

...TOURISM BY MOTOR VEHICLE IS NOT ENVIRONMENTALLY FRIENDLY! More fossil fuels are used, heat is generated by car engines (air-conditioned at that) and friction of car tires, as well as heat absorbed by asphalt road surfaces.

...Tourism will increase water use, in many instances stressing the capacity of the present water intake supplies and the sewage treatment plant capacities. Locally, Otsego Lake acts as a water-supply for Cooperstown and a sewage-flusher for the Susquehanna River. The west side of the lake is currently addressing a local sewage problem from the tightly packed camps and residences along the steep bedrock terrain. Alas!

This communication is written in the hope that truth will come out with facts and numbers.

Very truly yours,

Janice M Whipple

Janice M Whipple

From Hole talk quarterly publ, Empire State Water Well Drillers Assoc. Inc, Summer 2007

Energy, Water Closely Linked, New Report Says

From The National Driller – April 16, 2007

The United States should begin looking at energy and water needs as one issue so that each resource can be sustained in the future – that's the crux of the findings of a report recently submitted to Congress by the Department of Energy (DOE). A team from Sandia National Laboratories, Los Alamos National Laboratory, the National Energy Technology Laboratory, and the Electric Power Research Institute led the information collection and report development efforts, with Sandia authoring the report.

"Basically, the report notes that energy and water are closely linked," says key report author Chris Cameron. "The production of energy requires large volumes of water while the treatment and distribution of water is equally dependent upon readily available, low-cost energy."

The report, "Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water," was prepared in response to a letter from the chairmen and ranking members of the House and Senate Subcommittees on Energy and Water Development Appropriations.

"As population has increased, demand for energy and water has grown," the report says. "Competing demands for water supply are affecting the value and availability of the resource. The operation of some energy facilities has been curtailed due to water concerns, and [building] and operation of new energy facilities must take into account the value of water resources."

Cameron says that in preparing the report, it became obvious the availability of adequate water supplies has an impact on the availability of energy, and energy production and generation activities affect the availability and quality of water. It becomes particularly alarming as populations grow in water-scarce regions of the country like the South and Southwest where demand for power is increasing.

Water is used throughout the energy sector, including resource extraction, refining and processing, electric power generation, storage and transport. Large energy-related facilities, such as power plants, mines and refineries can have a significant impact on local water supplies and water quality.

U.S. Sen. Pete Domenici, ranking member of the Senate Energy and Natural Resources Committee, says the report should "serve as a wake-up call to those working to diversify our nation's energy supply. Those of us from the West already know how real the threat of limited water availability is," he says. "But the rest of the country should also be concerned because water is increasingly relied on in every aspect of energy production."

The report notes that thermoelectric power generation accounts for 39 percent of all fresh-water withdrawals and 20 percent of all nonagricultural water consumption in the United States. If new power plants continue to be built with evaporative cooling, consumption of water for electrical energy production could more than double from 3.3 billion gallons a day used in 1995 to about 7.3 billion gallons a day by 2030 – equivalent to the entire country's domestic water consumption in 1995.

There are a number of alternatives to producing electricity that do not use much water, including wind and solar energy — although they do not necessarily produce the electricity when it is most needed.

"More importantly, while not much water is currently consumed in producing transportation fuels, future transportation production fuels may be obtained from the production of biofuels, hydrogen and coal liquefaction, all of which require more water than is used now in refining petroleum," Cameron says. "And there are no easy solutions."

Mike Hightower, coauthor of the report, says that in their research for the report, they discovered that "water managers and energy managers don't necessarily talk to each other. They don't take a cooperative system-level approach to energy and water management."

"If the energy companies and water companies don't work together to resolve joint issues, we see big problems over the next 25 years," Hightower says. "They are going to have to look at their water and energy needs in unison, rather than following the current U.S. path of managing water and energy separately."

For a copy of the full report go to www.netl.doe.gov/.../coalpower/ewr/pubs/DOE%20energy-water%20nexus%20Report%20to%20Congress%201206.pdf

Power Generation Technologies, Paul Breeze, 2005

5 Combined heat and power

The production of electricity from fossil, biomass or nuclear fuels is an inefficient process. While some modern plants can achieve nearly 60% energy conversion efficiency, most operate closer to 30% and smaller or older units may reach only 20%. The USA, which has a typical mix of fossil-fuel-based combustion plants, achieves an average power plant efficiency of 33%. Other countries would probably struggle to reach even this level of efficiency.

Putting this another way, between 40% and 80% of all the energy burnt in power plants is wasted. The wasted energy emerges as heat which is dumped in one way or another. Sometimes it ends up in cooling water, but most often it is dissipated into the atmosphere. This heat can be considered as a form of pollution.

Some loss of energy is inevitable. Neither thermodynamic nor electrochemical energy conversion processes can operate even theoretically at 100% efficiency and practical conversion efficiencies are always below the theoretical limit. Hence, while technological advances may improve conversion efficiencies, a considerable amount of energy will always be wasted.

This energy cannot be utilised to generate electricity but it can still be employed. Low-grade heat can be used to produce hot water or for space heating[1] while higher-grade heat will generate steam which can be exploited by some industrial processes. In this way the waste heat from power generation can replace heat or steam produced from a high-grade energy source such as gas, oil or even electricity. This represents a significant improvement in overall energy efficiency.

Systems which utilise waste heat in this way are called *combined heat and power* (CHP) systems (the term co-generation is often used too). Such systems can operate with an energy efficiency of up to 90%. This represents a major saving in fuel cost and in environmental degradation. Yet while the benefits are widely recognised, the implementation of CHP remains low.

Part of the problem lies in the widespread preference for large central power stations to generate electricity. Such plants are sited to suit the demands of power network and of the power generation companies which own them. Rarely will there be a local use for the waste-heat energy such a plant produces. Only if generating capacity is broken down into smaller units, each located close to the source of demand, does it become possible to plan to use both electricity and heat.

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Power transmission

Where the wind blows

A grandiose plan to link Europe's electricity grids may recast wind power from its current role as a walk-on extra to being the star of the show

PLUG in your toaster—or your television or your vacuum cleaner—and the electricity that surges through it is an alternating current. The question of whether the world would be powered by direct current (DC), in which electrons flow in one direction around a circuit, or by alternating current (AC), in which they jiggle back and forth, was decided in the 1880s. Thomas Edison backed DC. George Westinghouse backed AC. Westinghouse won.

The reason was that over the short distances spanned by early power grids, AC transmission suffers lower losses than DC. It thus became the industry standard. Some people, however, question that standard because over long distances high-voltage DC lines suffer lower losses than AC. Not only does that make them better in their own right, but employing them would allow electricity grids to be restructured in ways that would make wind power more attractive. That would reduce the need for new conventional (and polluting) power stations.

AC/DC/PC

Wind power has two problems. You don't always get it where you want it and you don't always get it when you want it. According to Jürgen Schmid, the head of ISET, an alternative-energy institute at the University of Kassel, in Germany, continent-wide power distribution systems in a place like Europe would deal with both of these points.

The question of where the wind is blowing would no longer matter because it is almost always blowing somewhere. If it were windy in Spain but not in Ireland, current would flow in one direction. On a blustery day in the Emerald Isle it would flow in the other.

Dealing with when the wind blows is a subtler issue. In this context, an important part of Dr Schmid's continental grid is the branch to Norway. It is not that Norway is a huge consumer. Rather, the country is well supplied with hydroelectric plants. These are one of the few ways (but not the only way, see box on next page) that energy from transient sources like the wind can be stored in grid-filling quantities. The power is used to pump water up into the reservoirs that feed the hydroelectric turbines. That way it is on tap when needed. The capacity of Norway's reservoirs is so large, according to Dr Schmid, that should the wind drop all over Europe—which does happen on rare occasions—the hydro plants could spring into action and fill in the gap for up to four weeks.

Put like this, a Europe-wide grid seems an obvious idea. That it has not yet been built is because AC power lines would lose too much power over such large distances. Hence the renewed interest in DC.

Westinghouse won the battle of the currents in the 1880s because it is easier to transform the voltage of an AC current than of a DC current. High voltage is the best way to transmit power (the higher the voltage, the smaller the loss), but high voltage is not usually what the user wants. Power is therefore transmitted along high-tension AC lines and then "stepped down" to usable voltages in local sub-stations.

Edison was right, however, to argue that DC is the best way to transmit electricity of any given voltage. That is because the shifting current of AC runs to earth more easily than DC does. To avoid this earthing, AC lines have to be built a long way from the ground—and the higher the voltage, the farther away they need to be. At 400 kilovolts, a standard value for long-distance transmission, an alternating current 30 metres (100 feet) from the ground has a fortieth of the loss of a similar cable at ground level. But even at this height an overhead DC line will beat an AC line at distances more than 1,000km (600 miles), while ground-level DC will beat AC at distances as short as 30km.

Dr Schmid calculates that a DC grid of the sort he envisages would allow wind to supply at least 30% of the power needed in Europe. Moreover, it could do so reliably—and that means wind power could be used for what is known in the jargon as base load power supply.

Base-load power is the minimum required to keep things ticking over—the demands of three o'clock in the morning, or thereabouts. At the moment, this is supplied by traditional power stations. These »

Power storage

Trapped wind

Compressed air might help to make wind power more reliable

PUMPING water into the reservoir of a hydroelectric power plant may be a good way of storing energy captured by wind farms (see previous article)—but what if there are no such plants to hand and no high-tension lines to reach them? One answer is to use the energy to compress air, which can be squirrelled away in hermetically sealed underground caverns. Then, when electricity is needed, the air can be released and used to turn a generator.

At the moment, however, there are only two compressed-air energy storage plants in the world (one in America and one in Germany), and neither was built to make use of wind power. Instead they are designed to take advantage of variations in the price of electricity. When power is cheap, it is used to run their compressors. When it is expensive, the valves are opened and the generators turn.

Compressed-air plants are inefficient, and so they are commercially viable only in places where the price of power varies dramatically. But the intermittent nature of wind power can cause just that sort of variability. At any rate, a group of municipal power companies in the American Midwest reckon that building a wind-powered compressed-air plant to take advantage of the blustery Great Plains will be worthwhile. They have just selected a site in Iowa, and hope to be operational by 2011. BP, a British energy major, is also looking into the concept.

Meanwhile, General Compression, a small firm based in Attleboro, Massachusetts, is taking another approach. Its windmill compresses air directly. This has the advantage of eliminating two wasteful steps: the conversion of the mechanical power of a windmill into electricity and its subsequent reconversion into mechanical power in a compressor. But an air-compressing windmill, while fine for storing energy, cannot transmit electricity directly to the grid. The firm will not produce its first prototype until 2010, but sceptics already worry that what it gains by the swings it will lose on the roundabouts—or, in this case, on the turbines.

either burn fossil fuel and thus contribute to global warming, or use uranium, which brings problems such as how to get rid of the waste, as well as political opposition.

Though wind power has its opponents, too, its environmental virtues might be enough to swing things in its favour if it were also reliable. Indeed, a group of Norwegian companies have already started building high-voltage DC lines between Scandinavia, the Netherlands and Germany, though these are intended as much to sell the country's power as to accumulate other people's. And Airtricity—an Irish wind-power company—plans even more of them. It proposes what it calls a Supergrid. This would link offshore wind farms in the Atlantic ocean and the Irish, North and Baltic seas with customers throughout northern Europe.

Airtricity reckons that the first stage of this project, a 2,000 turbine-strong farm in the North Sea, would cost about €2 billion ($2.7 billion). That farm would generate 10 gigawatts. An equivalent amount of coal-fired capacity would cost around $2.3 billion so, adding in the environmental benefits, the project seems worth examining. Such offshore farms certainly work. Airtricity already operates one in the Atlantic, and though it currently has a capacity of only 25 megawatts, increasing that merely means adding more turbines.

Nor is this the limit of some people's vision. The Global Energy Network Institute, based in San Diego, California, reckons high-voltage DC lines could be used to bring solar energy to market from places such as the Sahara. Wind and geothermal power could be gathered from as far afield as South America and Siberia. Such a globalised market has its attractions. Whether the world is ready for the Organisation of Electricity Exporting Countries to take over from OPEC, though, remains to be seen.

Demography and fertility

In vitro veritas

...opulation up, it should promote IVF

INFERTILITY is normally seen as a private matter. If a couple are infertile and wish they were not, that is sad. But there is understandable resistance in many countries to the idea that treatments intended to deal with this sadness—known collectively as assisted reproductive technologies, or ART—should be paid for out of public funds. Such funds are scarce, and infertility is not a life-threatening condition.

However, two papers presented to the "State of the ART" conference held earlier this month in Lyon suggest that in Europe, at least, there may be a public interest in promoting ARTs after all. The low fertility rate in many of that continent's more developed countries means their populations are ageing and shrinking. If governments want to change this, ARTs—most significantly in-vitro fertilisation (IVF)—could offer at least part of a way to do so.

As the conference heard, IVF does seem to be keeping up the numbers in at least one country. Tina Jensen of the University of Southern Denmark has just finished a study of more than 700,000 Danish women. She found that young women in Denmark have a significantly lower natural conception rate than in past decades. That is partly, but not entirely, because they are having their children later in life. The rest of the cause is unknown, though reduced sperm quality in men may be a factor. Whatever the cause, she also found

State of New York
NELSON A. ROCKEFELLER, *Governor*

Department of Environmental Conservation
HENRY L. DIAMOND, *Commissioner*

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Airplanes And Hydrologists— A Beneficial Alliance

In Cooperation With The Department Of Environmental Conservation, The U.S. Geological Survey Has Been Using Airplanes To Collect Valuable Data About New York State's Water Resources

by **Janice M. Whipple, PhD, PE,** *Hydrologist, U.S. Geological Survey, Albany*

HYDROLOGISTS quite often work outdoors and sometimes they have more than their feet in water (Figure 1). Now they can be found several thousand feet in the air. One place this is happening is in New York State. In a cooperative program with the Department of Environmental Conservation, the U.S. Geological Survey has been using airplanes for the collection of water data.

This Federal agency is responsible for appraisal of quantity and quality of our national water resources, for studies of areas of existing or potential water problems, and for basic research in hydrology. The Geological Survey shares with State and local water agencies the responsibility for planning and financing water-resource investigations.

Publication authorized by the Director, U.S. Geological Survey.

Fig. 1 — Field hydrologist

Most water records to date have been collected on the ground. One of the oldest routine Survey programs has been stream gaging, where streamflows are measured at specified locations on various rivers. By building up a catalog of information, one can relate stage (water level) to discharge (flow, such as cubic feet per second), so that water quantity can be rapidly assessed. These data are needed, for example, for high-water prediction during spring runoff or for evaluation of low-flow conditions during summer drought. This information in turn is used for regulating streamflow to prevent floods or to maintain minimum discharge for various purposes. Many years of work have been involved in building this rapid-response capability.

Another program has been the mapping of areas subject to flooding. The area varies with the severity of the flood, which statistically may be called "50-year," "100-year," or even "annual." *Flooding is really a natural process and the flood plain should be considered as the river's land.* The airborne-data collection capability becomes very useful in mapping flooded areas, even after high water has subsided. The vertical aerial photograph of the Black River near Lowville shows a particular flood in April 1971 (Figure 2). The picture delineates the area of the flood plain under water and illustrates the mechanics of river flow. Note the flow lines of muddy water (from sediment picked up at the edge of the flood plain) converging where the

Fig. 2 — Black River in flood

water velocity increases at a channel constriction. If this stream were not regulated, the flooded area would probably have been more extensive.

A special project of the Geological Survey has been the study of Oneida Lake in central New York. This lake is undergoing "eutrophication" (a normal geologic process of filling-in with organisms and sediments, which can be hurried by man's activities). The aerial photograph (Figure 3) indicates the shoal areas of the eastern shore, but especially significant are the white streaks on the water surface. These streaks, which are almost parallel to the wind direction as indicated by the smoke, are called "wind streaks." They are formed by accumulations of foam or small material where water converges because of vertical circulation caused by the wind. These streaks must have been forming here for a long time, because the Indian name for the lake, Seughka, means "Striped with blue and white lines . . ." This wind-driven circulation is important in shallow Oneida Lake because it drags up nutrients that would otherwise lie quietly on the bottom and makes them available for feeding organisms such as algae.

A recent Survey program includes aerial thermal infrared (beyond-the-red)* mapping, whereby a catalog of water-temperature information is being compiled to augment data collected at intermittent point-sampling stations. This catalog is at the point where stream gaging was many years ago.

Instead of using color as an indicator of water flow or quality as in photography, we can use temperature. Because "state-of-the-art" technology permits measurement from the air, the hydrologist gains much new information. Airborne electronic equipment senses the heat radiated from the water surface and can be used day or night. Nighttime is often favored because the radiant temperature is more closely related to thermometer-read temperature in the water (the sun heats the water surface during the day). The usually calmer atmosphere at night also permits better data collection.

The infrared imaging process can be likened to making a photograph of the picture on a television screen. The problems of heat-signal detection can be compared to those of putting the right TV antenna in the right location. The electronics system includes an amplifier for magnifying the signal, a television (cathode ray) tube for converting the signal to light, and various knobs including those analogous to TV contrast and brightness to control the gray shades of the picture. Finally, the camera that photographs the light signal must be set and the film and prints must be developed. The final product is the photographic "image" in which gray shades

*Heat waves have a longer wave length than visible red.

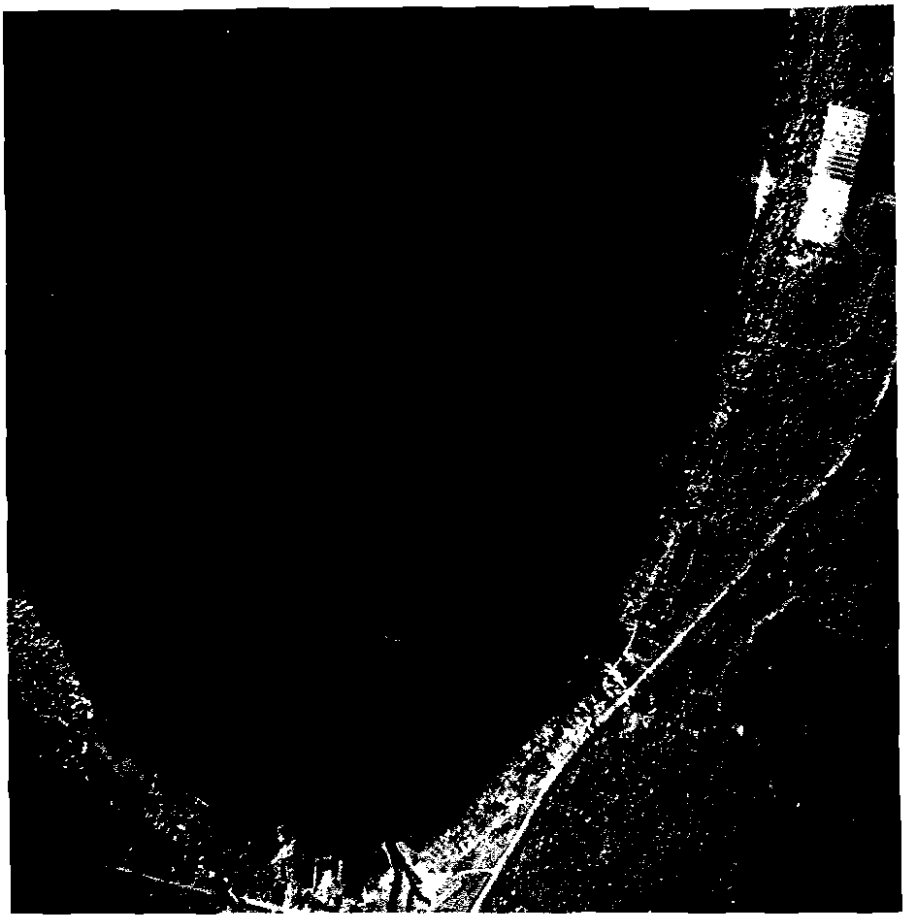


Fig. 3 — Oneida Lake

represent heat values: In a "positive" print, warm areas are printed as light tones and cold areas as dark tones.

Air Force Cooperates

Infrared imagery pictures of many New York State areas were made available to the Survey by the Reconnaissance Branch of the Rome Air Development Center at Griffiss Air Force Base in Rome, New York. These areas include Cayuga and Seneca Lakes, Lake Ontario shoreline, St. Lawrence River, and Onondaga and Oneida Lakes. In addition, infrared equipment was loaned by the Infrared Components and Techniques Section of Air Force Avionics Laboratory.

Water-circulation patterns can be described on infrared imagery. For example, the image of the northern part of Onondaga Lake, near Syracuse (Figure 4), shows that cooler (darker) surface water is apparently entering the lake through its normal outlet. On the evening of July 8, 1970, when this image was acquired, there was a 7-knot wind blowing toward the outlet. The pictured feature may be a reverse inflow into the lake resulting from complex water-level regulations in other parts of the Oswego River basin. The outlet has been difficult to "gage" (measure flow) because of the small elevation gradient and the difficulty of separating wind and flow effects at low water velocities.

The infrared image of the eastern part of Oneida Lake near Sylvan Beach (Figure 5) was collected on the night of October 7, 1970. Fish Creek (at left) is cooler (darker tones) than the lake (lighter tones). That condition is normal at this time of year after the lake has absorbed heat from the summer sun. The flamelike pattern in the near-shore area probably represents shallow water, warmed during the day, that is mixing with the bottom sediments. The mixing, and resulting water-current pattern, is an example of another natural geologic process that is sometimes called "beach erosion."

Infrared pictures such as these whet the scientific appetite for the actual radiant temperatures that the photographic gray shades represent. After all, the surface of a water body is very important because of the energy exchanges that take place there. (Consider how lakes may modify local climates by delaying fall frosts or by causing early winter snow-squalls.) Heat is absorbed daily from the sun and is lost (radiated) from the water at night; evaporation also takes place here. However, the activity at the air-water surface has been hard to measure by traditional means. As thermal infrared data become cataloged and interpreted, our understanding of the energy exchange will increase.

Fig. 4 — Onondaga Lake (infrared image)

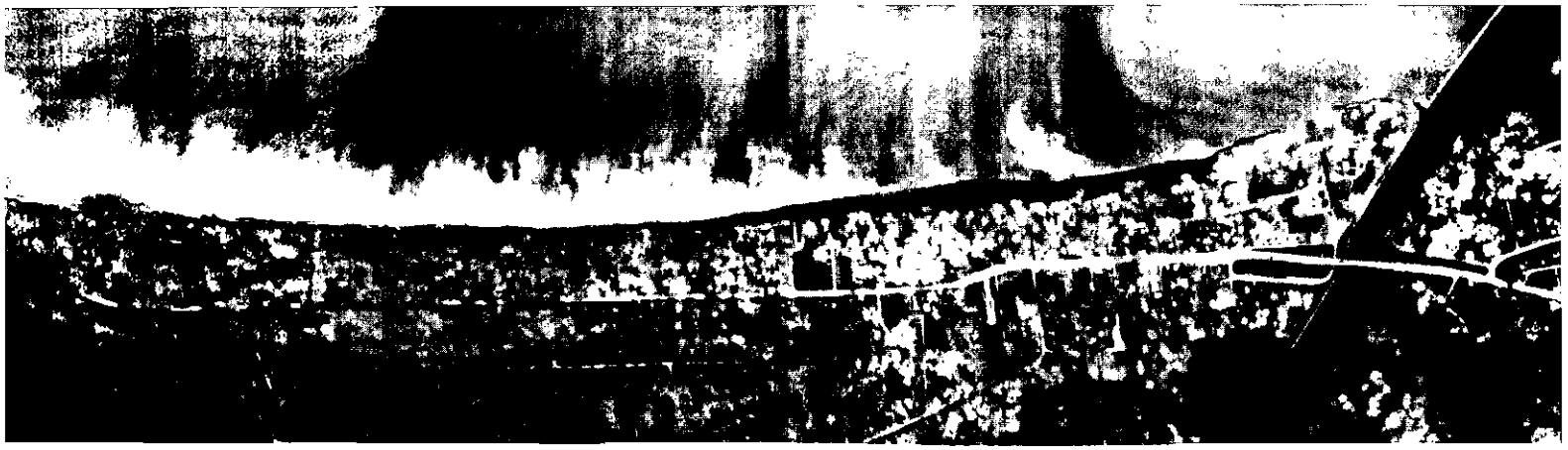


Fig. 5 — Oneida Lake (infrared image)

Now, in changing a picturing system to a measuring system, a considerable amount of extra equipment and operating time is needed. Extra care must be taken to ensure "high-fidelity" — the faithfulness of the picture you see to what is actually there. Besides changing the electronic circuitry from a.c. to d.c., so that there is a constant relationship of voltage to heat signal received, and calibrating the controls for brightness and contrast, temperature reference sources must be included in the airborne system.

The electronic signal may be recorded on magnetic video tape for later printing on film, as well as displayed on a TV-like screen during the flight (Figure 6). The "real-time" display is important to the hydrologist so that he or she may inspect the data as it is collected and adjust flight plans as required.

Infrared imagery of the St. Lawrence River on the night of December 10, 1970, was interesting because ice was just be-

Figs. 6 and 8 (inset) — Data collection equipment and aircraft

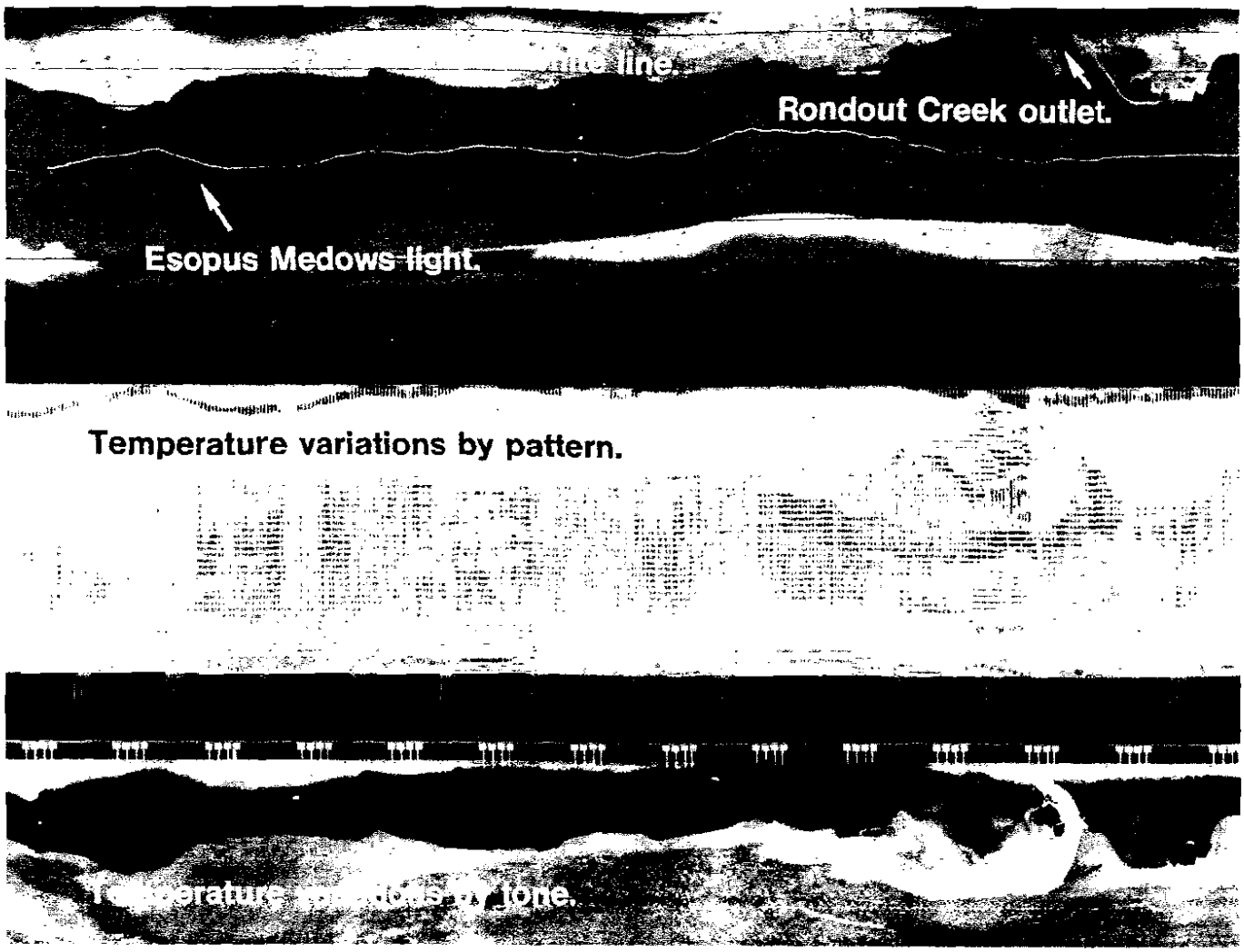


Fig. 7 — Hudson River Estuary (infrared image)

ginning to form. Data collected in the area of the Eisenhower Lock not only delineated areas of ice cover but also showed about a 2° Celsius (about 3½° Fahrenheit) difference in surface temperatures between the open water outside the lock and the ice-water mixture in the Wiley-Dondero Ship Canal. Information of this kind pertains to the length of the shipping season for the St. Lawrence Seaway.

Infrared imagery of the Hudson River Estuary near Kingston in the early-morning hours of April 24, 1971 (Figure 7), shows detail that has not yet been fully interpreted. The discharge of Rondout Creek is some 2° Celsius warmer than the main river body, as shown by the imagery coding symbols. The surface temperature profile is "noisy" over parts of the river and "smooth" at others. This difference is shown in the image as spotty versus smooth gray tones. The "smooth" area shoreward from the Esopus Meadows light is very shallow water with little apparent current. Flow lines that are indicated by natural temperature (rather than by color as in the flood photograph) again reflect the influence of channel shape on water velocity. Note that the land is much cooler (darker in the bottom picture) than the water. With the measuring system, it is impossible to get fine thermal detail and great temperature range at the same time, so the land information was sacrificed.

Department Program Expanded

Through coordinators S. P. Mathur and R. E. Maylath of the Department of Environmental Conservation, the Division of Pure Waters water-quality surveillance program was expanded to include the Geological Survey aerial infrared thermal data. Surface waters in New York State include about 70,000 miles of stream, 3,500,000 acres of inland lakes, and many square miles of ocean. Because it is virtually impossible to collect complete data over such extensive areas by ground-based personnel alone, the airborne data are most useful and economical. The information ties in with the automatic-monitoring network to add space-continuity to the time-continuity of the point samples. By distinguishing the relationship of the sampling point to the main water body, it also tells where sampling crews can be directed to collect meaningful water-quality samples.

The aerial view in the future may use more sophisticated equipment and be tied in with the view from farther out in space. The program office of the Geological Survey Earth Resources Observation System, in cooperation with the National Aeronautics and Space Administration, is looking toward the day in the near future when an orbiting satellite will be able to collect similar information from about 500 miles from earth. Until that time, and during periods of cloud cover, the airplane — even the venerable DC-3 (Figure 8) — will continue to serve capably as a mobile hydrologic laboratory.

AERIAL HEAT SENSING AIDS WATER QUALITY STUDIES

Observations using airborne thermal-infrared sensing equipment along Lake Ontario shoreline are again proving to be valuable in demonstrating capability of tracing water temperatures and in circulation patterns, according to Dr. Janice M. Whipple, a U.S. Geological Survey hydrologist in Albany. Dr. Whipple reported on airborne work carried on by the U.S.G.S. in cooperation with New York State Department of Environmental Conservation, Division of Pure Waters, between November 1970 and June 1971, at a recent joint annual meeting of the American Congress on Surveying and Mapping and the American Society of Photogrammetry in Washington, D.C.

Dr. Whipple pointed out that the Lake Ontario shoreline characteristics allowed aerial thermal-infrared sensing equipment to assist in calibrating and defining the surface area of temperature differences in the Lake caused by natural and artificial discharges. She reported that the boundaries and high-temperature characteristics of the Genesee River were clearly shown for 2,000 feet into the lake. Even the water plume of a much smaller stream from a generating plant farther west was readily visible and measureable on these special aerial images. Dr. Whipple emphasized that aerial measurement provides simultaneous and calibrated area-wide perspective in a pictorial or graphical format which is important in communicating with those of other scientific disciplines and that the images provided by this method are next to impossible to achieve by conventional temperature measurements made at lake surfaces. Dr. Whipple indicated the need for aerial data collection with continuing surveillance programming in order to provide necessary reference data for the thermal pollution arguments already taking place.

The airborne program included flights over four areas: South shore of Lake Ontario; Cayuga Lake; St. Lawrence River; and Hudson River estuary. Flying heights used in the survey ranged from 1,000 to 3,000 feet above ground with best flying time at night when interference from solar radiation and other factors is at a minimum.

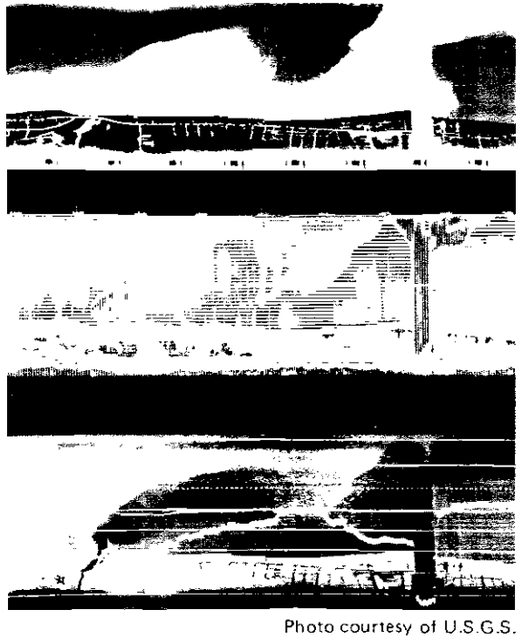
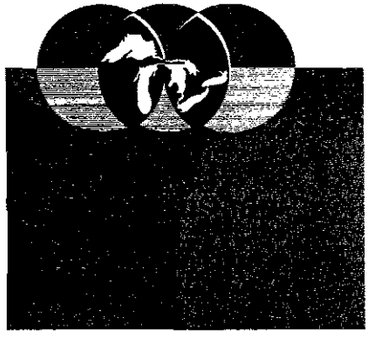
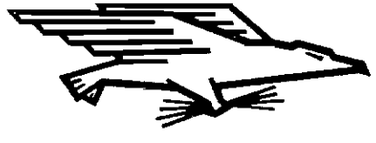


Photo courtesy of U.S.G.S.

Lake Ontario Shoreline. Aerial images from thermal infrared sensing equipment.





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Great Lakes Basin Commission

GREAT LAKES BASIN COMMISSION
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VOL. 2, NO. 11 MAY 1972

NEW COMMISSIONER AND ALTERNATE APPOINTED TO GREAT LAKES BASIN COMMISSION

William C. Salmon, Deputy Director of the Office of Environmental Affairs, has been appointed Commissioner of the Great Lakes Basin Commission from the Department of State. Mr. Salmon graduated from the Massachusetts Institute of Technology, Cambridge, Massachusetts, with Bachelor and Master of Science degrees in Mechanical Engineering. As a Sloan Fellow at MIT, he received in 1969 the degree of Master of Science in Management Science, and after receiving that degree he participated in the U.S. program for the International Decade of Ocean Exploration.

Mr. Salmon was Senior Engineer for the Dynatech Corporation of Cambridge, Massachusetts, before joining the Department of State in 1961. His work in the Department has included U.S. support of research overseas, international cooperation in water resource management, and desalting technology and development of the U.S. Water for Peace Program. Mr. Salmon holds membership in both the National Society of Professional Engineers and the American Society of Mechanical Engineers.

Appointed as Alternate Commissioner from the Department of the Interior is William J. Drescher, North Central Regional Planning Officer of the Water Resources Division, U.S. Geological Survey, Madison, Wisconsin.

Mr. Drescher received his Bachelor degree in Civil Engineering from the University of Colorado, and received his Master of Science degree in Geology from the University of Wisconsin. He has been associated with the Ground Water Branch of the U.S.G.S. in various positions including Project Chief, District Engineer in Wisconsin, and Area Chief for the Mid-Continent Area. Mr. Drescher holds membership in a long list of professional societies as well as being listed in *American Men of Science* and in *Who's Who in Engineering.* Mr. Drescher has authored and co-authored more than a

Official photograph, The White House

NIXON AND TRUDEAU SIGN WATER QUALITY AGREEMENT

The Great Lakes Basin Commission, represented by Chairman Frederick O. Rouse, was officially invited to be present with President Nixon and Prime Minister Trudeau in Ottawa on Saturday, April 15 at their signing of the Executive Agreement for water quality in the Great Lakes.

The Great Lakes Basin Commission has participated actively on the U.S. Negotiating Team and, working with a similar Canadian team, assisted in bringing the Agreement to signature. The Agree-

cially to better define the term "thermal pollution." Quantitative imagery also reduces the fieldwork necessary for limnological ground truth. Analysis of such imagery has pointed out the need for calibrating individual in-place temperature sensors and locating them at sites suitable for collecting the water information required.

Ultimately thermal-infrared radiometry will be used to define energy exchanges at the air-water interface. Activity at this surface is difficult to measure by traditional methods and is an important part of the energy cycle for all water bodies.

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Photogrammetric Engineering

Volume XXXIX February 1973 *Number 2*

COVER PHOTO—This month's cover photo resembles buttons that many people have been wearing on their lapels recently. How many readers know where you can see this happy face? The April cover will show an expanded view which includes the surrounding area, a description of the scene, and credit to the photographer.

(Continued on page 109)

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imagery that is calibrated can complete areal surface distribution of the existing point samples.

Perhaps the most important attribute of calibrated imagery is that it conveys information efficiently. Because a pictorial or graphical format can present data with little reliance on text, it is important in communicating to those who do not have detailed scientific training in hydrology. Water facts, in the long run, have little value if they are not in the hands of planners, managers, legislators, and users who need them.

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Meetings Schedule

Annual Conventions

March 11–16, 1973,* Washington Hilton, Washington, D. C.

March 1974,* Chase-Park Plaza, St. Louis, Mo.

March 7–12, 1975,* Washington Hilton, Washington, D. C.

Fall Technical Meetings

Oct. 1–5, 1973,* Disneyworld, Orlando, Florida; Jon S. Beazley, Florida Dept. of Transportation, H. Burns Bldg., Tallahassee, Florida 32304.

Sept. 8–13, 1974,† Washington Hilton, Washington, D. C.

1975,* (open), Phoenix, Arizona.

Sept. 28–Oct. 1, 1976,* Olympic Hotel, Seattle, Wash.: C. E. Buckner, 803 Seattle Municipal Bldg., Seattle, Wash. 98104.

Oct. 18–21, 1977, Little Rock, Arkansas.

Seminars and Symposiums

July 1973, Univ. of Maine, Orono, Maine. Fourth Biennial Workshop—Color Aerial Photography in the Plant Sciences.

October 1973, Sioux Falls, S. Dak. Management & Utilization of Remote Sensing Data. Convention Center and USGS EROS Data Center. Cosponsored by AIAA, IEEE and AGI. Dr. Harold T. Rib, 10129 Glenmere Road, Fairfax, Va. 22030.

International Meetings

July 1973, Mexico City, Mexico. Joint Technical Meeting with the Mexican Society of Photogrammetry.

Sept. 9–16, 1974, Washington Hilton, Washington, D. C., *14th Congress of the International Federation of Surveyors* (FIG); Jeter P. Battley, Jr., P.O. Box 14262, Washington, D. C. 20044.

* Jointly with the American Congress of Surveying and Mapping.

† To be held as part of the International Congress of FIG.

Janice Shipple, retired hydrologist, BCE, PhD
Comments of Jordanville Wind Project DEIS

Hearing #1
Thursday 29 June 2006

p1 of 3

I have reviewed the contents of the DEIS and find it generally satisfactory, and I would like to make further comments on geohydrology aspects and also on endangered species at another time. At this hearing, I wish to address the subject of existing visual character of the study site and the visual impact (of the turbine-towers) on the study site plus the 5-mile zone of interest. The DEIS follows the guidelines of THE DEC POLICY SYSTEM, DEP-00-2, Assessing and Mitigating Visual Impacts, issue date 7/31/00. The study site encompasses almost 10 square miles whereas the visual study zone is said to be 174 sq miles.

With respect to existing land use, the character of the study area is described as bucolic, relating to "dairy farming as the primary agricultural activity". This in one sense IS true, but the mechanization of agriculture has added the "noise " of tractors, combines, silo loaders, manure spreaders, etc. These are not continual noises however, and manure aromas do fade away. The limestone quarry has some noise, both from quarrying and from trucks hauling the crushed stone away.

It is said that "the villages and hamlets within this zone have a classic small town feel and convey a sense of permanence and history". There is also some appearance of decay of local business and community activity evidenced by disused buildings.

.....

With respect to visual impacts and the methodology used to assess them, the task is under control and suitably and honestly defined, including photo renderings and simulations, cross sections of lines-of-sight and other computer-aided tools. I wish to address the use of photographs compared to viewing a scene in Real Life.

1) Looking at a small-scale photo requires only a fraction of our natural "cone of vision, and because it is at hand it is easy to give that one particular view a sense of permanence. Real Life views occupy the entire cone of vision, said to be about 90° and most useful at 60°. In Real Life, weather and time visibility changing, the viewer is moving and the sunlight is changing. Superna Energy LLC has tabulated average monthly cloudiness for Albany NY, with annual totals of 69 clear days, 111 partly cloudy (80%) and 185 cloudy (50%). Real Life brings peripheral vision into play and a wrap of diffused light bring a sense of connectedness to the scene.

2) The viewer's intent also determines what is seen in either a photo or in Real Life. The writer has drawn many mountain panoramas with the intent of naming the mountain peaks and finding (other) forest-fire observation towers. Sometimes binoculars are required for the latter. Other viewers may be searching to find a blip on the horizon that defines a wind turbine tower.

3) In photo renderings/simulations, the turbine-towers are so small that the entirety is usually described as visible, with the tip of one of the 3 blades at the vertical defined as the critical dimension (400ft) for a line of sight to the entire structure. In Real Life, it can be seen that the hub of the blades at the nacelle (262 ft) is the visual center of gravity. The tower stops abruptly here, the nacelle boxes it off. The slender, variable-pitch blades emanate from this point. If the blades are stationary with one tip at 400 ft, the 2 Other blades draw the eye downward. It is also the visual center of gravity because the rotary motion of the blade begins here. If the blades are moving, it will be difficult to focus on that 400 foot tip dimension. Therefore, I suggest that the dimesnsion of 262 feet become the criterion for visibility studies.

4) For the photos, the report stated openly and honestly that ("the effects of distance (hazing, bluing, loss of detail) were not added to any of the simulations or photo renderings..." At photo scale, that would be a tough job to do! In Real Life there is plenty of this atmospheric effect, something artist call aerial perspective. This includes change in <u>value</u> (light to dark, TV contrast) and <u>color</u> (hue, such as blue, yellow, red)(TV color). With distance values get lighter and colors get bluer. With distance, especially at the horizon, this effect occurs in Real Life because there is more atmosphere that is penetrated, and that atmosphere contains water molecules and/or other particulates. The sharp edges of any forms become less well-defined. Diffused atmospheric light "wraps around" objects, especially slender ones like the wind-turbine blades. Direct sunlight creates the shadows.

5) Artists' Linear perspective was treated in the simulations, that is (quote) "the project elements are shown in proportion, perspective, and proper relation to the landscape". The photo-simulator uses computer programs to calculate this and the artist uses eye-level, horizon, and vanishing points. In Real Life, the (land) surveyor(used to) use a transit fitted out with a vertical arc and stadia hairs in the telescope. In most cases the hairs were calibrated at a vertical distance to give a vertical intercept of one foot on a rod held 100 feet away.

6. Using the artist's technique of a "picture plane" or "plane of projection" with the surveyor's use of measuring distanes from subtended vertical arcs, it may be possible to get an estimate of the perceived height of a wind turbine-tower at various distances. In Real Life, we can use a yardstick(36 in) held out at arm's length (about 36 inches) for our measuring stick on our imaginary picture plane. (The artist, on small paper, might be using pencil lengths). Let's use the oft-quoted but ephemeral "dimension" of 400 feet for the turbine "height"---because it's an easy number to work with.

Begin: Stand 400 feet from the tower. Assume eye level is so close to the bottom of the the tower it's irrelevant. Roll your eyeballs up and take a line-of-sight on the blade tip at 400 ft. The angle subtended is 45°, and the tangent (opposite leg over (divided by) adjacent leg) is 1. Use all of the yardstick to record this impression on your picture plane. Next see how tall a tower at 800 feet away will appear on your picture plane: tangent is 400/800 = 0.5 and the angle is 27°. Use 18 inches to represent the tower. Next, at 1200 feet away, almost one-quarter of a mile, the tower will appear to be 12 inches tall. And so on ...

At 2800 ft (a bit over ½ mile) the tangent = 1/7 =0.14286; x 36" = 5.1 in apparent hgt.
5200 ft (almost one mile)..... = 1/13=0.077 ; = 2.8 in.
12,000 ft (about 2¼ miles)..... = 0.0333 = 1.2 in.
26,400 ft (exactly 5 miles)..... = 0.0152 .....= 0.54 in.
42,240 ft (exactly 8 miles)..... 0.00946 .....= 0.34 in.

Using the hub height at 262 feet instead of 400 feet, the resulting apparent heights would 262/400 = 0.655 of those dimensions above: from23.6 in @ 400 ft. through 11.8,7.9,5.9,4.7,3.9, to 3.37"@ 2800 feet, and so on to 0.35in @ 5 miles. These marks upon our 36-inch high picture plane go from full-frame to minimal with distance, with the greatest change within the first 1200 feet of distance .

The 8-mile zone was brought in because of "historic or sensitive resources " existing in that neighborhood. If these calculations are correct, how sensitive can it get? Just what is the visual impact and how is it defined and measured? If historic-building preservation is to work, the atmosphere should be rid of acid rains--exactly what wind generated electricity can help with..

end

James Whipple

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sine 1 min = tangent 1 min = 0.00029
sine 1° =tan 1° = 0.01745 = 0.01 3/4) p173
(fig 1211,p 257 interval between stadia wires ....gives a vertical intercept of 1 ft on a rod held 100 ft away; stadia interval factor = 100. Add stadia constant.

Janice Whipple .....p1 of 2 Remarks at public hearing, 12 July 2006

...I want to place the DEIS in the context of ~~envio~~external environmental impacts now affecting this location: abnormal, "weird" weather events, and 2) increasing news about terrorist activity which may accelerate urban sprawl.

...Global warming aka Climate change has been addressed by scientists for at least 50 years. We read about natural disasters throughout the world. We noticed when Katrina struck, perhaps with some alarm. Then, that last week in June 2006, weird-weather came upon us! We Needed Help! Is weird-weather an aberration or will it become the norm? Climate change is accelerating. Historical storem statistics from the past century probably won't work anymore.

...Is there anything else that might affect our weather? The water molecule H_2O is known to be sensitive to electric fields--remember that General Science experiment with theglass rod charged by a silk cloth; bending a thin stream of water? Water does have a natural tendencyto break down spontaneously into hydrogen H+ andhydroxyl OH- ions. Would the growing amount of electromagnetic activity--such as microwave routes, radio&TV broadcast, radar searches--affect our weather? *If it does, it might become the norm.*

...Regarding terrorist attacks, we hear more reports of attacks having been thwarted. Is our security ever enough? Do we want more nuclear power plants, easy 1-time targets for attack s that can result in stray radioactivity as well as big losses of electric power?

...The October 28,2005 issue of the New York Times carried the news that a 1,600 megawatt reactor, "far larger than any plant operating in the United States", and an untried design (though an example is under construction in Finland) had been proposed for a site in the Scriba (Lake Ontario) area. The Oswego County Legislature had already voted 20 to 5 to support construction. End of article.. It is not known if this construction is to be related to the new proposed high-voltage long-distance transmission line from Marcy to Orange County. Of course, we can get blackouts <u>without</u> terrorists activity from trying to satisfy the ~~s~~ open-ended, uncontrolled demands for air conditioning, particularly from metropolitan areas.

...Compound these problems with high-priced oil/gas/gasoline and with climate change. Food supplies are at risk and prices will rise. We need to look ahead, not back.

~~xxxThe DEIS thoroughly addressed the impacts wind turbine facilities xxxxxxxxxx~~

...The area studied by the DEIS(project area) is geologically good farmland. This Helderberg/Onondaga Escarpment, (marking the north edge of the Allegheny/Appalachian plateau) consists of layers of sedimentary rocks, gently dipping (sloping downward) to the southwest; the 2 named limestones form the cap rock(s). Good farming needs high calcium -which is available from the limestone. Ground water is also available, in some layers in abundant amounts, but it is difficult to predict exact ground water occurrence. Karst topography w/ open joints and filled or empty caverns in the limestone create that problem. This would not be a good area for subdivision, both on that account and on the need for wise use of water.

...This somewhat narrow strip of flat limestones in Herkimer and northern Otsego counties should be set aside for farming and food production. The areas to the north and south are geologically less suited to farming, because water of suitable quantity and qality is difficult to ensure, the nutrients in the soil are less, and the topography is more irregular with steep slopes.

...Farming is hard but heartfelt work. Selling out to developers could look very attractive and sometimes the only option. Farmers don't make big city incomes. Multi-national agrobusiness monopolies have the upper-hand. The dairy farmers plight is amplified by restricted market choices and low prices paid for milk.

...It is essential that this productive land be reserved for farming, and it calls for experienced farmers who know the lay of the land and who can manage their water requirements for sustainable yields. The presence of the Amish Community is a benefit to us, as they care for the good soils and water responsibly.

...It is essential that these farmers can improve their present incomes by participating in the two Town project under examination here--a wind turbine facility. It must be done NOW. Once our efficient-to-farm,large lots are subdivided into smaller, irregular plots for houses, there's no return. Not only does residential development require more tax-based services and also more pumping on the aquifers,.....the food supply for the future is GONE

...This is historically a farming area, lets keep it historical as a living process, not as preserved remnants of history.

end

Janice Whipple pl of 1 Hearing #3, Thu July 27, 2006

...At the first hearing, I presented information about aerial (atmospheric) and linear perspective from an artist/engineer's viewpoint. No one to date has come forth to correct my diagrams. However, recently I had occasion to refer to my own research done in 1990- trying to "calibrate" my topographical drawings of scenes in the Himalayan mountains. I wanted my readers to have a truer picture of the area. ...Prior to my first visit to the area in 1977, I'd studied many books. Imagine great white peaks rising up in the green-terraced backyard of a red/white house, thatched roof, and a banana tree beside it! After my trek began, however, I realized that my senses had been tricked! If I were to see that book-picture, I'd be looking through binoculars! The photo had been made with a high-power telephoto lens.

...I checked this distortion out against my chart, and found that it agreed with the part of the chart where the change in scale and the scale itself were both small. This resulted in the compression of the space between the objects.

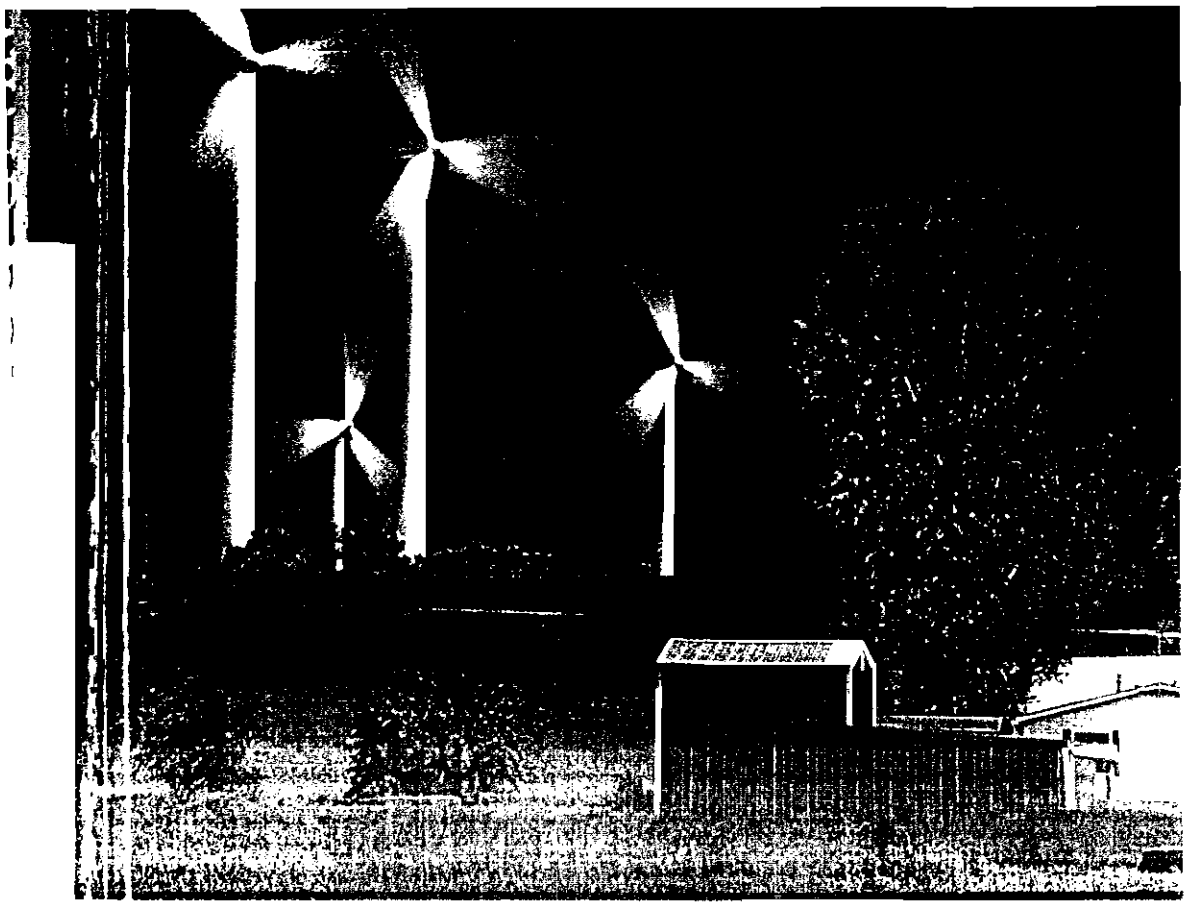
...We may see some of these photos distortions in windmill pictures. However, Community Energy's DEIS report gives a calibration to their photo simulations. First they indicate a basic optical focal lenth of 50mm, the old standard lens for 35mm cameras, with field of view similar to the normal eye. Second, they gave the distance to the nearest windmill. Look for calibrations in any photographic work passing as "true". Beware of the pasted-cardboard image look in depth perception! It spoils our telephoto

...The DEIS line-of-sight profiles were properly included, however the vertical scale exaggeration was excessive for easy visualization. Accuracy and/or precision could be indicated by other means. This is a minor point.

.....

...One would think that the DEIS is a working/living document so that permitting agencies can insure that our air, water, geologic and other resources are protected for the benefit of this and future generations. However, by removing the project from background environmental, economic and other situations, both in time and space, it promotes minute dissection of the topic as trying to fit as writing in stone. Another problem is that wind power is separated from the big problems of electric power generation and consumption today. We've now had our very own "natural disaster", we have increasing warfare throughout the world, and global heating is here. The construction of "wind farms" today is a straightforward engineering project; today's technology is working...in NYState, in the USA, and throughout the world. ~~Don't we depend our professional engineers to manage this work? From.....~~ ~~The wind facility can even be disassembled if need be, with few if any remains, unlike coal, gas or nuclear plants. Try it. Keep our waters pure and cool..~~

Thank You



POWER

ENERGY LANDSCAPES IN A CROWDED WORLD

martin j. pasqualetti, paul gipe, robert w. righter

10

A View from Lake Como

Gordon G. Brittan, Jr.

During the discussions about wind energy landscapes at Lake Como that developed into this collection, we focused on certain themes and reached tentative conclusions—this, in spite of the diversity of the participants with regard to nationality, profession, contexts, and histories. It was a spirited 10-day gathering consisting of a rich exchange of positions and views, perspectives and ideas about the future acceptance of wind power. In this Afterword, I wish to emphasize some of the issues discussed and, in a tentative way, some of the conclusions which we drew. My goal here is to indicate them as an aid to formulating clearer policy guidelines applicable to future wind energy development. Indeed, the establishment of clear guidelines is essential to the whole planning process; without guidelines tailored to specific sites in question, any proposed project is encumbered substantially from the outset.

The group shared many beliefs about wind power. For example, there was no serious disagreement that greater use of wind energy will reduce some of the problems associated with nuclear and fossil fuels. The entire group is convinced that wind energy has a place in the spectrum of energy choices, and an important one. There was also no doubt that wind power technology is now reliable and cost-effective. And we all believed that the future task is how to legitimately counter the resistance to wind energy that has been recorded in many countries. There was not, however, unanimity as to how this was to be done.

There were essentially three areas of disagreement. The first has to do with *perspectives*. Some participants believed that the main problem the industry faces is one of mitigating the visual impacts of wind energy on the landscape, largely by way of more sensitive siting of the turbines and more involvement of the public in this process. Others, however, believed that only fundamentally reorientating the way we think about wind energy,

and about the turbines designed to capture it, will disarm the rather widespread opposition to them.

The second main difference among the group was in *aesthetic presuppositions*. Some took it as obvious that aesthetic judgments are in some deep sense subjective, that beauty is truly "in the eye of the beholder." Others held that in the same deep sense aesthetic judgments are objective, and that there are standards which can be the basis for decisions.

The third theme that differentiated us was the relative significance of the various *problems* to be faced in seeking to win greater public acceptance of wind energy. Four main themes were mentioned: (1) the character of the technology, (2) its deployment in the landscape, (3) the system of its ownership and control, and (4) the attitudes of people to its increasing presence.

There were variations on each of these themes. Geographer Martin Pasqualetti is a *cultural* subjectivist who believes that there is socially conditioned agreement within but not between cultures regarding what is beautiful. Engineer Martin Hoppe-Kilpper is an *individual* subjectivist who maintains that "it all comes down to a matter of taste." There were also degrees to which each person pushed his or her position. Artist Laurie Short is a *radical* individual subjectivist, convinced that it is, in fact, pernicious to seek, still more to enforce, a consensus on aesthetic questions. Landscape architect Christoph Schwahn is a *moderate* individual subjectivist, who recognizes differences in taste, but suggests they are nonetheless well worth discussing.

This said, we can locate the participants in what is admittedly an overly tidy taxonomy. Most of the discussion centered on defining the problem. What exactly is the resistance to wind power, and how is it best to be resolved? There were several different emphases. Historian Robert Righter and I, a philosopher, wanted to open up the technology option, questioning whether the Danish three-bladed turbine was the culmination of technological and aesthetic advance. Righter called for a "greater sensitivity toward the possibilities" of nonconventional wind turbines, illustrating the richness of past efforts in this direction. I urged consideration of my own small-scale soft-sail design. Paul Gipe and Frode Birk Nielsen thought that such a discussion was rather pointless, convinced that the future held no radical departure in design.

Landscape architects Nielsen and Schwahn opened up the placement issue, using such techniques as computer visualization to show how varying numbers of turbines and different kinds of arrays and placements can be assessed with respect to particular sites. Paul Gipe also initiated discussion of the deployment option, focusing more on the visual

appearance of the turbines themselves (their height, their color) than on their siting.

Hoppe-Kilpper and Nielsen addressed what was labeled the *system* option, among other things advocating an equity interest in the turbines by those who own the land on which they sit. For the most part these are farmers who would then count wind energy as an additional cash crop. Such local ownership and control contrast with the widespread present arrangement in which a farmer's land is merely leased by a distant corporation. There was a strong consensus that a significant equity interest by locals can markedly influence acceptance.

Our discussion often returned to the *people* problem. Short advocated "technological fatalism," that is, the idea that we have to accept that "we cannot change the dimensions of ugliness and beauty to the point where it will affect decision-making in the placement of wind farms." Implicitly he suggested that we cannot affect the technology. If we cannot change the technology and we have few choices on deployment and ownership options, then, to quote Short, "we can only change people's aesthetic perceptions."

The *people* problem has several variations. Some thought it was a *process* problem. The point is to involve as many of those directly affected by wind turbines in the process of drawing up the rules for their placement and use. Those who emphasized process included geographer Karin Hammerlund, who urged the use of sophisticated polling techniques to sample public attitudes, and Short, whose two favorite words were "consultation" and "cooperation."

Others thought it was a matter of educating the public about the desirability of wind energy. Thus Pasqualetti's view on the vast San Gorgonio wind development is that the most important element, indeed the real power of our landscape perception, is its function in educating the public about the trade-offs, relative costs, and benefits of wind energy and competing methods of generating electricity. Hammerlund added that people will more readily accept wind energy if they know that it is merely transitional in character and will phase out as other energy alternatives possibly come online. Wind turbines, after all, are easily removed from the landscape. Still others held that wind power has a *perceptual* problem. The public must learn to consider wind turbines as ingredients in aesthetically pleasing landscapes. This will be an evolutionary process, one that will happen only as the public becomes more knowledgeable about and accustomed to their presence. Elements of this position can be found in the papers of Righter, Hammerlund, Pasqualetti, and Short.

Finally, Christoph Schwahn emphasized that the main problem has to do with efficient energy use. Strictly speaking, this is an issue with all forms of energy and not just with wind. For Schwahn, when people see the downside of *all* forms of energy production, including the visual impact of wind, they will want to conserve all the more. He wants people to see the visual *price* they must pay for profligate consumption, a view Pasqualetti stressed. In Schwahn's view, we are better off in the long run not making wind turbines and their deployment too beautiful or too remote, for in that case the necessary, inevitable steps toward greater energy efficiency will only be delayed.

It is fair to say that the technology question was not widely debated. The majority of workshop participants assumed that the Danish-style three-bladed turbine would continue to be the industry standard. Although there was some discussion of scale and its bearing on the aesthetic quality of landscapes, it was generally accepted that the trend toward larger and taller machines would continue as well. Where our deliberations centered on the turbines themselves, we all emphatically agreed that the turbines must *turn*; nothing is more destructive to public confidence than a field of broken or nonoperating machines. We also discussed color and the way in which the nacelle[1] was packaged. Put another way, most of the discussion centered on new ways of deploying and owning and controlling the turbines and on the processes by which the public's attitudes and perceptions might be changed.

The historians and humanists among us knew well enough that the consensus of a moment does not often last, and that suggestions not considered in full when they are first made often come to dominate public policy.

There are many new ideas in this collection of papers, but three ideas gained more or less general support in our discussions.

1. Placement. Wind turbine placement must always be sensitive to site. This is a common principle among architects so far as buildings are concerned. But it has yet to be universally adopted in connection with wind turbines. In the United States, in particular, landscape architects play a minimal role, and a one-size-fits-all approach is still the norm. Often the only site characteristics typically considered are strength of wind and availability of power transmission lines. Aesthetic acceptability must not be an afterthought; the success of wind energy rests at least in part on the degree to which wind turbines blend into their surrounding landscape context. Naturally, *blending in* within this context includes various support structures, the buildings in which the transformers are located, the roads connecting the turbines, the transmission lines, the way they are main-

tained, and the diligence with which the developers keep derelict equipment from accumulating.

The majority of us also recommended that wind turbines not necessarily be hidden or camouflaged. Indeed, there was majority consensus that the visual character of wind turbines should not be disguised. Rather, some saw their blatant display as a kind of honesty, which is an important element in their aesthetic appeal. Of course, some new turbines are placed well offshore and out of sight of people on shore. But in the rural landscapes where they are typically located, very large wind turbines tend to be out of scale with their surroundings. In these common situations, some attempt should be made to balance them with other natural and man-made structures in the landscape.

The principle of site sensitivity involves other considerations than those of scale. It also has to do with the histories and cultural practices of particular regions, with the kinds of materials out of which local buildings are constructed, with the character of available light, and with the flora and fauna (particularly the bird populations) which frequent the area. Again, these kinds of consideration are commonplace among professional architects; they need to become commonplace with wind turbine owners and operators.

2. Equity interest. Local landowners should have an equity interest in the turbines on their property and, where possible, be involved in their maintenance and use. Two points were made in this connection. One is that the permitting of wind turbines takes place at the local level; such permitting is more likely to go through if the turbines are locally owned and operated. The cases of Denmark and the Netherlands are relevant. In Denmark, as in Germany, the majority of turbines are owned by farmers. Easily available low-interest loans and high government-subsidized utility buyback rates make this possible. And in Denmark (the situation in Germany is more complicated), wind energy enjoys very wide acceptance. Indeed, wind power has become identified with the country's high population density, and the Danes are proud of their world leadership in both wind energy production and technology. Much like neighboring Denmark, the Netherlands is a coastal low-lying country with a long windmill tradition and few alternative sources of power. But resistance to wind turbines, largely on aesthetic grounds, is evident in the Netherlands, and it now seems certain that national goals for the use of renewable energy will not be met on schedule. The only evident difference between the two countries is that in the Netherlands wind turbines are for the most part owned by large corporations. There is little local equity.

The other point about local ownership and control is more difficult to describe. It has little to do with the political and economic question. That is, it is not merely that the local people should enjoy the economic benefits of wind energy and therefore want to encourage it. We contend that the system of ownership and control has itself certain aesthetic dimensions. To the extent that someone else, in particular a large corporation, owns an object, it has become alienated from us and we can no longer fully enjoy it. But whatever one's aesthetic theory, even if one has no aesthetic theory at all and thinks that it is all a matter of taste, there is some sort of connection between the perception of beauty and personal enjoyment. Indeed, there is a great deal of evidence that we enjoy and appreciate most that which is near at hand and familiar, those things in which we have a personal stake.

Significant new wind power development will require large sums of money, and the sheer size and complexity of the technology coming on line will require a great deal of engineering expertise. Whether the Danish model of local ownership and control can be widely exported remains to be seen. Short of that, every effort will have to be made to involve local people (in whose hands rests the ultimate fate of wind projects) in every phase of the planning. Such involvement takes patience on all sides and substantial time. However, it is presumably the only way in which people will accept wind energy in their own backyards.

3. Aesthetics. The aesthetic issue needs to be addressed directly. There is, of course, the strategic point that it is an issue best avoided because we believe that beauty *is* in the eye of the beholder. Such a position does little to lessen public resistance to wind energy. This is a subjectivist position to which technocrats and their corporate sponsors would like to retreat. But it is at just this point that we lose people (enough to make a difference) who otherwise support wind energy. They resist because they do not want their own (or personally cherished) area ruined. Urbanites and even major environmental organizations in a variety of different countries are on record against further wind power development. In almost every case, the underlying reasons are aesthetic.

What, then, is the best approach to the aesthetic question? We believe that we cannot deal with it by setting out universal standards of beauty and then compelling designers, developers, or the general public to honor them. Even in our group, highly homogeneous with respect to education, social and economic status, and occupation, there was too much difference of opinion for this to happen. But short of consensus, aesthetic considerations can be made an important and explicit part of the discussion at every level, from the original design of turbines to their eventual installation.

This will involve bringing humanists and artists into the discussions, and breaking down the otherwise crippling distinctions that exist among the arts, humanities, and sciences. We were able to break them down in our own discussions, and this should provide a model for others.

The past few years have witnessed the installation of a great deal of additional wind generating capacity, most of it outside the United States, making wind power the most rapidly growing form of renewable electrical energy in the world. Judging from the shortfalls in electricity supply reported from every quarter of the United States and many other countries, it has been coming at a good time. Even with this boom, however, there is still stubborn resistance to wind energy. For many people, there is no more than grudging acceptance of wind energy's potential. The emphasis, at least in North America, still rests on the notion of finding new sources of fossil fuels rather than on developing renewable energy, an emphasis which the newly elected President of the United States has made clear. This resistance continues to be rooted in aesthetic considerations. People generally are no more ready now than they were when we met in Bellagio to countenance wind turbines erected within their view. Neither are they willing to make radical changes in their lifestyles or reduce their consumption of energy. This is to say that, however large the wind industry's success may appear, we have not yet made a sufficient place for wind turbines in the landscape.

At that, there seemed in our discussions to be a fairly large measure of agreement concerning what was beautiful. Despite all of the arguments about aesthetics, and the frequent allusions to differences in cultural standards and matters of taste, all of us thought that the view from our conference center overlooking Lake Como to the small villages dotting its shores and finally to its mountain enclosure was marvelous. It is a vision, though only one vision, of Arcadia. But there is still the very real problem of fitting wind turbines into any of them, of balancing nature and need. Resolving it will take us deeper into aesthetics, technology, and the landscape. This book has been our contribution to advancing that discussion.

NOTE

1. Where the generator, gearbox, and brakes are housed.

from WIND POWER IN VIEW -Energy Landscapes in a Crowded World,
by Martin J Pasqualetti, Paul Gipe, Robert W Righter; /Academic Press, 2002

from Part IV /Working with the Wind, chapter 9 Design as if People Matter:
Aesthetic Guidelines for a Wind Power Future, p 173 -212 incl notes/ref.

from: WHAT WE CAN DO, P 180: (my numbers) Thus

01...Provide visual order

02...Provide distinct visual units

03...Provide visual uniformity

04...Use similar turbines and towers together

05...Use towers of consistent height

06...Limit the number of turbines per cluster

07...Use open spacing

08...Keep them spinning

09...Remove nonoperating wind machines

10...Use only free-wheeling rotors

11...Remove headless horsemen

12...Remove ancillary structures

13...Bury intraproject power lines

14...Harmonize ancillary structures

15...Avoid mounting telecom antennas

16...Minimize earth moving and control erosion by avoiding steep slopes

17...Minimize or eliminate roads

18...Use existing roads

19...Minimize grading width

20...Minimize staging areas and crane pads

21...Restore original contour and revegatate

22...Be unobtrusive

23...Avoid aircraft obstruction markings

24...Douse security lights

25...Avoid billboards

26...Avoid logos on nacelles

27...Choose color carefully

28...Use proper proportions

29...Maintain good housekeeping

30...Always "dress" your wind turbine properly

31...Clean nacelles and towers

32...Keep sites tidy

33...Remove all bone yards

34...Respect the land and the landscape

35...Inform the public or provide public access

36...Limit tower height and turbine size

37...Avoid tower pedestals

38...Consider the aesthetics of small wind turbines

WIND "MILLS"

"You'll see them!!!"

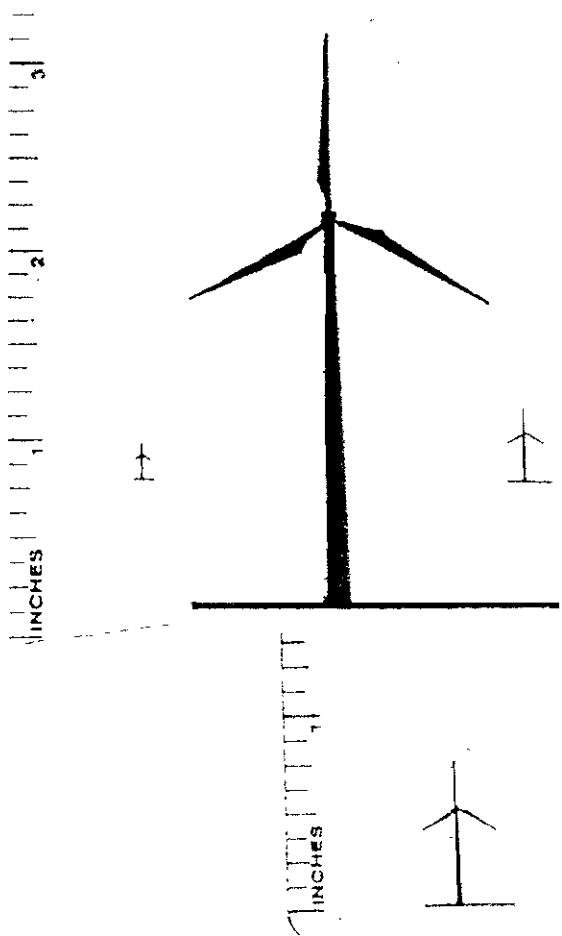
???? WHERE??

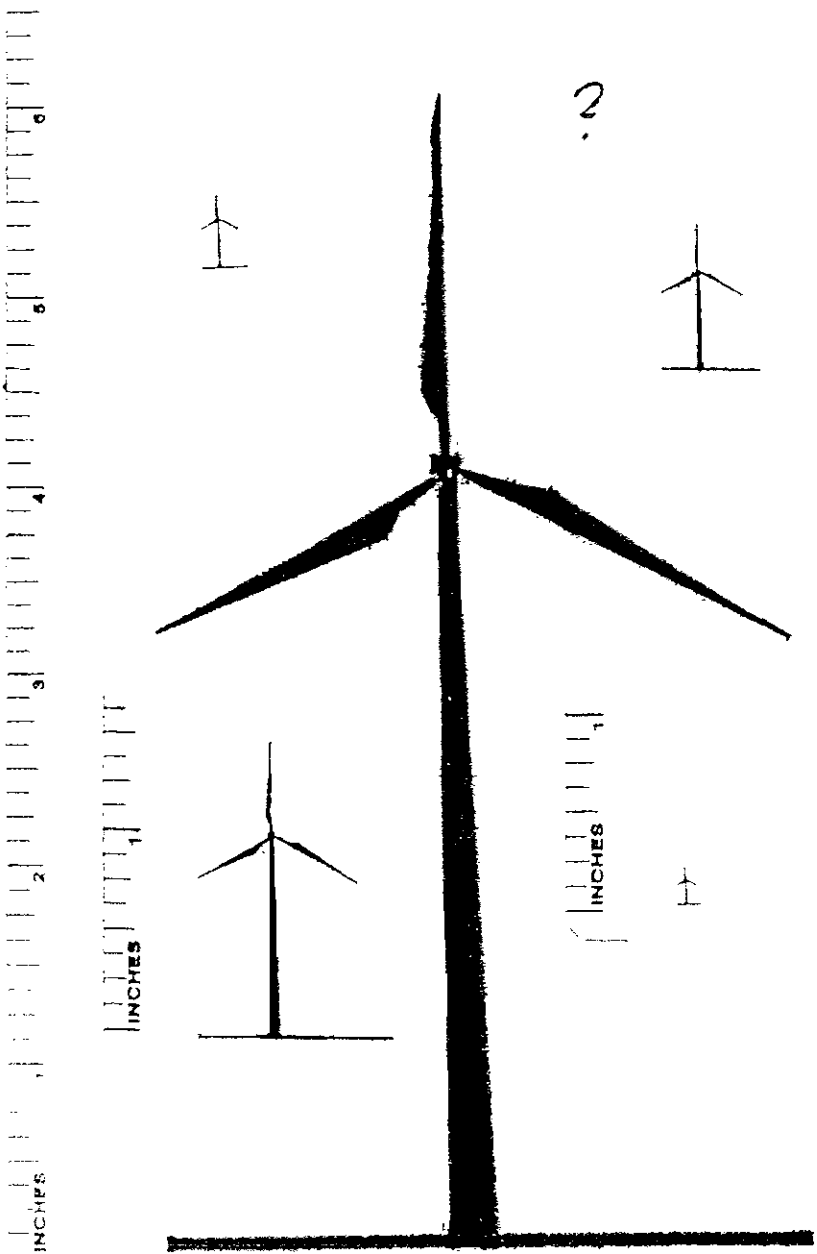
HOW FAR AWAY??!?

Visual Apparent Height?

WHAT'S THAT?

??? (Read On)





PRACTICAL PERSPECTIVE

PART I: The GRAPHICS show the mathematics of Linear(or Scientific) Perspective and the resulting curve representing the decrease of visual apparent height (size) with distance increasing from the observer. These show the skills of a surveyor and those of a visual artist working "in plain air". The apparent height decreases dramatically near at hand; in the distance the decrease is tangential or minimum.

The first draft, with mathematics & graphics, was demonstrated/presented by Janice M Whipple at the first Jordanville Wind Project public hearing. This was held at Jordanville on June 29, 2006 - the first of 3 such hearings in the SEQR process. This edition: May 2007.

PART II: Wind turbine generator (WTG) SILHOUETTE drawings were developed from PART I data. They (7 in total) represent the <u>actual</u> (100% size) visual apparent height at selected locations. Each successive silhouette is 50% (1/2 of) the height of the preceding one. Hold each silhouette at arm's length out level from the side which is 36"± from ℄ body.
This was first conceived and developed by J. D. Skandera about May 2007 and subsequently presented.

Text and annotations on 66% graph are part of minimum revisions in October 2007. Mathematics and text remain as earlier. Janice M Whipple

SILHOUETTE TABLE

The mathematics of Graph & Silhouettes is "GENERIC" but the WTG Example used in both has the following heights: to blade tip - 400 feet ±; to the hub @ nacelle - 262 feet ±

Booklet - Graph page location	Silhouette Number	Distance from Observer Feet (')	Miles (mi)	Visual Apparent Height Inches (") @ blade tip	@ hub
original sheet 1 of 3 page 1	— (engage)	400'	——	36"	24"
	1	600'	——	24"	16"
	1	800'	——	18"	12"
page 1	#1	1,200'	1/4 mi = 1,320'	12"	8"
page 1	#2	2,400'	1/2 mi = 2,640'	6"	4"
page 2	#3	4,800'	1 mi = 5,280'	3"	2"
page 4	#4	9,600'	2 mi = 10,560'	1 1/2"	1"
page 6	#5	19,200'	5 mi = 26,400'	3/4"	1/2"
original sheet 2 of 3	#6	38,400'	7 1/2 mi = 39,600'	3/8"	1/4"
original sheet 3 of 3	#7	76,800'	14 1/2 mi = 76,560' 15 mi = 79,200'	3/16"	1/8"

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