Appendix 1-A: Comments Received on the DEIS

List of Contents – Comments Received on the DEIS

List of Contents – Comments Received on the DEIS (continued)

1

From: Vicki Doyle <doylev@caryinstitute.org>
To: "depprmt@gw.dec.state.ny.us" <depprmt@gw.dec.state.ny.us>
CC: CIDuHamel <ciduhamel@nyc.rr.com>
Date: 6/14/2011 9:43 AM
Subject: Cricket Valley review and comment sessions

Mr. Tomasik,

Please consider adding an additional review and comment period on a Saturday for Cricket Valley Energy project. Many of our residents commute to the city on weekdays and are unavailable for mid week. I am a Town Councilwoman for Town of Amenia since 2004 and feel a Saturday meeting is needed to ensure we have balanced representation by our residents. 1-1

Thank you for your consideration.

Vicki Doyle

Vicki Doyle
Senior Development Associate

Cary Institute of Ecosystem Studies

PO Box AB, 2801 Sharon Turnpike
Millbrook, New York 12545-0129
P 845-677-7600 x 203
F 845-677-5976
www.caryinstitute.org
P Please consider the environment before printing this email

From: Constance I DuHamel <cduhamel@lebenthal.com>
To: Stephen Tomasik; Willie Janeway
CC: Alexander Ciesluk
Andrew T. Chmar
Antonia Bowring
Chris Hogan
Chris Wood
cid
cwolf@poughkeepsiejournal.com
dovercac@townofdoverny.us
doylev@caryinstitute.org
earthlyphoto@verizon.net
editor@millertonnews.com
George Sweikert
Gregg Osofsky
Helene Goldberger
info@catskillmountainkeeper.org
JMUTTER98@aol.com
John Penney
jpenney@poughkeepsiejournal.com
Kate Goldsmith
Katschib@aol.com
Kenneth Grzyb
manna jo clearwater
Matthew Martin
MelissaAndreychek
mike purcell
mseilback@alany.org
mstengel@eany.org
news@countytimes.com
nsullivan@scenichudson.org
Peter Rostenberg
PlanningARB@TownofDoverNY.us
publisher@lakevillejournal.com
ramsayadams@gmail.com
ramsayadams@yahoo.com
Robert Herzog
Sibyll Gilbert
sk092300@aol.com
Tonia Shoumatoff
townboard@townofdoverny.us
Date: 6/17/2011 3:40 PM
Subject: Dutchess County: Cricket Valley Energy natural gas 1000 megawatt power plant: DEIS Public Comment: Third Request for Saturday Session, for maximum community participation

Hi Stephen and Willie,

I am following up to see if you have had further discussions about a date for a possible Saturday Session for the Cricket Valley Energy DEIS Public Comment Period. A Saturday session will ensure maximum attendance by local working parents who cannot get away from home on a Tuesday night, weekenders who may not be able to get up to Dutchess County on a weeknight, and members of the larger, regional community who will be impacted by this natural gas project. 2-1

I received a copy of Amenia Councilmember Vicki Doyle's letter to DEC requesting a Saturday Session on CVE; she mentioned that DEC held a Saturday Session for the proposed remediation of their landfill five years or so ago. I understand that Dover Town Hall has received calls from residents requesting a Saturday session.

For your convenience, I include the thread of our May 27th correspondence, and I have made an effort to cc those who were or should have been on my first request. Where do you stand on the issue please?

Thank you ,
Stancy DuHamel
www.growsmartdover.org<http://www.growsmartdover.org>
work: 212-697-3542
cell: 917-328-8184

Begin forwarded message:
From: Constance DuHamel <ciduhamel@me.com<mailto:ciduhamel@me.com>>
Date: May 27, 2011 3:17:57 PM EDT
To: Stephen Tomasik <smtomasi@gw.dec.state.ny.us<mailto:smtomasi@gw.dec.state.ny.us>>
Cc: Alexander Ciesluk <afcieslu@gw.dec.state.ny.us<mailto:afcieslu@gw.dec.state.ny.us>>, Chris Hogan <cmhogan@gw.dec.state.ny.us<mailto:cmhogan@gw.dec.state.ny.us>>, George Sweikert <gasweike@gw.dec.state.ny.us<mailto:gasweike@gw.dec.state.ny.us>>, Helene Goldberger <hggoldbe@gw.dec.state.ny.us<mailto:hggoldbe@gw.dec.state.ny.us>>, Kenneth Grzyb <krgrzyb@gw.dec.state.ny.us<mailto:krgrzyb@gw.dec.state.ny.us>>, Wendy Rosenbach <warosenb@gw.dec.state.ny.us<mailto:warosenb@gw.dec.state.ny.us>>, Willie Janeway <wcjanewa@gw.dec.state.ny.us<mailto:wcjanewa@gw.dec.state.ny.us>>
Subject: Cricket Valley Energy DEIS available for Public Review -- Request for a Saturday Session

Stephen,

Thank you for response.

It is my belief that a project of this magnitude within the Great Swamp and in the Harlem Valley, a relatively undeveloped part of Dutchess County with unique natural resources, warrants maximum community participation.

A project with significant environmental impacts on our water and air quality deserves a Saturday session. While the extended written comment period is helpful, it's objective is likely not to be met, given the lack of a local newspaper in Dover. The Saturday session may be the only session in which a broader cross-section of the public can come to better understand the impacts and proposed mitigations, and whether or not enough is being done by NYS and CVE to address the effects of this project on our community's health and well being.

Sincerely,
Stancy

Stancy DuHamel
w 212-697-3542<tel:212-697-3542>
c 917-328-8184<tel:917-328-8184>

"Do what you can, with what you have, where you are." T.R.

On May 27, 2011, at 12:22 PM, "Stephen Tomasik"
<smtomasi@gw.dec.state.ny.us<mailto:smtomasi@gw.dec.state.ny.us>> wrote:

TO: Stancy DuHamel
Coalition for the Responsible Growth of Dover

This is in response to your email of May 27, 2011.

Thank you for your interest in the proposed Cricket Valley Energy Project. We appreciate the concerns you raised regarding the busy schedules of the citizens of Dover and the surrounding area and the ability to attend the public hearing sessions on June 28. However, it is not typical DEC policy to hold hearings on the weekend, and the agency does not believe that a Saturday hearing session is warranted in this case. As you are aware, there will be two hearing sessions on the hearing date; one in the afternoon to accommodate those who may wish to be present in a capacity related to their workday, or who may otherwise be available at that time; and one session in the evening to accommodate those who are not available during the workday. Please note that although the evening session begins at 6 PM, the session will continue to run until all those who are present at that meeting have the opportunity to make a statement.

In addition, it is important to emphasize that DEC will accept written statements on the DEIS and draft permits through July 25, 2011. DEC gives equal weight to written comments and those presented at the public hearing.

Please feel free to continue communicating your concerns to DEC throughout the SEQR and permit review processes.

Stephen Tomasik
Project Manager
Major Projects Management Section
Division of Environmental Permits
NYS Department of Environmental Conservation
625 Broadway - 4th Floor
Albany, New York 12233-1750
PH: (518) 486-9955
FAX: (518) 402-9168
smtomasi@gw.dec.state.ny.us<mailto:smtomasi@gw.dec.state.ny.us>

3

From: Lorraine O'Neill <LOneill@TownofDoverNY.us>
To: <wcjanewa@gw.dec.state.ny.us>
CC: <Supervisor@townofdoverny.us>, Lorraine O'Neill <LOneill@TownofDoverNY.us>
Date: 6/20/2011 6:43 AM
Subject: Cricket Valley

Willie

William C. Janeway, Regional Director
NYS Department of Environmental Conservation, Region 3
21 South Putt Corners Road
New Paltz, NY 12561-1620

phone: 845-256-3033
fax: 845-255-3042
email: wcjanewa@gw.dec.state.ny.us

BE GREEN. PLEASE DO NOT PRINT THIS EMAIL UNLESS YOU REALLY NEED TO. THANK YOU.

Dear Mr. Janeway,

I would like to thank the DEC for the upcoming public hearings for Cricket Valley.

Many residents, of all stature have asked myself and the DEC for a Saturday public hearing.

I am not sure why a project of this magnitude is not being given a Saturday public hearing? I remember your words quite distinctly, "The DEC Will Work With The Town of Dover and Its Residents". My question to you is why isn't the DEC meeting the request of our residents?

I understand we have two public hearings during the week and written comment. This is good but, not good enough. Our residents would like their voices heard and not only their letters read.

I am of the understanding that the DEC has held public hearings for surrounding Towns in the past. So, why not Dover and why not now?

3-1

Please note, this is my formal request to the DEC to hold a Saturday public hearing on Cricket Valley.

A response would be greatly appreciated. Thank you for your time.

Lorraine O'Neill
Councilwoman
Town of Dover

4

From: "Sibyll Gilbert" <rg5285@comcast.net>
To: <depprmt@gw.dec.state.ny.us>
CC: "Stancy DuHamel" <ciduhamel@mac.com>
Date: 6/23/2011 11:25 AM
Subject: DEC Public Hearings - Cricket Valley Energy

Dear Mr. Tomasik, Project Manager,

The application/DEIS for Cricket Valley Energy is the second largest project to impact the Harlem Valley. There are several issues of great magnitude that could very seriously harm the local communities. The public hearing process should be transparent, and friendly to the public which has so much at stake.

There have been many requests by members of the public asking for access to the information and opportunities to ask questions and be heard. Cricket Valley has been as open and as cooperative as they can be. But when DEC limits public hearings to weekdays, there are few members of the public who are able to take part.

In order to facilitate the public participation process, could not the Department of the DEC conduct a hearing on a Saturday? Please take this under consideration. Thank you,

4-1

Sibyll Gilbert, Vice Chair
Oblong Land Conservancy
One Memorial Avenue
Pawling, NY 12564

5

From: "Peter Rostenberg" <prostenberg@sbcglobal.net>
To: ctcommittee@highlandscoalition.org; hudson-valley-environment@npogroups.org; Permitting DEP
CC: Andrea O'Connor; Andy Chmar; Bob Miller; Stancy Duhamel; Willie Janeway
Date: 6/24/2011 12:56 PM
Subject: Cricket Valley 1000MW Natural Gas Plant Proposal Dover NY

Stephen M. Tomasik,
Project Manager,
Cricket Valley Energy
NYS Dept of Environmental Conservation Division of Environmental Permits,
625 Broadway--4th Floor
Albany, NY 12233-1750
depprmt@gw.dec.state.ny.us

Dear Mr Tomasik,

The Connecticut Highlands Coalition is a loose association of environmentalists and environmental groups whose mission is to protect water, air, land and wildlife in Connecticut, east of the New York line. Hudson Valley Environment is a list serve comprised of environmentalists throughout the mid-Hudson Valley.

Many of us are concerned that that 1000Cricket Valley Energy plant, and we have not been directly involved with the process up to now. We understand there will be a meeting in the Town of Dover next Tuesday, but at this late date, many of us are unable to attend.

We therefore request that a Saturday meeting be scheduled to permit Connecticut residents a chance to learn more about CVE. I draw your attention to the fact the the Swamp River aquifer flows to Connecticut. And the prevailing winds that blow over CVE pass into Connecticut.

5-1
5-2
5-3

Thank you for your consideration

Peter Rostenberg
Hudson Valley Environment
Steering Committee Highlands Coalition

6

From: Mike Purcell <mpcarpentry@msn.com>
To: <wcjanewa@gw.dec.state.ny.us>
Date: 6/27/2011 10:24 PM
Subject: Cricket Valley Energy Public Hearing June 28th 2011

Dear Mr Janeway,

The Cricket Valley Energy combined gas turbine electrical generating plant and its potential to release above threshold greenhouse gases and NOx warrants a a hard look and a Saturday meeting for a public hearing . From personal observations as a resident of the Harlem Valley I can report the the Great Swamp has an almost daily occurrence of fog rising from the wetlands in the dawn hours.The fog rises above the elevation of the 2 stacks that Cricket Valley is proposing.Emissions of NOx combined with water vapor is the main ingredient for smog Smog is the leading cause of acute and chronic respiratory problems , especially in children and those experiencing respiratory difficulties The presence of this naturally recurring phenomena of the Great Swamp Critical Environmental Area has not been addressed in Cricket Valley Energy Documents and poses significant adverse impacts to water resources and the calcareous wetland ecology of the Harlem Valley . Calcareous wetlands are dependent on low NOx volumes to maintain the fragile ecosystems that are common here and rare statewide. Given the unique characteristics found in the Great Swamp Watershed a hard and closer look at what occurs in the dawn hours of the Great Swamp would be better than sitting in meetings and board rooms pushing papers.Saturday mornings are always good.

6-1

6-2

6-3

Sincerely,

Mike Purcell
130 South Harmony Hill Road
Pawling ,NY 12564
914-489-1892
mpcarpentry@msn.com

7

From: Tara Shoureck <lanamama22@gmail.com>
To: <wcjanewa@gw.dec.state.ny.us>
Date: 6/27/2011 10:49 PM
Subject: Saturday session needed

This is to request a public comment session be added on for a Saturday, so that more people will have the ability to attend and make their feelings known about the Cricket Valley Plant. 7-1

The times of 3:00 and 6:00 on a weekday are only good for retirees or stay at home moms, provided they want to bring along the children. This is a major proposed project that will affect many people and they should be given the opportunity to be in attendance. I started a petition up regarding this matter, and every person that signed it stated the Tuesday meeting times were not something they could do; also , more outreach needs to go to the surrounding towns as well, Pawling, Millbrook, nearby CT... as this will impact them as well. 7-2

Thank you for taking this into consideration.

Tara Shoureck

8

>>> "Sibyll Gilbert" <rg5285@comcast.net> 6/28/2011 9:24 PM >>>
Dear Commissioner Janeway,

These public hearings, being held in the Harlem Valley, make it impossible for many of the interested residents to become informed and have an opportunity to participate in the public hearing process.

We have repeatedly requested that public participation be more friendly. Most of these residents work, and commute many miles, following the closure of the two principle places of employment in this little valley. By New York state! They cannot attend afternoon and early evening meetings. Many other folks are weekenders, but they also take an interest in their quality of life issues, and their property values.

The Harlem Valley, Dover in particular, are hard hit by this recession and the loss of their jobs. The Town of Dover, for the most part, is low income. It lacks any local newspaper, to provide them with news about the proposed Cricket Valley Power Plant.

Give these people a real chance to participate. Try to provide a Saturday time slot.

8-1

Thanks for this consideration.

Sibyll Gilbert, Vice Chair
Oblong Land Conservancy

9

Housatonic Valley Association

150 Kent Road
P.O. Box 28
Cornwall Bridge, CT 06754
860-672-6678

www.hvalinday.org

June 28, 2011

Mr. Stephen M. Tomasik, Project Manager
NYS Department of Environmental Conservation
Division of Environmental Permits
625 Broadway – 4th Floor
Albany, New York 12233-1750

RE: Cricket Valley Energy Project Draft Environmental Impact Statement

Tomasik:
Dear Mr. ~~Hogan~~:

The Housatonic Valley Association (HVA), founded in 1941 is among the oldest non-profit watershed conservation organizations in the nation, and is dedicated to preserving and protecting the natural character and environmental health of the Housatonic River and its 1,948 mile watershed, which includes the Tem Mile River watershed in New York. Our work in surface and groundwater protection issues is extensive. HVA reviewed the Draft Environmental Impact Statement (DEIS) and offers the following comments and recommendations for your consideration.

Section 3.2 Existing Conditions

The portion of the property located west of the railroad track is relatively undeveloped and is adjacent to the Swamp River. This portion of the property is within the New York Department of Environmental Conservation (DEC) Great Swamp Critical Environmental Area (CEA) for its natural resource value. HVA is pleased that Cricket Valley Energy, the Oblong Land Conservancy and the Friends of the Great Swamp have begun exploring ways to permanently conserve the portion of the project site to the west of the Metro North railroad tracks.

9-1

Section 4.2 Baseline Air Quality, Meteorology and Climatology

Thus far, the applicant has relied upon climatological data, particularly wind measurements, obtained from the Poughkeepsie Airport for air quality modeling.

9-2

Specific air dispersion models should be developed using **on-site meteorological data** to ensure that the dispersion modeling will indicate compliance with all state and federal requirements. The project site is within a valley that is topographically complex and may be subject to downwash from the exhaust stacks that would produce locally high concentrations of pollutants.

Section 5.4 Water Supply

HVA is pleased that the project will incorporate several water conservation measures to minimize water

9-3

use during construction and operation of the facility. The project will rely on groundwater wells for process and domestic uses. During the pump testing, two existing wells at Dover Knolls as well as many neighboring properties were monitored. The DEIS indicated that the water withdrawals for the proposed facility should not adversely impact neighboring wells. However, additional wells will be necessary to serve the new residences and commercial properties at Dover Knolls. These future wells were not considered in the DEIS.

9-3 cont.

HVA requests that the DEIS include a regional evaluation of the cumulative impact of the groundwater needs of this project, Dover Knolls and all other large developments within the Ten Mile River watershed either under construction or currently going through the local approval process.

9-4

Other Comments

We request that the each appendix be labeled with its subject as well as a number.

9-5

HVA appreciates the opportunity to comment on this project.

Sincerely,

Tonia Shoumatoff
New York watershed Manager

Elaine E. LaBella
Director of Land Protection

10

Tuesday June 28, 2011

From : Tara Shoureck
19 Millers Lane
Wingdale, NY 12594

Re. : Cricket Valley Energy DEIS Public Hearings

I have many concerns about this plant, and over the last year or so have expressed them. I will try to be brief, and try to express them in a 'common man' manner. The very technical DEIS statement is difficult for the average person to read, and I do understand technical terms are needed. However, they can be explained in a 'regular guy' fashion. I did some investigation on my own of some of the things that are of great concern to me.

Air Quality

We already live in a most polluted part of the country, and the topography of the valley adds to this. After all, what goes up, must come down, and where better to settle than in a valley? Sulfer dioxide (SO2) will be a by-product of this plant. In both high and low concentrations, it is linked to respiratory problems, especially in those individuals with asthma or other lung related illnesses. No matter how 'clean' this plant will be, it still will be a major source of air pollution.

10-1

10-2

10-3

Nitrogen dioxide (NO2) will also be released by this plant, another source of respiratory distress. This will be released into the air from the stacks at a continuous 24/7 rate for the life of the plant. People exposed to these two said pollutants are told to 'limit their outdoor activity' on particularly high concentrations days. Well, depending on which direction the wind will be blowing, that will affect not only Dover, but the surrounding. towns of Pawling, Millbrook, towns in nearby CT, and places further away. I guess we all will have to stay inside - try telling that to your kids!

10-4

I was told by a Cricket Valley rep that 'clustering' the stacks will reduce emissions by about 40%. I researched this, and found clustering will force the debris plume up higher, where wind speeds are stronger. It will disperse the emissions further away on a strong wind day, it does nothing to reduce pollution.

10-5

The Cricket Valley spokepeople have said that this plant will 'displace the operation of

older, less efficient plants in the electric grid." Which plants and where are they located? I finally got a response to that question - 'displace' does not mean 'replace'. Since natural gas will be less expensive (in theory) the older plants using coal and oil will close down, due to no one interested in purchasing a more expensive commodity. I guess they never heard of supply and demand - natural gas will certainly become more expensive.

10-6

Aqueous Ammonia (NH3)

This pollutant will be used as the reducing agent in the project to reduce and control the nitrous oxide emissions. NH3 solution, 19%, will be stored in two 30,000 tanks on site. That is the equivalent of two swimming pools with the dimensions of 20' X 40'. That's a lot of ammonia!!

10-7

I find it interesting that the solution will be 19%, as I did a little research into this chemical. At 20%, storage of this substance is subject to stringent requirements under the Clean Air Act. While I'm sure CVE will do it's best to avoid an accident, they do occur.

Water Issues

In my research, I tried to focus mainly on Air Quality issues, but water is of concern as well. The nearby Great Swamp, and our town's drinking water supply will be affected one way or another. Weather is dynamic, and right now we are experiencing great rainfall and had a record setting winter snowfall in this area of the country. We also have had periods of drought as well. The tremendous amounts of water that will be needed to run this plant has got to have some impact on the Town of Dover, and when we potentially pollute our water, we also pollute ourselves.

10-8

Jobs

This is an area that amuses me to no end. CVE has repeatedly stated how many wonderful jobs it will create. At best, these are going to be what I view as 'long term temp jobs'. Why? Because the plant will have an expiration date when it no longer will be online, and the few technical jobs it will create will disappear as well. As far as construction jobs go, I am no expert, but big jobs of this nature tend to go to unions. So, if you are a member of a particular union that gets this contract, you will have employment for a few years. Again, a temp job to a particular union, as all these jobs are.

10-9

10-10

Also, while discussing the construction of this plant, CVE has stated that Route 22 provides good access for truck traffic. Maybe, but it also is a single lane road. It virtually

10-11

closes down when something happens. A little over 2 weeks ago, such an occurence took place during a Thursday evening storm. It took me over 2 hours to get home from my usual 25 minute commute from Carmel, NY. Downed trees and power lines, fires and idiots on the road all added to the utter state of confusion. Gas stations were closed due to the fact that the pumps could not work with no power. When you turned on one road for a detour, you saw the light at the end of the tunnel, only to be turned back. It was a nightmare for many, and my mind started to think - "What if this was a real emergency", such as the power plant explosion that occurred in Middletown, CT, in Feb. 2010. That occurred at a similar type of plant to the proposed Cricket Valley plant. There were deaths, and people for miles around heard and felt the explosion. Human error of some sort was to blame, and since we all are human, this can occur to anyone of us.

10-11 cont.

This proposed plant is very close to the Dover Middle/HS, close to Wingdale Elementary and Dover Elementary as well. I say 'what if' because I have to, we all should. What if something during construction were to go wrong and this plant goes "KA-BOOM!!" Children in these schools would most definitely be affected, parents both at home and at work would be frantic. Never mind the worst case scenario of an accident, the daily operations of this plant will affect these children, many of whom suffer with asthma or other respiratory distress. I know, because I am a parent of a child with bad allergies and asthma, and spend many a sleepless night trying to get her comfortable so she can sleep.

10-12

In short, this plant is proposed in a very poor area for the residents of Dover, NY. Too close to both schools and homes for me. It is a fine location for Advanced Power, the parent company of the project, but what do they care - they don't live here. Potential financial gain is not a good reason to put this plant in Dover, the traditional dumping ground of Dutchess County. Could this be because it is the first town outside of the New York City Watershed?

These are my views, but, what do I know - I AM A DOVER RESIDENT!!

Respectfully submitted,

Tara Shoureck

Tara Shoureck
Wingdale, NY

11

From: <vee7757@optonline.net>
To: <smtomasi@gw.dec.state.ny.us>
CC: <Supervisor@townofdoverny.us>
Date: 7/5/2011 10:34 PM
Subject: Comments on the proposed Cricket Valley Energy

July 5, 2011

Division of Environmental Conservation,

Robert M. Herzog of the Town of Dover has written a letter to enlighten the understanding of the Cricket Valley Energy Project.

The proposed Cricket Valley Energy Project is an outrage. I do not support this project based on the following:

1. Environmentally, approving this project will hinder the quality of life as we know it. Our water and air quality will be much more polluted. The noise level will be intrusive. 11-1

2. Natural Gas prices will cost more because of the demand it will have. 11-2

3. Cricket Valley Energy is owned by parent company Advanced Power. They have no loyal history because they sell the company once up and running. What ever commitments they make will be obsolete. 11-3

These negative consequences will out-weigh the benefits. As a resident of Wingdale, New York I strongly reject to this project.

However, I strongly support more viable environmental alternatives such as: Solar and Wind. These alternatives will have less substantial negative effect on the environment at large. 11-4

Thank you,
Venna Curro
17 Millers Lane
Wingdale, New York 12594
845-832-7573

12

OBLONG
LAND CONSERVANCY

July 9th, 2011

Conserving the land, protecting our future.

Mr. Stephen M. Tomasik, Project Manager,
NYS Department of Environmental Conservation,
Division of Environmental Permits,
625 Broadway – 4th Floor,
Albany, New York 12233-1750

Dear Mr. Tomasik,

Cricket Valley Energy - Draft Environmental Impact Statement

May I express appreciation, first, for the opportunity to offer some comments on this important project and, secondly, for the ability to do so at this additional hearing. It was not possible to attend on June 28th last.

The Oblong Land Conservancy is an all volunteer grass-roots land trust based in the neighboring community of Pawling. We were established in 1990 and since that time have been actively involved in acquiring property and conservation easements over approximately1,100 acres in the south-east corner of Dutchess County. Pawling and Dover are our back yard and we are concerned to see that all development proceeds in a measured and appropriate way having regard to the long term needs of the community. The Harlem Valley is a rather special place and provides a number of unique habitats that we and many others would like to see conserved.

We participated in the Scoping Session that was held some 12 months or so ago and are pleased now to offer some comments upon aspects of this proposed development.

We are aware that a variety of questions have been raised including the short-term need for this plant, the long-term availability and cost of the gas used to power it, the linkage, if any, with the issue of hydro-fracking in the Marcellus Shale formation and the benefits that will accrue locally as opposed to regionally from the construction and operation of the plant. None of this we see as within our purview as a conservation organization. These are, nonetheless, important questions but they have to be addressed at a different level and by different sorts of organization than ourselves. We confine our input to conservation related matters.

12-1

Oblong Land Conservancy is a 501(c)3 organization

In that connection we are very pleased to note that the proposal will conserve some 74 acres in a sensitive area adjacent to the Swamp River and our own "Carruth Preserve", and will provide for some remediation of formerly degraded wetlands. It will also clean-up an old industrial area that is a blight upon the landscape and in so doing will set a new standard for developments in the immediate area.

12-2

That said there are areas of concern and I will address these individually.

PO Box 601, Pawling, NY 12564 | 845-855-5993
oblongland.org

Air Quality

This is a subject that is complex at best and highly technical and as the DEIS notes the project will be a new major source of air emissions. As laymen it seems to us as though the air quality modeling is based upon data obtained from Poughkeepsie Airport. Admittedly adjustments have been made for the change in topography and ground cover but we are concerned that this modeling may not properly represent conditions in the Project Development Area. For example, the Harlem Valley is frequently subject to air inversions, with the Village of Pawling being located at the lowest elevation. We believe that air dispersion models must be developed based upon local conditions. In conjunction with this we believe that a specialist air quality firm must be engaged by the Town of Dover to review the DEIS and make recommendations thereon.

12-3

12-4

Water

The project incorporates a number of conservation measures and pump tests have been run that would indicate that the needs of the project should not exceed local capacities. However, the fact remains that the communities in the valley rely upon an aquifer that is a finite resource. The Swamp River is also a slow moving stream with limited capacity to self-cleanse. Were the water resources to become contaminated or subject to chronic depletion present and future residents of the area would have nowhere to turn. In view of this we believe it prudent to look at water resources on a regional basis and consider the needs of CVE against the long term implications of additional piecemeal development in the area as well as large scale projects such as Dover Knolls.

12-5

Given the critical importance of this resource it would be prudent to examine the practicality of crafting and implementing a permanent monitoring regime so that the town is forewarned of changes in aquifer levels and water quality. Such a regime should be coupled with the requirement on the part of CVE to change its operating model to maintain a certain level of resource availability. In order to guarantee adequate groundwater supplies for neighboring residents, and unlimited supplies to sensitive hydrological resources like the several fens in the area and the wetlands and the Swamp River, this is a measure that would help ensure protection of these water resources.

12-6

Noise

The DEIS states that CVE has carefully considered noise impacts to the surrounding community in developing the project layout and in the selection of facility components and orientation. As such, the project is not expected to produce a significant noise impact and will be consistent with the levels established in NYSDEC and local noise guidelines.

That said the project is expected to comply with the most restrictive night time sound level limit of the Town of Dover Zoning Code at the north and east property lines. However, the west property line abutting the Metro-North rail line and the southern proposed property line abutting other industrially zoned property are expected to be non-compliant. This is not anticipated to be problematic since these properties are not likely to be occupied by noise-sensitive users.

12-7

We cannot support the view that exceeding the Town of Dover's noise limits is acceptable under any conditions irrespective of whether adjacent land users are noise sensitive or not. Sound travels and there is no way to tell in advance what, in fact, the impact of this new source of sound will be.

Notwithstanding the modeling that has been undertaken we retain considerable reservations about the introduction of a new and continuous source of sound in a substantially rural area. In these circumstances the project should be required to comply with all existing sound regulations. Additionally, a permanent sound monitoring regime along the lines of that proposed for the water resources, and accompanied by the requirement for remediation in the event of significant noise impacts should be a requirement.

12-7 cont.

12-8

We appreciate the opportunity to submit these comments.

Yours sincerely,

C. L. J. Wood
Chair
(845) 855 7014
cljw001@msn.com

13

DOVER UNION FREE SCHOOL DISTRICT

2368 ROUTE 22
DOVER PLAINS, NEW YORK 12522

Area Code 845

Mr. Michael Tierney
Superintendent of Schools
Tel. 832-4500
Fax 832-4511

Mr. Christopher Prill
Assistant Superintendent for Business Affairs
Tel. 832-4510
Fax 832-4512

Mrs. Donna Basting
Assistant Superintendent of Curriculum, Technology and Staff Development
Tel. 832-4539
Fax 832-4545

Mr. Rudy Abrams
Buildings and Grounds
Tel. 832-4542
Fax 832-4525

Ms. Pamela O'Neil
Director of Special Education
Tel. 832-4540
Fax 832-4547

Mrs. Catherine Alvarez
Principal
Wingdale Elementary School
Tel. 832-4530
Fax 832-3974

Mr. Herman Harmelink
Principal
Dover Elementary School
Tel. 877-4700
Fax 877-3460

Mrs. Patricia Rizzo
Principal
Dover Middle School
Tel. 832-4521
Fax 832-6094

Mr. Brian Timm
Principal
Dover High School
Tel. 832-4520
Fax 832-3924

Mr. Daniel Doherty
Assistant Principal
Dover High School
Tel. 832-4520
Fax 832-3924

July 13, 2011

Mr. Stephen M. Tomasik, Project Manager
NYS Dept. of Environmental Conservation
Division of Environmental Permits
625 Broadway – 4th Fl.
Albany, NY 12233-1750

Dear Mr. Tomasik:

In response to the SEQR process now in progress for Cricket Valley Energy, we are stating for the record that Dover Union Free School District's primary concern is the impact, or potential impact, that the construction and operation of the power plant may have on our students. Specifically, we are concerned about the traffic flow on Route 22, air quality, and noise that can impede the educational process. Additionally, we would like to see in place an emergency evacuation plan, including immediate notification of potential problems at the plant, and a plan delineating the prolonged closure of school caused by a safety problem at the plant.

On most school mornings, there is a backup of cars entering the Dover Middle/High School complex, typically heading north on Route 22. An increase in the number of cars driving south from 7 am to 8 am would add to this problem. 13-1

We must also emphasize that this project should not impact the positive and consistent air quality that is currently intact at the school complex. We have hundreds of students inside the buildings and on school grounds; therefore, having consistently positive air quality is essential. We need assurances that the air quality will remain at stable, healthy levels, not affected by wind changes or smoke stack emissions. 13-2

Along with clean air, it is also necessary that noise from the plant have no impact on the school complex. We want assurances that during the plant construction and operation, the noise would have no effect on our ability to provide a quality education, both inside and outside of our schools. 13-3

The last set of concerns revolves around potential problems at the plant that may influence District safety. In the event of a safety concern, plans must be in place 13-4

MT/am

to notify the District and parents, and evacuate and transport students (especially with regard to a prolonged closure of Route 22). Finally, a plan for the prolonged closure of school, due to a plant safety issue, must also be in place. This extensive planning for crisis management, including communications and evacuation procedures, should not be the District's responsibility. The District does not have the time or resources to develop these important plans that are necessary when being in close proximity to a power plant. Our hope that all of these issues will be addressed to ensure that our school, students, and staff can continue to operate successfully and safely.

13-4 cont.

13-5

Respectfully,

Kathy Schibanoff
Board of Education, President

Michael Tierney
Superintendent of Schools

MT/am

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

July 19, 2011

Mr. Stephen Tomasik
Project Manager
NYS Department of Environmental Conservation
Division of Environmental Permits
625 Broadway
Albany, NY 12233-1750

Dear Mr. Tomasik:

This is in response to your May 25, 2011, Notice of Availability of a Draft Environmental Impact Statement (DEIS) for the proposed Cricket Valley Energy Center located along NYS Route 22 in the Town of Dover, Dutchess County, New York. The following comments are provided pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). This response does not preclude additional U.S. Fish and Wildlife Service (Service) comments under other legislation.

We offer the following comments by DEIS section.

Section 3 Natural Resources

3.1 Applicable Laws, Regulations, and Policies

3.1.2 Clean Water Action Section 404 Permit Program and 3.1.3 Endangered Species Act

We understand that the U.S. Army Corps of Engineers is involved through authorizations under Section 404 of the Clean Water Act. Federal agencies have responsibilities under Section 7(a)(2) of the ESA to consult with the Service regarding projects that may adversely affect Federally-listed species or "critical habitat," and confer with the Service regarding projects that may adversely affect Federally-proposed species or proposed "critical habitat."

14-1

3.2 Existing Conditions

3.2.5 Protected Species

The introduction mentions previous coordination with the Service, New York Natural Heritage Program, and New York State Department of Environmental Conservation (NYSDEC) in June 2009 for two species, the Federally-listed threatened and State-listed endangered bog turtle (*Glyptemys [=Clemmys] muhlenbergii*) and the State-listed threatened timber rattlesnake (*Crotalus horridus*). The Service previously provided comments on the potential for not only the bog turtle, but the Federally- and State-listed endangered Indiana bat (*Myotis sodalis*) and Federal candidate for listing, New England cottontail (*Sylvilagus transitionalis*) listed species to occur at the project area in our July 20, 2009, and September 21, 2009, letters to the project sponsor's consultant, ARCADIS.

3.2.5.1.7 Bog Turtle

In our September 21, 2009, letter, we agreed that no suitable habitat was found within the property limits, and stated that the focus of an effects analysis should be indirect effects to bog turtles and habitat in wetland DP-22. The effects analysis (one paragraph) provided on page 3-29 is insufficient. For example, additional information should be provided on the proximity of proposed activities to bog turtle habitat. Depending on the proximity, protective fencing and preconstruction turtle surveys by permitted biologists may be needed. A summary of the groundwater withdrawal information provided in Section 5 should be provided in this section with a rationale for the conclusion that "withdrawals will not have an appreciable effect on the hydrology of onsite or offsite wetlands, or the Swamp River". The same recommendation applies to the stormwater management plan. A summary is needed regarding how that will avoid changes in surface water quality or quantity to offsite wetlands. We previously provided ARCADIS with a list (although not exhaustive) of potential impacts to bog turtles to consider in our July 20, 2009, letter, and expected to see an analysis addressing these items.

14-2

14-3

14-4

14-5

3.2.5.3.1 New England Cottontail

The project sponsor should obtain current location information for this species from the NYSDEC. This section does not address any potential indirect effects to New England cottontail from habitat impacts.

14-6

3.2.5.3.2 Indiana Bat

As stated in our September 21, 2009, letter, without any additional site-specific bat studies, it is reasonable to assume that Indiana bats are using the project area given its location and natural features of the site. Therefore, similar to the bog turtle, the next step is to determine the potential impacts to this species. We provided comments and recommendations on what to consider in this analysis in our letter and our comments were not addressed in the DEIS.

14-7

3.2.6 Construction Laydown/Worker Parking Site

3.2.6.2 Wildlife Habitat

Page 3-37 accurately states that ARCADIS coordinated with the Service regarding this site in July 2010. On August 5, 2010, the Service sent ARCADIS our standard FAX with directions to use our website for county-based species lists. The DEIS addresses several species that may occur at the site. However, for some reason, the Indiana bat was not addressed. This will need to be completed. 14-8

3.2.6.2.2 Bog Turtle

The final sentence states that "while portions of the Laydown Site are bordered by perennial emergent wetlands, these habitat were dominated by vegetated overstories or invasive species, and are not considered to be suitable habitat for the bog turtle." Please note that many (if not most or all) bog turtle sites have invasive species to various degrees. If any of the wetlands may be impacted (directly or indirectly) by work at the Laydown Site, Phase 1 bog turtle surveys should be conducted by a qualified bog turtle surveyor. 14-9

3.2.6.2.3 New England Cottontail

Similar to the project site, the project sponsor should obtain current location information for this species from the NYSDEC. This section does not address any potential indirect effects to New England cottontail from habitat impacts. 14-10

3.3 Project Related Impacts and Mitigation Measures

3.3.3 Potential Wildlife and Habitat Impact

As discussed above, the DEIS lacks a real analysis of potential impacts to Federally-listed or candidate species at this time. Page 3-48 states that "seasonal restrictions on clearing will be imposed to avoid potential impact to Indiana bat habitat." As you are aware, seasonal restrictions on clearing are intended to avoid direct impacts to the bats themselves. Clearing the trees may be an impact to habitat (and therefore result in indirect effects to Indiana bats); however, we consider the amount of habitat and the landscape context in which the clearing is conducted. 14-11

We have the same comments on the bog turtle analysis on page 3-48 as we provided for Section 3.2.5.1.7.

As a reminder, the most recent compilation of Federally-listed and proposed endangered and threatened species in New York* is available for your information. Until the proposed project is complete, we recommend that the project sponsor check our website every 90 days from the date of this letter to ensure that the listed species presence/absence information for the proposed project is current. 14-12

Thank you for your time. If you require additional information please contact Robyn Niver at (607) 753-9334. Future correspondence with us on this project should reference project file 90453.

Sincerely,

David A. Stilwell
Field Supervisor

*Additional information referred to above may be found on our website at: http://www.fws.gov/northeast/nyfo/es/section7.htm

cc: NYSDEC, New Paltz, NY (Attn: L. Masi/A. Ciesluk)
NYSDEC, Albany, NY (Wildlife Diversity)
COE, New York, NY (Attn: B. Orzel)

15

From: <MahoBay7@aol.com>
To: <smtomasi@gw.dec.state.ny.us>
Date: 7/25/2011 11:12 PM
Subject: Public Comment period for the Cricket Valley Extension Request

Dear Mr. Tomasik,
I am writing to you to request the Public Comment period for the Cricket Valley be extended past August 1 so that the Town of Dover may hire an independent expert to review the DEIS. 15-1

The adding of pollutants to our stagnant air mass here in the valley will affect the health of all our residents and fauna and flora. Please allow us this much needed time to review this important document and gather more information to determine the impact and the need for an energy plant in our region. 15-2

Thank you,
Mark Chipkin
Mark Chipkin
Chairman
Pawling Nature Reserve Management Committee
60 Hurds Corner Road
Pawling, N.Y. 12564
845 855-9155
www.PawlingNatureReserve.org
http://www.pawlingnaturereserve.org/
mahobay7@aol.com

16

From: John Fila <jcf942@gmail.com>
To: <smtomasi@gw.dec.state.ny.us>
CC: <depprmt@gw.dec.state.ny.us>
Date: 7/26/2011 7:50 AM
Subject: Cricket Valley DEIS

Many town of Dover residents are concerned about the accuracy of certain information and the assumptions contained in Cricket Valley's DEIS. and feel the need for an independent expert review of the data. As a former member of the town's planning board I know that independent expert analysis is very often required to properly evaluate complex environmental impact statements. In such cases, the cost of the independent review should be covered by the applicant and not place any financial burden on DEC(taxpayers).

16-1

Please consider carefully the absolute requirement for a complete, thorough and accurate environmental impact analysis, and the need for independent expert review in order to facilitate this. In addition, the Public Comment period should be extended to allow public review and comment based on any new information contained in the independent expert analysis.

John Fila
Former Town of Dover Planning Board Member

17

From: Janet Pickering <pickering.j@earthlink.net>
To: <smtomasi@gw.dec.state.ny.us>
CC: <depprmt@gw.dec.state.ny.us>
Date: 7/26/2011 10:56 AM
Subject: Cricket Valley Energy

Dear Mr. Tomasik:
I am a resident of the Town of Dover and attended the Saturday Public Comment Session on the DEIS submitted by Cricket Valley Energy. I am writing to add my voice to those who are asking that the time frame for public comment be extended beyond the August 1 deadline. It is quite clear that there would be significant negative environmental impacts on the community from this plant, especially in terms of air quality and noise. Because of the scientific complexity of the issues, I believe it is essential that there be an independent, impartial review of the facts and assumptions in the applicant's DEIS. The extension of the public comment deadline would give the Dover Town Board time to engage an independent expert to do such a review.
Thank you for your consideration.
Janet Pickering

17-1

18

From: Joanne Venturini <venturinij@caryinstitute.org>
To: "smtomasi@gw.dec.state.ny.us" <smtomasi@gw.dec.state.ny.us>
Date: 7/26/2011 8:56 AM
Subject: Cricket Valley Power Plant

Dear Mr. Tomasi,

I am requesting an extension of the public comment period past August 1st, so that our town board can hire an independent expert to review Cricket Valley Energy Draft Environmental Impact Statement. We must have an unbiased and objective review of the facts, figures, assumptions and conclusions before we permit a 1000 megawatt power plant in our valley which, combined with an environment more humid than the sites used to collect data (Poughkeepsie Airport,) will have a negative impact on our kids just 1000 yards north of the site. And there is some question as to whether or not NYS even needs this plant.

18-1

18-2

18-3

Thank you,
Joanne Otero
49 White Farm Road
Wingdale, NY 12545

From: Mike Purcell <mpcarpentry@msn.com>
To: <depprmt@gw.dec.state.ny.us>
Date: 7/24/2011 3:22 PM
Subject: Public Comments on Cricket Valley Energy DEIS
Attachments: Comments on the Cricket Valley Energy DEIS-1-2.docx

> Stephen M. Tomasik, Project Manager
> NYS Dept. of Environmental Conservation
> Division of Environmental Permits
> 625 Broadway – 4th Fl.
> Albany, NY 12233-1750
> Fax: 518.402.9168
> Email: depprmt@gw.dec.state.ny.us

Dear Mr. Tomasik,

Thank you for facilitating and extending the Cricket Valley DEIS public comment period to August 1, 2011 in regards to the Cricket Valley Energy project located in Dover NY. Please find attached my written comments pertaining to the Cricket Valley DEIS documents. Please acknowledge receipt of my comments and thank you again for allowing the public's participation.
Respectfully submitted
July 23, 2011 by
Michael Purcell
19 Sans Souci Drive
Pawling NY, 12564

Comments on the Cricket Valley Energy DEIS

Thank you for the opportunity to participate in the DEIS process focusing on the Advanced Power Cricket Valley Energy combined cycle electrical generation plant.
My name is Michael Purcell residing at 130 South Harmony Hill Road. My background is in residential construction, energy conservation in buildings and conservation of regional natural resources.

My service to the community includes participation with the Pawling Conservation Advisory Board in reviewing conservation as it pertains to site plans, the Environmental Leaders Learning Alliance focusing on regional strategies to conserve the Hudson Hills and Highlands, a volunteer with Dutchess Watershed Awareness Month which focuses on providing educational material and free public events pertaining to Dutchess County Watersheds, a past board member of Friends of the Great Swamp ,and a member of the Great Swamp Watershed Alliance.
The comments submitted today are based on personal observations from the field, research on combined cycle gas turbine plants using HRSG technology, research on Nitrogen pollution in the Northeastern United States, data on mean annual precipitation rates for the Harlem Valley , a report from the American Lung Association and review of Cricket Valley Energy documents and the use of USGS Topographic Maps , Dover Quadrant

The proposed Cricket Valley Energy plant (the CVE site) is situated in the valley formed between West Mountain range and East Mountain range in the Town of Dover. The summits and ridgelines of East and West mountain ranges form the watershed boundaries of the Swamp River Watershed, a sub watershed of the Ten Mile River watershed and the Housatonic Basin . Data taken from the USGS Topographical map series 41073F5 , Dover Plains, NY quadrangle depict elevation contours at 10 foot intervals, elevations of summits , wetlands, water bodies, residential areas ,community buildings and natural features.

The valley bottom in Dover and Pawling receives surface water runoff from streams and groundwater discharges originating in the higher elevations and headwaters of the West and East Mountain ranges. Precipitation from the surrounding hills and summits contributes significantly to recharging the drinking water aquifers of the valley bottom and supports aquatic life. The streams draining the West and East mountains are classified as suitable for trout fishing C(T)and trout spawning C(TS) . A study funded by Friends of the Great Swamp in July 2010 found evidence of acid deposition in macroinvertebrate communities in two reaches of the Swamp Rive . The two sites were at lower elevations of streams that drain the West Mountain and Pawling Mountain areas (www.frogs-ny.org science page)

CVE site plan documents depict the construction of three chimney stacks at 282.5 feet above finished grade. The stacks emit combustion gasses for the combined cycle gas turbines The benchmark elevation in building construction projects is expressed as 0 feet and is used as the starting reference point for the actual construction of the buildings. Review of the CVE documents and review of the Dover USGS topographical map shows that the construction benchmark for the CVE site will be approximately 450 feet above mean sea level. Mean sea level is expressed as msl when referencing the topographical maps. The sum of the USGS topo map 450 foot msl elevation and the CVE above benchmark elevation of 282.5 feet would place the point source for CVE emissions at an elevation of 732.5 feet above mean sea level. A clarification should be made as the CVE Draft EIS also states the emissions plume would be 500 feet above the ground and not pose a threat to the surrounding topography based on data from Dutchess County Airport .The Dutchess County Airport has significantly lower elevations than the Harlem Valley.

19-1

. Quoting the CVE DEIS :

"The effect of inversions (which can result as colder air settles in the valley, typically during the night under conditions with few clouds and light winds) can strongly influence near- surface (within 100 – 200 feet of the ground surface) conditions at the Project Development Area. Under these conditions, the 282.5 foot stacks will be above the inversion layer, and the inversion will prevent the plumes from mixing down to ground level. Poughkeepsie Airport data provide regionally representative wind speed and cloud cover observations. Dispersion conditions at plume height, 500 feet above the ground surface, are characterized well by observed conditions at the Poughkeepsie Airport. As such, the airport data accurately represents conditions at plume height including potential inversions."

The Dutchess County Planning Department's
"Natural Resource Inventory of Dutchess County" (NRI)

http://www.co.dutchess.ny.us/countygov/departments/planning/16138.htm

The NRI contains chapters covering the atmosphere and air quality, water resources, geology and topography of Dutchess County.

The NRI notes that the topography of the Harlem Valley is very different from the western portion of the county where weather, wind and topographical data were obtained for the Cricket Valley Energy project site. The NRI contains chapters compiled by Dutchess County's leading scientists, engineers and planners in a single document to aid municipalities in land use decision making processes and as a reference for developers in the private sector.

The CVE DEIS does not include data or supporting documentation that the temperature inversions will not occur in the Harlem Valley or that the surrounding slopes will not be impacted by emissions. The Dutchess County NRI may be a useful guidance document for CVE planners. 19-2

Given the geography of the Harlem Valley and the height of the proposed emission stacks there seems to be a potential for NOx emissions to be adsorbed by water vapor and the forested slopes adding additional nitrogen to the Swamp River and larger Ten Mile River watersheds . The elevations of the surrounding summits are well above "ground level" Some elevations in close proximity of the CVE site are listed for reference : 19-3

USGS Topo Map MSl elevations adjacent to the CVE Site are noted here:
West of the CVE site in theWest Mountain range
West Mt. el. 1289' msl
Bald Mt. el. 1266' msl
Dennis Hill el. 1366"msl
Chestnut Ridge el. 1227' msl
Dobar Mt. el. 1085' msl
Lossing Hill el. 971'msl
Pell Lake el. 1118' msl
High Plains Trailer Park el. 987 'msl
Lakeside Grove Mobile Home Park el. 1151' msl
Saw Mill Hill el. 803' msl
USGS Topo Map MSL elevations east of the CVE site:
Preston Hill el. 1450' msl
Shaghticoke Mt el. 1325' msl
East Mt summit el. 1335' msl

Fog rises in the valley bottom of the Great Swamp Watershed just before sunrise and a bit after sunrise on an almost daily basis. Further studies should be conducted by CVE to assess the amount of NOx emissions that will adhere to water vapor and naturally occurring fog in the 19-3 cont.

Swamp River Watershed. BACT , RACT and NOx Budget Trading Program technologies while better than ever still do not eliminate point source emissions and in fact are introducing new point sources to an area that is currently without point source emissions .The Harlem Valley's topographic and precipitation data are different from the source used for air modeling . Other than the data supplied by Dutchess County Airport I do not see mention of the Harlem Valley's unique topographical features in CVE documents. In a report prepared by Chazen Companies in April 2006 titled "Dutchess County Aquifer Recharge Rates and Sustainable Septic System Density Recommendations" USGS mean annual precipitation data shows an average 46-48" inches of precipitation within the Harlem Valley and along the eastern ridges of the Ten mile River Watershed due east of the project site compared to 40 " annually for the Dutchess County Airport site. From personal observations working along the eastern ridges the air temperature is generally 3- 8 degrees F cooler at the higher elevations. Summer rain events frequently form along the eastern ridges and sloughs of the Harlem Valley, this may account for the increased annual precipitation rates. Perhaps this was overlooked in the PSD air permit application and remains an unknown variable.

19-3 cont.

19-4

19-5

Monitoring the prevailing winds and northerly downdrafts in the Harlem Valley air shed at the valley's higher elevations should be a CVE priority to protect air and water quality within the Swamp River and Ten Mile River watershed .The Ten Mile River Watershed is noted as discharging 24% of Dutchess County surface waters from an area of 210 square miles. This is the most discharge of any watershed in Dutchess County. The project site is located in the valley bottom of a NYSDEC Important Biodiversity Area . Migratory birds should monitored for impacts related to plume velocities and stack heights, the Great Swamp Critical Environmental Area and NYS Wetland DP-22 are noted for supporting species of birds that are breeding , rare and of species special concern in New York State. .

19-6

19-7

Quoted From CVE DEIS:

"Local impacts from acid precipitation formed due to the project are highly unlikely because the processes that convert SO2 and
NOx gases into their acid counterparts can take several days. During this time, the pollutants would have traveled hundreds of miles from the original source. Thus, the emissions from the project would have little or no contribution to the acidity of the precipitation that falls on the surrounding area. Furthermore, impacts at greater distances would be negligible due to the wide dispersion of these gases."

19-8

The CVE DEIS does not offer any data supporting this statement, in fact it seems to go counter to research at Hubbard Brook Field Station in New Hampshire that reports that NOx emissions to the atmosphere have been increasing for the last 50 years and recorded for the last 30.
(Bio -Science April 2003, Driscoll et al)

Nitrogen pollution from point sources in the northeastern United States is well documented as the leading cause of nitrogen loading in Long Island Sound and a major contributor to smog. Emissions from gas fired power plants account for 25-50% of nitrogen point source pollution. Emissions of NOx can convert quickly to other forms of Nitrogen once sunlight is introduced.Nitrogen does not readily readsorb into the landscape but is documented as readily

adsorbing into aquatic environments, headwaters of watersheds and contributing to the eutrophication Long Island Sound. Soils in the surrounding higher elevations could be assessed for their Effective Cation Exchange Capacity (NRCS Web Soil Survey)

19-8 cont.

The American Lung Association report from summer 2010 rated Dutchess County air quality with an "F" for Dutchess County as a result of smog during the smog season.
CVE could help mitigate NOx emissions and other point source pollutants by taking full advantage of the sites south facing facades .The CVE project documents depict south facing building facades covered in metal siding . These surfaces could readily accept solar pv arrays as a means to produce non polluting energy to the electrical grid.

19-9

Every square yard of surface are can produce 8 watts of clean renewable power .
In researching the CVE project documents other electrical generation plants (report prepared by General Electric for Cricket Valley Energy about national grid and electrical demand) in the urban and greater metroplitan area have air monitoring stations located at schools near the emission sources of electrical power plants.

The Dover Middle and High School campus would be a good candidate for an air quality monitoring station. In closing CVE can certainly take a closer hard look at the surrounding hills and valleys and provide more resources to address the monitoring of air quality, water quality and most importantly human health. Prevention of potential environmental impacts is far easier with good planning and research before the infrastructure is built. Dutchess County municipalities, the public at large and CVE project planners have the NRI available as a reference in making land use decisions that are compatible with sustainable development. Dutchess County's many resident university professors and scientists who contributed to the NRI have assembled a document that points the way towards a sustainable future the county's natural resources. Without baseline water and soil chemistry data from higher elevations and headwaters of the Ten Mile and Swamp River Watersheds it seems unlikely that the CVE Draft DEIS has the accuracy the citizens of Amenia , Dover, and Pawling deserve for a project of this magnitude. Additional studies should be completed and funded through escrow of the applicant to establish topographic, watershed and air quality baseline data as a first step towards mitigating potential environmental impacts from the Cricket Valley power plant. Thanks again for the opportunity to submit comments,

19-10

19-11

Sincerely
Michael Purcell
130 South Harmony Hill Road
Pawling NY, 12564

References:
Dutchess County Natural Resources Inventory
http://www.co.dutchess.ny.us/countygov/departments/planning/16138.htm

NRCS Web Soil Survey
http://websoilsurvey.nrcs.usda.gov

(The reference work “Nitrogen Pollution in the Northeastern United States , Sources , Effects and Management Options” published in Bio Science, April 2003,vol 53 no 4 by Charles T Driscoll, Peter Groffman et al depicts the Long Island Sound Air Shed and sources of nitrogen pollution.)
http://ny.water.usgs.gov/pubs/jrn/ny0242/i0006-3568-053-04-0357.pdf

Evidence of acid deposition was found in two macroinvertebrate communities sampled in July 2010 on two reaches of the Swamp River. The study followed parameters and criteria of NYSDEC Stream Biomonitoring Unit to assess biological communities and water quality. The full report is available at Friends of the Great Swamp web page
www.frogs-ny.org Science page.

2010 Connecticut DEP report on airborne pollutants
http://www.epa.gov/ttnamti1/files/networkplans/CTAssess2010.pdf
Locations of Monitoring Stations

What is Nitrogen Oxide and why is it controlled? United States Environmental Protection Agency Air, EPA 456/F-99-006R Planning and Standards November 1999

American Lung Association report on air quality
http://readme.readmedia.com/hudson-valley-receives-mixed-grades-in-lung-associations-annual-air-quality-report/1241070

http://www.deq.virginia.gov/air/permitting/Dominion_Warren/Modeling/Air_Dispersion_Modeling_Protocol_RevII.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

JUL 29 2011

Mr. Robert Stanton, P.E., Director
Bureau of Stationary Sources
Division of Air Resources
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-3254

Re: EPA Comments on the Draft State Prevention of Significant Deterioration of Air Quality (PSD) Permit for the Cricket Valley Energy Center, Dover, New York

Dear Mr. Stanton:

The Region 2 Office of the U.S. Environmental Protection Agency (EPA) has completed its review of the Cricket Valley Energy Center, LLC (CVE) draft State PSD permit that was issued by the New York State Department of Environmental Conservation (NYSDEC) on May 25, 2011, as indicated on the NYSDEC's website. Although the website indicates that the public comment period ended on June 24, 2011, the State's Environmental Notice Bulletin (ENB) published on July 27, 2011 states that the public comment period for this proposed project has been extended until August 5, 2011.

At the outset, we note that EPA was unaware of the issuance of the draft permit and thus had only limited time to conduct its review. As you know, EPA has an interest in reviewing all draft PSD permits, and in particular, those that list greenhouse gases (GHG) as a PSD-affected pollutant. Therefore, it is preferred that draft PSD permits be sent to EPA for review before the start of the public comment period. Providing EPA with sufficient time to review draft permits ensures that EPA has the time necessary to carefully review the existing record and provide NYSDEC with comments to help ensure that the project meets all federal requirements, that the permit provides all necessary information so that it is readily accessible to the public, and that the record provides adequate support for the permit decision. It is my understanding that given the late start of EPA's review of this draft permit and in order to ensure a complete permit record containing EPA's comments, NYSDEC has decided to extend the public comment period, at least in part, so that EPA has the opportunity to submit its comments.

Background

CVE is proposing to construct a nominal 1,000 megawatt (MW) combined-cycle electric generating facility, firing natural gas as the combustion turbines' sole fuel. The project comprises three units capable of operating independently to respond to energy demand with the maximum efficiency. Each unit consists of one F-Class Technology combustion turbine generator (CTG), one heat recovery steam generator (HRSG) with supplemental duct firing with

a maximum capacity of 596.8 MMBtu/hr heat input (HHV), one steam turbine generator (STG), and an associated air cooled condenser (ACC). The project is intended to operate as a base load facility and is proposing to be available to operate up to 8,760 hours per year, incorporating a range of load conditions. In addition to the combustion turbines, the facility will contain ancillary combustion equipment including one natural gas fired auxiliary boiler (maximum heat input capacity of 48.6 MMBtu/hr, limited to 4,500 hours/year of operation), one diesel fired fire pump engine and three diesel fired black-start generators (each with a maximum power rating of approximately 3 MW, firing ultra-low sulfur diesel, and limited to 500 hours/year of operation).

According to the PSD application submitted by the facility, the proposed project is subject to 6NYCRR Part 231 (PSD State Implementation Plan) for the following pollutants: NOx (276.1 tpy), CO (680.5 tpy), PM_{10} (196.1 tpy), $PM_{2.5}$ (196.1 tpy), SO_2 (50.1 tpy), H_2SO_4 (10.3 tpy), and GHG (3,576,943 tpy). Accordingly, CVE conducted a "top-down" BACT analysis for all of the PSD-affected pollutants. To reduce the emission of NOx, the turbines will be controlled through the use of a selective catalytic reduction (SCR). Emissions of CO and VOC will be controlled through an oxidation catalyst system. The turbines will also have dry low-NOx combustion design. Emissions of PM_{10} and $PM_{2.5}$ will be minimized through the use of natural gas as the primary fuel and implementing good combustion practices. The BACT limit for PM_{10} (or $PM_{2.5}$) emissions from each combustion turbine without duct burning will be limited to 0.006 lb/MMBtu, and the BACT limit for PM_{10} (or $PM_{2.5}$) emissions from each combustion turbine with duct burning is limited to 0.007 lb/MMBtu. To minimize GHG emissions, CVE proposes as BACT to operate the turbines in combined-cycle mode and proposes a heat rate limit of 7,605 Btu/kW-hr to achieve a design thermal efficiency of 57.4% (LHV). (At ISO conditions with no duct firing.) In comparison to a similar combined cycle turbine configuration, the permit for Calpine's Russell City Energy Center will achieve a thermal efficiency of 56.4% (LHV).

EPA Comments

1) Although not listed in the application or the draft PSD permit, PM is a PSD-affected pollutant, regulated under 6NYCRR Part 231, in addition to PM_{10} and $PM_{2.5}$. Therefore, emissions of PM should be addressed in the PSD application, and emission limits for PM should be added for all the PSD-affected emission units that emit PM, as necessary.

20-1

2) Although the facility is subject to PSD for GHG as discussed in the April 2011 Draft Environmental Impact Statement (DEIS) submitted to NYSDEC by CVE, the draft permit does not contain GHG emission limits or specify efficiency design parameters for the combustion turbines (i.e., the units that will emit the largest amount of GHG). Note that we agree that the efficiency of the selected combustion turbines is at a level that meets BACT for this proposed source. Consequently, we recommend that the GHG BACT limits and conditions proposed in the DEIS be incorporated into the final permit for CVE. These permit limits and conditions include:

20-2

   a) Each of the three GE 7FA.05 combustion turbines shall have a thermal efficiency of 57.4 percent (LHV) at ISO conditions with no duct firing. In addition, the GHG BACT limit for each combustion turbine shall be a heat rate of no greater than 7,605 Btu/kW-hr at ISO conditions with no duct firing (based on net output).

b) Total annual CO_2e emissions from the three combined-cycle units shall not exceed 3,576,943 tons per rolling 12-month period. Each combustion turbine shall install a CO_2 continuous emissions monitoring system (CEMS), or alternative method as specified under 40 CFR 75, to demonstrate compliance with this combined limit.

c) Total CO_2e emissions from the auxiliary boiler shall not exceed 15,887 tons per rolling 12-month period. The CO_2 emissions from this unit shall be monitored through fuel usage.

d) Total CO_2e emissions from the emergency fire pump shall not exceed 114 tons per rolling 12-month period. The CO_2 emissions from this unit shall be monitored through fuel usage.

e) Total CO_2e emissions from the four black-start generators shall not exceed 4,822 tons per rolling 12-month period. The CO_2 emissions from these units shall be monitored through fuel usage.

20-2 cont.

If you have any questions, please contact Ms. Suilin Chan of my staff at (212) 637-4019.

Sincerely,

Suilin M. Chan

for Steven C. Riva, Chief
Permitting Section
Air Programs Branch

cc: Ken Grzyb, NYSDEC Region 3
Stephen Tomasik, NYSDEC, Albany

21

From: Anne McCabe <amamc26@gmail.com>
To: <depprmt@gw.dec.state.ny.us>
Date: 7/31/2011 3:06 PM
Subject: opposition to gas plant in Dover

Sir:

Until the gas power plant operator signs with NYS an agreement that this plant will never burn the product of hydrofracked gas, I stand in opposition to its opening. 21-1

Anne McCabe

22

From: catherine sebastian <picturecat@mac.com>
To: <depprmt@gw.dec.state.ny.us>
Date: 8/1/2011 3:59 PM
Subject: Re; the proposed natural gas plant near Dover.

Dear Mr. Tomasik,

Where and how would this natural gas be obtained? The idea that Fracking would be involved is frightening. I believe the well being and future of our country depends on rejection of fossil fuel. 22-1
Catherine Sebastian
Ulster County
NY

23

Evelyn and Joseph Chiarito
90 Craig Lane, Dover Plains, NY 12522
845-877-6498
echiarito@aol.com

August 1, 2011

Mr. Stephen M. Tomasik, Project Manager
NYS Department of Environmental Conservation
Division of Environmental Permits
625 Broadway – 4th Floor
Albany, New York 12233-1750

Fax: 518.402.9168 - Email: depprmt@gw.dec.state.ny.us

RE: **Cricket Valley Energy DEIS comments**
Cricket Valley Energy Proposal located at Route 22, Town of Dover, Wingdale, NY

Dear Mr. Tomasik:

My husband and I are home owners and taxpayers in the Town of Dover and submit comments below on the proposed Cricket Valley 1,000 MW electric generating facility to be located at the old Mica Plant campus.

While the folks at Cricket Valley Energy have been extremely pleasant and likeable, I am submitting the following comments and concerns which need to be addressed and considered as this project will have a huge impact in many areas on our community.

The 1999 Chazen Companies study of the Harlem Valley aquifer indicates that the Harlem Valley towns from Amenia to Patterson all share the same aquifer, which provides water for 20,000 people. Draw-down on this aquifer by the Dover Knolls complex (1,376 units), other recently approved and proposed housing developments, existing homeowners, adjacent Dover High school, Wingdale Elementary and Dover Elementary schools, and Cricket Valley Energy (all high volume water users) should be evaluated. It is all the same aquifer. 23-1

Also, what will be the effect on the adjacent Great Swamp (DP-22) and its sensitive habitats and ecological preserves, such as the Mostachetti-Slocum Preserve and Carruth Preserves held by the Oblong Land Conservancy as well as Nature Conservancy Nellie Hill Preserve and Perry Preserve? Some method of monitoring aquifer depletion should be put in place and maintained by the applicant. 23-2 23-3

It would be distinctly unfair to put an economically deprived community at risk where local government might have to come up with monies to remedy the lack of water suffered by homeowners and public services. The DEIS should evaluate the cumulative impact on regional groundwater. 23-4

The old Mica Plant site which will house Cricket Valley and now houses Rasco Materials (a petroleum contaminated soil processor with **not** a good track record), has a troubling past history. It has been reported that glue was disposed of in deep injection wells on this site in its prior manufacturing days. The possibility of

aquifer contamination is a very serious issue. I realize that Cricket Valley will clean up the site but am wondering if aquifer draw-down can also cause the deep well contamination to be drawn up into the water supply? 23-5

The American Lung Association of New York State rates our air quality in Dutchess Co. as an "F." I am not an air quality expert nor do I understand the Cricket Valley modeling explanation. But, I am **astounded** that our air quality comparison is from the Poughkeepsie (airport) area. In our very narrow valley, we have numerous quarrying (blasting) and mining operations with unknown emissions from their operations, related heavy trucking, processing machinery, and Rasco Materials,(a petroleum contaminated soil processer), all of which affect our air quality. Cricket Valley construction, commuting construction crews, trucks and equipment will add to existing air pollution. 23-6 23-7

Yes, gas is “clean-er” than oil but a gas power plant still pumps out millions of tons of CO2, smog producing chemicals, and toxins directly into the air we breathe and will increase the already high pollution in our small narrow valley. **None of these cumulative air emissions have ever been evaluated** but we are proposing adding more without any reliable benchmark. It seems to me that we should know what we have before we project what we may/will have. It reminds me of what has happened in poor communities in the Bronx and New York City and the resulting health problems and high asthmatic rates among the children of those communities. Our narrow Harlem Valley is subject to frequent air inversions, a fact which local hang-gliders have also long reported and which any person living here can attest to and clearly see for themselves. 23-8

Air quality monitoring equipment should be installed at the Dover High School for a sufficient period of time to provide a reliable air quality benchmark to avoid putting our children at higher risk for lung and other poor air-quality related diseases as well as to comply with all state and federal requirements. 23-9

Because air quality is such an important and serious health impacting issue, the Dover Town Board must hire an independent air quality specialist expert to review and evaluate the DEIS and make recommendations. However, the Town of Dover is a poor community without extra monies to spend on experts, (likely one of the reasons that Dover was chosen for this project), I request that Cricket Valley fund this expense. We seem to be a targeted community! 23-10

Any proposed host benefit package or money donations is an unfair exchange for the health of our children.

We need to be sure that our small rural fire company is equipped to handle accidents. We recall the huge explosion and tragedy at the Middletown, Ct. gas fired power plant. Safety is critical especially since the facility is close to the Dover High School and Wingdale Elementary school and residential communities, as we as Con Ed transmission lines and the Iroquois gas transmission line. How will Cricket Valley be prepared to handle such a situation? 23-11

Noise is already an issue. At the last Town Board meeting, folks living on adjacent Chipewalla Rd. complain that they constantly hear the back-up beeps from Rasco Materials on the same site, and are greatly concerned about the noise they will have from Cricket Valley both from construction and when operational. It appears Cricket Valley will exceed the noise ordinance. After all, this is a narrow valley where noise carries and echoe from the surrounding hills. Those who live here know that. 23-12

Mr. Herzog, former Director of the Energy Office of the City of New York covers noise in detail as well as questioning the need for this plant. I agree with his comments.

I have been told that gas for this project will come from fracking. After reading about the environmental damage from fracking, and seeing the documentary "Gasland," I cannot morally support fracking which has left communities in upstate NY and nearby Pennsylvania areas with contaminated water and without a way to survive in their communities. It is unconscionable. Some of the situations are heartbreaking so I cannot condone such an unethical, heartless method of obtaining fuel, especially if it is not really needed as NYS Independent Service Operator finds. 23-13

Cricket Valley will not provide power for this community or more inexpensive power anywhere else. It may also receive so many tax breaks that it will not bring many economic benefits to Dover but big benefit to the developer. Any community benefit may also be offset by the need for emergency and fire services, road maintenance all funded by the taxpayer as well as increased air pollution, community health issues, decreased water availability and/or contaminated aquifer. 23-14

I would like to see addressed how this project is being funded. Is it being constructed to take advantage of Federal, State, brownfield, IDA, grant, subsidy, monies (all taxpayer monies)? 23-15

Thank you for the opportunity to submit comments.

Respectfully Submitted,

Evelyn Chiarito and Joseph Chiarito

24

From: Joel Tyner <joeltyner@earthlink.net>
To: <depprmt@gw.dec.state.ny.us>
Date: 8/1/2011 3:36 PM
Subject: Mr. Tomasik (Stephen)-- I represent Clinton and Rhinebeck in Dutchess County Legislature-- comments here re: 1000-Megwatt power plant for Dover...

Mr. Stephen M. Tomasik, Project Manager
NYS Dept. of Environmental Conservation
Division of Environmental Permits
625 Broadway - 4th Fl.
Albany, NY 12233-1750

Mr. Tomasik (Stephen):

I am in my fourth term serving the towns of Clinton and Rhinebeck in the Dutchess County Legislature; chief among my concerns regarding the proposed 1000-Megawatt "natural gas" power plant for Dover is this-- has anyone from Cricket Valley, Dover, or the NYS Department of Environmental Conservation 100% guaranteed that none of the natural gas to be burned at the power plant will come from fracking?

24-1

Note-- the fact is that frackable Utica shale is right here in Rhinebeck, Red Hook, Hyde Park, and Poughkeepsie; see:
http://www.chemungcounty.com/usr/ACNE/Utica%20Shale%20Fairway%20in%20NYS.jpg
(even the City of Buffalo passed a resolution against fracking of Utica shale there; folks all over NYS aren't just concerned about Marcellus shale; we're also concerned about polluting impacts of fracking Utica shale).

Dutchess County's and our country's future in green jobs-- not in fossil fuels like natural gas-- but solar farms; am I only one who heard the great report recently on WAMC re: green jobs from new solar farm in VT?
http://www.publicbroadcasting.net/wamc/news.newsmain/article/0/0/1833568/WAMC.New.England.News/Vermont's.Largest.Solar.Farm.Commissioned.With.I-Phone. \

24-2

Even the Greene County Industrial Development Agency is welcoming a solar farm there http://greeneida.com/2010/04/greene-ida-and-cornerstone-partner-on-solar-farm/ .

Recall May Duke University study-- groundwater in areas near active fracking wells contained, on average, methane concentrations 17 times higher than wells located where fracking was not taking place--
http://www.naturalgaswatch.org/?p=381 -- and recent NYTimes article on how fracking is Wall Street "Ponzi scheme"-- "Insiders Sound an Alarm Amid a Natural Gas Rush"--
http://www.nytimes.com/2011/06/26/us/26gas.html -- and-- more NY'ers against fracking than for it(!):
http://www.whcu870.com/content_page.php?contentType=4&contentId=8182728&fGId=38413&fGCTId=47&tempId=36927&tId=1&gId=554 (Marist/YNN and Siena polls show more of us against than for it):

24-1 cont.

http://www.huffingtonpost.com/2011/07/15/new-york-gas-drilling-rul_n_900011.html .

Yes, all of this is pertinent to the plant proposed for Dover-- because it's to be fired by "natural gas" (with good possibility much of that natural gas coming from fracking-- over my dead body!).

24-1 cont.

Fact: Dr. Richard Perez of SUNY-Albany has conclusively proven that ALL of NYS's energy needs could be met completely by solar energy alone-- by covering 0.75% of NY's surface with photovoltaics:
http://www.asrc.cestm.albany.edu/perez/publications/Other%20Papers%20and%20Applications/Is%20there%20really%20enough%20sun-07.pdf .

24-2 cont.

Fact: 22,000 jobs across NYS could be created with the bipartisan Bonacic/Cahill Solar Jobs Act of 2011 (for solar renewable energy credits, as in NJ, PA, MA-- all much more heavily incentivizing the purchase of solar for their state residents than New York does here); Germany has less sunlight than NYS but has solar panels all over-- http://votesolar.org/new-york-solar-jobs-act-of-2011/ .

24-2 cont.

My point?...This-- Dutchess does not need the Dover plant for energy, jobs, or power.

Please also do take into consideration the information here below from Constance du Hamel, Robert Herzog, Mike Purcell, The Oblong Land Conservancy, The Pawling Press, Stephen Kaye, and the Housatonic Valley Association.

What happens in Dover doesn't stay in Dover-- it affects all of us here in Dutchess and across the Hudson Valley.

DuHamel and others justifiably share their concerns re: more air pollution from plant here in Dutchess; take note of these three crucial facts:

Fact: This April Dutchess County earned an "F" for ozone pollution for literally the third year in a row, with 15 orange days for ozone pollution, one more day than in 2010, according to the American Lung Association of New York State.
[http://www.midhudsonnews.com/News/2011/April/27/HV_air_ALA-27Apr11.html]

Fact: Dutchess County was one of only two counties in the state whose number of high ozone days increased when compared to last year, according to the American Lung Association of New York State, and there are over 35,000 Dutchess residents with asthma, bronchitis, or emphysema, according to the American Lung Association of New York State.
[http://www.ALANY.org]

24-3

Fact: Dutchess County's average hourly concentration of ozone is actually quite a bit higher than even that of New York City's, according to a recent study conducted at the Cary Institute of Ecosystem Studies by Dr. Clive Jones, Jillian Gregg, and Todd Dawson that was reported July 10, 2003 in the New York Times and in the Poughkeepsie Journal as well.
[http://www.CaryInstitute.org]

Three guesses-- that the air pollution/emissions from this proposed "natural gas" power plant won't smell like roses...

Joel Tyner
Dutchess County Legislator
Clinton/Rhinebeck
324 Browns Pond Road
Staatsburg, NY 12580
http://www.DutchessDemocracy.blogspot.com
home: 845-876-2488
cell: 845-444-0599
joeltyner@earthlink.net
Host, "The Real Majority Project", Fridays 5-6 pm on WVKR 91.3 FM http://www.wvkr.org
Host, "Common Sense", Saturdays 8-10 am on WHVW 950 AM

- -

From GrowSmartDover.org...

[also see: http://growsmartdover.org/citizen-drops-bomb-on-cricket-valley-deis/#more-1441]

CVE DEIS Public Comments, accepted thru August 1, 2011

- Cricket Valley Energy DEIS Public Comments from DuHamel, Constance, July 9, 2010
[http://growsmartdover.org/wp/wp-content/uploads/2011_6_28_CVE_DEIS_com_duhamel.pdf]

- Cricket Valley Energy DEIS Public Comments from Herzog, Robert, July 9, 2010
[http://growsmartdover.org/wp/wp-content/uploads/2011_6_28_CVE_DEIS_com_herzog1.pdf]

- Cricket Valley Energy DEIS Public Comments from Housatonic Valley Association, June 28, 2010
[http://growsmartdover.org/wp/wp-content/uploads/2011_6_28_CVE_DEIS_com_HVA.pdf]

- Cricket Valley Energy DEIS Public Comments from Oblong Land Conservancy, July 9, 2010
[http://growsmartdover.org/wp/wp-content/uploads/2011_7_6_oblong_CV_com.pdf]

- Cricket Valley Energy DEIS Public Comments from Purcell, Michael, July 9, 2010
[http://growsmartdover.org/wp/wp-content/uploads/2011_7_01_CVE_DEIS_com_purcell.pdf%22]

- -

More from http://www.GrowSmartDover.org ...

Is Cricket Valley Energy needed, even if Indian Point shuts down?
[Robert Herzog's comments answer this question:
http://growsmartdover.org/wp/wp-content/uploads/2011_6_28_CVE_DEIS_com_herzog1.pdf .]

24-4

Their answer isŠ no. Based on their expert analysis, NYISO stated in its 2009 Power Trends Evaluation, "Based on current NYISO projections, the state's wholesale electric power system will continue to meet accepted reliability standards through 2018." The NYISO 2010 report extends the period of reliability even further, to 2020. It might be more, but that is as far as their forecast period extends. The New York Control Area baseline summer peak demand forecast developed for the 2010 report shows a baseline energy forecast growth rate of 0.41% for the years 2011 through 2021. The 2009 report forecasted growth rate for annual energy in that period was 0.78%. That represents a 47% decrease in one year! The energy growth rate in the 2011 forecast is lower than in 2010 due to a lower econometric forecast and an increase in the projected amount of energy efficiency impacts.

- -

More from http://www.GrowSmartDover.org ...

American Lung Association New York's position on building new power plants

July 10, 2011

In a letter addressed to Constance DuHamel on July 12, 2011, Michael Seilback, Communications Director of the American Lung Association in New York, states, "[O]ur public policy agenda declares that we believe that we need to see more conservation, efficiency and the use of renewable resources before building new power plants."

24-5

For questions about how ALANY "supports an aggressive advocacy program which influences government, corporate and community policies, regulations and statutes, and advances lung health across New York State," please contact:

Michael Seilback
American Lung Association in New York
631-265-3848?16
mseilback@alany.org
www.alany.org

ALANY's Hudson Valley Asthma Coalition (HVAC) is a program of the American Lung Association in New York is funded by the NYS Department of Health and the national American Lung Association. For information, please contact:

Jacqueline Rubino
914-347-2094, ext 20
jrubino@alany.org
www.hudsonvalleyasthma.org

237 Mamaroneck Ave, Suite 205
White Plains, NY 10605

- -

More from http://www.GrowSmartDover.org ...

Citizen drops bomb on Cricket Valley DEIS

July 14, 2011
Millbrook Independent
By Stephen Kaye

A Dover resident raised new issues that cast doubt on several assumptions critical to the proposed Cricket Valley Energy plant last Saturday at the final public session on the DEIS. Written comments were read into the record by Constance du Hamel of behalf of Robert M. Herzog who could not be present. Those comments went to the heart of the economics of the plant and raised a serious question about noise levels.

Herzog, who has a house around 1.5 miles from the site, was Director of the Energy Office of New York City and was involved in power plant sitings and energy distribution. He questioned whether the 1000 megawatts of the Cricket Valley Energy plant would be needed. He cited published reports of the New York Independent Service Operator, known as NYISO, that says energy consumption in the NY metropolitan area is not expected to exceed the modest increase in supply that is already expected.

He also challenged the assumption expressed in the DEIS that newer and less polluting plants are preferred when distribution decisions are made. He said the distribution decisions are made by NYISO on the basis of costs. A coal fired plant using low cost fuel that is older and therefore has a depreciated basis for establishing costs will generate energy that costs less than a plant using cleaner but more expensive fuel but with a higher amortization schedule. Cricket Valley's DEIS assumed that its power would be preferred over power generated by old coal fired plants.

24-6

Herzog said NYISO will take power from hydro, nuclear and coal first because that energy is cheaper than gas.

Herzog also addressed the possibility of both Indian Point plants closing as is being urged by Governor Cuomo and an active citizens lobby. Even then, there are alternatives available that might be cheaper than using a gas fired plant in Dover. He said there are two new plants that are on cue ahead of Cricket Valley, one in Queens and another in Bayonne, N.J. Both have location advantages since the power grid from the Harlem Valley would run through Westchester where the grid "is congested" while the other two are within the area of heavy use. There is also hydro and wind power coming on line in Quebec and a proposal for bringing that power to NYC via an underwater cable to run down Lake Champlain and the Hudson.

Before Cricket Valley could be built it would need a green light from NYISO. Investors and lenders would need that green light.

Herzog questions the DEIS statement that the new plant would improve air quality because the more polluting plants would shut down. If the more polluting plants produced cheaper energy, they would not be shut down, so there would be no net gain. Absent the shutdown of older plants, the CO2 in the NY power pool would increase 2 % if Cricket Valley is built.

"DEC as lead agency with the mandate to protect our environment has the legal responsibility to consider the NYISO's findings and the likelihood of far better alternatives available during the time frame when they will actually be needed. Circumventing or ignoring such findings would be a violation of DEC's mission," says Herzog in his written statement.

After making a strong argument that the Cricket Valley DEIS errs in its claims as to economic need and its air pollution claims, Herzog then raised the noise issue that he says is significant. The DEIS says the average noise level will be no louder than 50db meaning that sometimes it will be more and sometimes less. He cites the World Health organization that says "environmental noise above 40-50db Leq is likely to lead to significant annoyance; outdoor levels of 40-60db may disturb sleep."

24-6 cont.

The plant is within 1000 feet of the Dover Plains High School. Herzog says the ambient noise levels will penetrate into the classroom and interfere with the learning of students.

He also says that the plant's noise level will exceed that permitted by the town of Dover's zoning law and that a waiver will be necessary for the plant to operate. Herzog asks that the waiver not be granted.
Herzog questioned the bias of those who conducted Cricket Valley's DEIS studies.

"The energy cost and environmental impact studies were prepared by General Electric. GE will also be selling to CVE major pieces of equipment for the facility, for hundreds of millions of dollars. Their findings in support of the plant are hardly a surprise, and an alternate study performed by a truly independent and unbiased organization, selected by the community, should be conducted for this and all other major findings of the DEIS that were derived from interested parties. As the DEC's mission includes supporting environmental justice, it should mandate that CVE provides funds for such studies, since the community is hard pressed to do so."

Neither the DEC nor Cricket Valley commented on Herzog's statement at the hearing on Saturday. Because Herzog's comments are now part of the record, the DEC as lead agency is obligated to consider them. Herzog recognized that one approach might be to require new studies on the points he raised. He asked that Cricket Valley pay for those studies, but the choice of who would write them should be the town's. This comment was repeated by other speakers at the public comment session.

Herzog's comments were "like dropping a bomb" said Stancy duHammel who has been following the process as resident of Wingdale and member of FROGs and other local groups. "These points go to the heart of the matter. If there's no market, this plant won't happen. With its

282 foot stacks, this plant no longer looks so good." DuHamel also noted that no comments were submitted on behalf of the town on the scoping session and that the town had not engaged specialists to assist them in assessing or commenting on the Cricket Valley DEIS.

- -

More from http://www.GrowSmartDover.org ...

Economic Development

July 15, 2011
Pawling Press
From the Editor's desk

It all seems to be happening in Dover. But all is not gold that glitters.

There are a couple of mammoth projects underway in Dover. The first is Dover Knolls (DK) and this involves the redevelopment of the now unoccupied Harlem Valley Psychiatric Center. The second involves the construction of a 1,000 megawatt power plant just south of the Dover Middle and High School campus at the Mid-Hudson Recycling Center, an old industrial site. DK is largely through the permitting process but the power plant is not.

The two developments are of fundamentally different characters but both are adjacent to Route 22 and the Swamp River, the slow-moving central artery of the northern reaches of the Great Swamp, an important wetland. They also both sit atop the single source aquifer that the communities in the Harlem Valley rely upon for their water supply. Demolition of the first buildings at DK has taken place and we await further developments. The power plant, known as Cricket Valley Energy (CVE), is still in the SEQRA (State Environmental Quality Review) process but construction could start in 2012 assuming all the regulatory matters are put to bed in a timely way.

The CVE project first saw the light of day in or around May 2009 when a presentation was made by Advanced Power to the Town of Dover at the High School. The proposal was to option some 130 acres of land approximately 50 of which would be devoted to the development of the plant and the remainder would be placed into permanent conservation. The price tag was to be some $1 billions and several hundred jobs would be created during the 3-year construction period with some 25 to 30 permanent jobs created once the plant was operational.

The permitting process for a project of this type is complex with lots of agencies involved at Federal, state and local levels. It took CVE about a year to get to the point where a Scoping Document was finalized in June 2010 and another year to produce what is known as the Draft Environmental Impact Statement (DEIS). The idea is that the public gets to participate in the process leading up to the Scoping Document which establishes the framework for the DEIS. And there was plenty of public participation given the nature of the project.

The DEIS, a monster document, was published in early June this year and the public hearings on it duly took place on June 28th last. Since this was a Tuesday there was a bit of an outcry from those who could not attend due to work schedules and eventually the New York State Department of Environmental Conservation (DEC) yielded to public pressure for a further Saturday session. That session was held on Saturday last at a packed Dover Town Hall; our page 1 article refers. Without getting bogged down in all the detail the DEC are the Lead Agency and are responsible for orchestrating the SEQRA process.

The DEC are also one of the 13 permitting agencies who will control the grant of some 30 different permits.

There were a number of people at that meeting that said they were unaware of the project until two weeks prior to the July 9th meeting. Without doubting the veracity of their claims one wonders where there have been. Over the last two years CVE have retained communication consultants to help them reach out into the community and there have been workshops, newsletters, media coverage and goodness knows what else to help draw the public into this process. We can find no fault with their outreach. However, with the best will in the world there will be the odd few folks whose address the Post Office clearly may not have.

The long and the short of it is that there are four major areas of concern that were expressed by members of the public who attended the last meeting. First, whether there is, in fact, a need for this plant. Additionally, and in no order of importance, the environmental impacts of the plant upon air quality, water resources and noise.

The need for this plant is not something that we ordinary mortals can deliberate upon. In fact the power grid demands are something that is handled by the New York Independent System Operator (NYISO). Apparently, there may be some question as to whether NYISO agrees that there is a short-term need for the power to be generated by CVE. How that gets resolved we do not know. Further, given that the power to be generated will benefit the state rather than the locals there is the question of the level of benefits that should accrue to the host community for accepting this facility.

Leaving those issues on one side, and assuming the plant proceeds, we are left with the potential environmental impacts. The plant is state-of-the-art and CVE have been responsive in designing it down to mitigate its impact on the surrounding areas. Since there is no way to tell now exactly how the plant will impact us in the areas of air, water and noise extensive modeling and testing has been done. With the best will in the world these models are necessarily complex and beyond the grasp of most of us. They are also based upon certain assumptions that may or may not bear out in practice. The problem is that once one has invested $1 billions and the plant is up and running one's options to change things are limited.

24-7

The DEIS is prepared by CVE and it contains a wealth of detail furnished by about a dozen expert consultants in each specialized field. It is, of course, CVE's document and whilst is intended to address all matters raised in the Scoping Document one could not expect it to take the opposite side of any particular issue. This is not to infer that the document is biased but what it does call for is an independent review by experts retained by the Town of Dover on behalf of

its residents. Now, the Town has retained the firm, AKRF, to advise them but it is an open question as to whether additional expert help would be useful in evaluating the impacts upon air, water and noise.

24-7 cont.

We might take the view that a plant some 4.5 miles north of us is too far away to be of interest. However, that is a flawed view; we draw water from the same aquifer and breathe the same air. Noise will probably not be an issue given that we are not within earshot of the plant.

The DEC is open to receiving written comments on the DEIS through August 1st and there have been requests for additional extensions of this time limit. We should interest ourselves in what is happening north of the town line.

- -

[recall Pok. Journal editorial on all this July 8th]

Concern Swirls Over Power Plant Bid
http://www.poughkeepsiejournal.com/article/20110708/OPINION01/107080324/Concern-swirls-over-power-plant-bid

Constance I. DuHamel, cofounder of the Coalition for the Responsible Growth of Dover, is focusing, in part, on how much more polluted the air will be in the area with a new power plant on line, "taking into consideration the relatively poor air quality we are reported to have already."

24-8

She rightly calls on environmental officials to be continually mindful of the cumulative impact of the site's presence, not just governmental thresholds for the harmful chemicals coming from the emissions of this particular plant.

24-9

She also proposes Cricket Valley Energy pay for an air-quality monitoring station, to be located nearby on the grounds of the Dover middle and high schools, with the data collected independently and submitted to the EPA. The plant is about a mile from the school, and DuHamel notes there are times of year when children play outside using school facilities.

24-10

25

From: <MahoBay7@aol.com>
To: <smtomasi@gw.dec.state.ny.us>
Date: 8/1/2011 11:48 AM
Subject: ATT: Stephen Tomasik -CVE DEIS Public Comment

Attention:
Stephen Tomasik
Project Manager
Major Projects Management Section
Division of Environmental Permits
NYS Department of Environmental Conservation
625 Broadway - 4th Floor
Albany, New York 12233-1750
PH: (518) 486-9955
FAX: (518) 402-9168
smtomasi@gw.dec.state.ny.us

Cricket Valley Energy Project Dover Plains

These are my concerns, requests and questions, most of which were stated at the DEC meeting on Saturday July 9, 2011

· A third party review of this project should be paid for by Cricket Valley. The third party used must be chosen by the Town of Dover. 25-1

· If The Town Board is NOT the Lead Agency, then the meeting of local residents should be directly with the DEC members who are making the decision. I believe the DEC representative had to leave the meeting. 25-2

· The Cricket Valley Power Plant from will remove clean water from our aquifer, and in exchange they will add air, visual and noise pollutants to our environment. This will increase the health risks to residents, many of whom have moved to the Dover Region to avoid city pollutants. 25-3

· Due to the stagnant nature of the air in the Harlem Valley Region, this is particularly true. 25-4

· No exception to decibel levels should be considered. 25-5

· Dover and surrounding Towns must be given the opportunity to buy local electrical power from Cricket Valley at reduced rates. 25-6

· Cricket Valley can do much more to give to the Dover Community: new acreage of trees and parks can be purchased, trees can be planted to offset the carbon dioxide and other greenhouse gases that will be pumped daily into our air, a plant can be built to remove toxins from existing water ways and the aquifers. Air pollution monitoring systems, educational scholarships and the support of local land acquisition and environmental programs are some possible examples of appropriate give backs to our community. 25-7

· It is unclear as to whether this plant is needed. What would be the implications if no contract to produce power was obtained? What precautions can be put in place now to prevent abandonment? How can we set up the agreement between the Town and Cricket Valley, so that any new owners are held responsible for environmentally sound actions? 25-8

· This project can be a “hybrid” power generating plant which would include solar and wind power. This would be a more appropriate example of working towards a green, sustainable energy plan for the future.

· GE is building a power plant that uses a flexible natural gas power generator coupled with concentrating solar power and wind turbines

· It was unclear as to whether bog turtles and rattlesnakes are on this site and how they would be protected.

· Jobs in the community in exchange for polluted air for everyone else, is not acceptable.

· Has Cricket Valley explained how they would avoid a deadly situation similar to the explosion at a Middletown CT plant?

· What is making Dover so attractive to developers of environmentally risky projects? Is it that the developers know that Dover will not be able to afford the third party review and the litigation that may be needed to oppose any inappropriate aspects of the project?

25-9

25-10

25-11

25-12

25-13

Sincerely,

Mark Chipkin
60 Hurds Corner Road
Pawling, New York 12564
845-855-9155

26

From: George Quasha <gquasha@stationhill.org>
To: <depprmt@gw.dec.state.ny.us>
Date: 8/1/2011 9:28 PM
Subject: the 1000-megawatt natural-gas-fired power plant proposed for Dover

To: DEC Project Manager Stephen M. Tomasik:

I and my wife Susan Quasha, Co-Publisher, urge you to disallow the 1000-megawatt "natural-gas"-fired power plant proposed for Dover. 26-1

We support Joel Tyner's well researched position on this matter with which you are no doubt familiar.

Thank you,

George Quasha
Publisher
Station Hill Press, Inc.
120 Station Hill Road
Barrytown, NY 12507

845-758-5293
www.stationhill.org

27

From: Mike Purcell <mpcarpentry@msn.com>
To: <depprmt@gw.dec.state.ny.us>
CC: <smtomasi@gw.dec.state.ny.us>
Date: 8/2/2011 5:15 AM
Subject: Cricket Valley DEIS comments

Dear Mr Tomasik,

27-1

27-2

The Cricket Valley Energy combined gas turbine electrical generating plant and its potential to release above threshold greenhouse gases and NOx warrants a a hard look and a Saturday meeting for a public hearing . From personal observations as a resident of the Harlem Valley I can report the the Great Swamp has an almost daily occurrence of fog rising from the wetlands in the dawn hours.The fog rises above the elevation of the 2 stacks that Cricket Valley is proposing.Emissions of NOx combined with water vapor is the main ingredient for smog Smog is the leading cause of acute and chronic respiratory problems , especially in children and those experiencing respiratory difficulties The presence of this naturally recurring phenomena of the Great Swamp Critical Environmental Area has not been addressed in Cricket Valley Energy Documents and poses significant adverse impacts to water resources and the calcareous wetland ecology of the Harlem Valley . Calcareous wetlands are dependent on low NOx volumes to maintain the fragile ecosystems that are common here and rare statewide. Given the unique characteristics found in the Great Swamp Watershed a hard and closer look at what occurs in the dawn hours of the Great Swamp should be considered in the applicants planning process.

Sincerely,

Mike Purcell
19 Sans Souci Drive
Pawling, NY12564

28

STATE OF NEW YORK DEPARTMENT OF PUBLIC SERVICE

THREE EMPIRE STATE PLAZA, ALBANY, NY 12223-1350

www.dps.state.ny.us

August 4, 2011

Stephen Tomasick
Project Manager
Division of Environmental Permits
NYS Department of Environmental Conservation
625 Broadway, 4th Floor
Albany, New York 12233

Re: Cricket Valley Energy (CVE)
1000MW Combined Cycle Generator
DEC Permit(s) #3-1326 00275/00002, 00003
Town of Dover, Dutchess County

Dear Mr. Tomasick:

The Department of Public Service (DPS) has reviewed the local special permit application, Draft Environmental Impact Statement (DEIS) and supporting documentation for the proposed Cricket Valley Energy (CVE) 1000 MW combined-cycle generating facility to be located in the Town of Dover, Dutchess County. The applicants must receive a Certificate of Public Convenience and Necessity (CPCN) pursuant to Section 68 of the Public Service Law (PSL) and, since a proposed security issuance has a term of more than one year, approval of financing pursuant PSL Section 69.

28-1

On December 10, 2009, DPS Staff provided initial comments regarding CVE's application for a Special Permit from the Town of Dover in a letter to Town Supervisor, Ryan Courtien. Those comments included specific information requests for satisfying the requirements of CVE's CPCN and financing approvals. For example, additional information is necessary regarding the proposed project's back-up operating procedure in the event of an unanticipated contingency. This information should include a discussion of what back-up energy production capacity can be sustained, if any; the back-up fuel source(s); the proposed on-site fuel supplies and their expected duration; and, the process for switching fuels if a gas emergency occurs or is declared. The applicants should also discuss how the power production capacity was determined for the proposed generator at the Cricket Valley site.

28-2

28-3

The EPA has recently promulgated new standards relating to the emission of Nitrous Oxides and Sulfur Oxide compounds into the environment. The applicants should describe how the low-NOx auxiliary boiler could meet these emission standards and whether significant equipment changes would be required to meet them in the future. 28-4

In general, it is not clear why section 2, entitled "Earth Resources," is needed in the DEIS. The topics of Section 2 would be easily discussed in Section 3, "Natural Resources." Statements made in the DEIS at Section 2, "Earth Resources," sub-section 2.1, "Applicable laws, Regulations and Policies" include "National building codes address the construction of structures in certain seismic zones and draft seismic provisions have been prepared to support the New York State Uniform Fire Prevention and Building Code" (DEIS, page 2-1). Please note that Section 1613 of the 2010 update to the Building Code of New York State includes required seismic design criteria for new buildings. 28-5

Staff of the NYS Department of Public Service will review CVE's petition to the Public Service Commission (when filed) for an eventual recommendation to, and decision by the Commission on the required Section 68 and Section 69 authorizations. As such, DPS Staff requires copies of all plans, documents and specifications to be prepared in further support of this project including, but not limited to, final construction drawings and specifications, final site grading and drainage plans, wetland restoration and mitigation drawings and a final Storm Water Pollution Prevention Plan. DPS Staff reserves the right to request additional information during its review. 28-6

Thank you for the opportunity to provide these brief comments. If you have any questions, please contact Richard H. Powell at (518) 486-2885 (richard_powell@dps.state.ny.us) or Vance A. Barr of my staff at (518) 473-4817 (vance_barr@dps.state.ny.us).

Sincerely,

Christina C. Palmero

Christina C. Palmero, Chief
Renewable Energy and
Environmental Compliance

CC: DEC: L. Wilkerson, C. Hogan
Town of Dover: Ryan Courtien, Supervisor
CVE: J. Ahrens
Keene & Beane: Richard L. O'Rourke
DPS: S. Blow

29

August 4, 2011

Stephen M. Tomasik
Project Manager
NYSDEC
Division of Environmental Permits
625 Broadway – 4th Floor
Albany, New York 12233-1750

Dear Sir: I wish to comment on Cricket Valley Energy's DEIS. I attended CVE's presentation at Dover Town Hall in August. I have read parts of all sections of the DEIS. I've have written a DEIS for sand and gravel mining application near Cortland, New York as part of a master's program in geology education. Presently I work as a part-time teacher in Dover School District and reside in neighboring Town of Pawling.

I have several concerns:

1) Viewshed analysis shows that the plant is plainly visible from the library at Dover Junior-Senior High School. Prevailing winds will bring particulate matter directly over the school's athletic fields and track facility. Pediatric asthma studies indicate negative health effects from stagnant atmospheric inversions in our areas. There are also several summer camps in Lake Ellis region just east of the school property that are dealing with children with these problems. 29-1 29-2
2) Any SEQRA document needs to include substantive alternative actions to the proposed application. The DEIS plainly dismisses this responsibility; stating there is no environmental benefit to the no action alternative- there is clearly a distinct benefit to not approving this project. 29-3
3) The largest concern is a lack of track record for CVE. There are no current projects operating in the U.S. A plant in the Boston area is not up and running yet. I would recommend delaying action on this application until performance can be evaluated on other projects initiated by CVE's parent company. 29-4

Thank you for your time in reviewing these comments

Sincerely,
David W. Roberts
33 Elm Street
Pawling N.Y. 12564

SIERRA CLUB
FOUNDED 1892
ATLANTIC CHAPTER

STERLING FOREST/HIGHLANDS COMMITTEE

CONTACT PERSON: Jürgen Wekerle
P. O. Box 287
Walden, NY 12586
Tel.(845)744-5116

30

August 4, 2011

NYS DEC Division of Environmental Permits
625 Broadway (4th Floor)
Albany, NY 12233-1750

Attn: Stephen Tomasik, Project Manager

STATE ENVIRONMENTAL QUALITY REVIEW (SEQR) DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS), AND DRAFT DEC PERMITS FOR THE CRICKET VALLEY ENERGY CENTER (CVE) POWER PLANT APPLICATION, TOWN OF DOVER, NY.

Dear Mr. Tomasik:

The Sierra Club is a national, state and local grassroots membership organization committed to protecting the natural and human environment which we share. The Atlantic Chapter consists of over 41,000 members who reside throughout New York State. The Chapter has a special interest regarding issues that impact the NY-NJ Highlands Region.

The following written response supplements Sierra Club oral comments made at the July 9, 2011, CVE DEIS Public Comment Session held at Dover Town Hall, and includes only some of the issues that were overlooked or inadequately evaluated in the Cricket Valley Energy (the Project) DEIS. Those issues must be addressed in the Final EIS, and during any permit deliberations.

THE PROJECT DESCRIPTION

CVE proposes to construct and operate a natural gas (methane)-fired power plant generating an electrical output of 1,000 MGW. The fuel is to be supplied by the nearby Iroquois pipeline which connects to the TransCanada pipeline and currently provides natural gas from conventional sources in Eastern Canada. The electricity to be generated is to tie into the nearby Con Ed power lines and is to be directed to the Pleasant Valley substation complex east of Poughkeepsie for further transmission to the high use but already well-supplied NY Metro market.

Not explained but integral to the CVE Project is the planned fuel switch to Marcellus Shale hydrofracked methane as the fuel source, and the related plan to construct the new 66-mile, 36-inch diameter NY Marc pipeline needed to transport that Marcellus Shale gas to a new Iroquois pipeline interconnection to be constructed in Pleasant Valley which will feed the CVE power plant. 30-1

Also not explained are the capacity limits and congestion vulnerability of the electric substation in Pleasant Valley which exists now even before the CVE plant is brought on line. Major rewiring is anticipated in order to accommodate the Project. 30-2

SEGMENTATION AND CUMULATIVE IMPACT

The Project is to be dependent on Marcellus Shale gas and on the new pipeline required to transport that methane to the Project site in Dover. Like a three legged stool, each leg is needed to support the other, but each has its own issues that need to be evaluated separately and in combination. However, each is currently being segmented from the other as though they were disconnected projects.

The DEIS must evaluate the public health impacts caused by ground-level ozone production and greenhouse gas atmospheric production caused by fugitive methane emissions related to the horizontal drilling hydrofracking production process which is taking place in the Marcellus Shale region. Methane is a much more potent greenhouse gas than is Carbon Dioxide, and also is immediately injurious to human health. 30-3

Independent studies have recently documented that the drilling process itself introduces elevated volumes of toxic methane and other toxic substances into the open environment causing formation of ground level ozone in addition to negative climate change impacts.

Attached are two reports: "methane and the greenhouse-gas footprint of natural gas from shale formations," authored by Professor Robert Howarth (Cornell University), et al.; and, "Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing," authored by Professor Robert Jackson (Duke University), et al. Please review and incorporate into the DEIS evaluation and response.

The DEIS must evaluate the NY Marc connecting pipeline needed to supply the CVE Project as noted above.

The NY Marc Connector originates in the Town of Wantage, Sussex County, N. J., and links the Tennessee Gas pipeline to the Millennium Gas pipeline in the Town of Minisink, Orange County, N. Y., continues northeast along the Wallkill River Corridor to the Town of Lloyd, Ulster County, passes under the Hudson River, continues through the Town of Poughkeepsie, Dutchess County, and terminates at the Iroquois Gas pipeline in the Town of Pleasant Valley. The Tennessee pipeline transports Marcellus Shale gas from northern

Pennsylvania, and the Millennium pipeline transports Marcellus Shale gas from New York's Southern Tier.

Not only should the DEIS include the adverse impacts and mitigation options required by SEQR, but also should incorporate DEC policy guidance on greenhouse gas emissions as well as policy considerations required by the NYS energy plan.

Further, the infrastructure deficits that currently exist at the Pleasant Valley substation must be evaluated with or without the Project's added load. The NYS Public Service Commission (PSC), NYISO, U.S. Department of Energy (DOE), and the U.S. Federal Energy Regulatory Commission (FERC) have all identified the electric transmission interconnections located at the Pleasant Valley substation as a grid choke point presenting critical constraint/ congestion problems for the entire grid right now, problems that can only be aggravated by additional production by CVE.

The grid and substation in Pleasant Valley are in dire need of modernization independent of CVE. In turn, the efficiencies gained by an upgraded grid/substation could equal the production capacity of CVE and thus obviate the reason for the CVE Project as was the case of the Lovett power plant in Rocklant County noted below. This infrastructure efficiency scenario should further be considered among the range of alternatives that support a "no action" alternative.

In order for the CVE Project to function, Marcellus Shale gas production, connecting NY Marc gas pipeline construction, and the rewiring of power lines must also take place. The DEIS must evaluate the comprehensive construction and the cumulative impacts of methane emissions starting with the drilling/production of the methane, the delivery of the methane to the Project, the health and air quality consequences of the methane leakage into the atmosphere as well as the CVE stack emissions post-combustion.

DETERMINATION OF NEED

SEQR requires an evaluation of the public need and benefits of the CVE Project. Before the specifics of the Project are even considered, the DEIS must establish the need for such a new source of power supply which depends on public financial support. SEQR requires the taking of a "HARD LOOK" at the CVE proposal as well as at a full range of alternatives and strategies that could also satisfy the Project's stated purpose.

And, New York State regulations also require an evaluation of impacts on the use and conservation of energy including a demonstration that the Project will satisfy generating capacity and other electric system needs in a manner consistent with the state energy plan, the state Renewable Portfolio Standards (RPS), and the state Greenhouse Gas Emission Policy. 30-4

The New York Independent System Operator (NYISO) which manages the supply/reliability of electricity produced and traded among

30-4 cont.

New York merchants has confirmed that there is no existing or anticipated need for additional power supply in New York State during the next 10-year planning cycle through 2020 or beyond. NYS is experiencing its fourth year-over-year steady decline in power consumption since 2007, even though July 2010, had the highest monthly use on record, and several weeks during July 2011, had the highest weekly use on record. During those peak periods, no supply disruptions were experienced.

The following are three recent cancelled power supply projects resulting from reduced demand:

-- During 2007, the Mirant-owned Lovett coal-fired power plant, located on the Hudson River in Rockland County, was under a consent order to upgrade its emission system. Due to a decline in demand and in revenue, Lovett elected to go out of business but first had to demonstrate to the PSC that a replacement source of electricity existed. Due to O&R Utility reconstruction of a major substation and local distribution lines, efficiencies were created which made up for the loss of the Lovett power output. The decommission request was granted by the PSC and the plant has since been demolished. No new power generation was needed as a replacement for Lovett. Instead, efficiency provided the replacement power.

-- During 2007, New York Regional Interconnect (NYRI) proposed a transmission-only power line to deliver new power supply from upstate into the NY Metro market. Generators and utilities would pay fees for use of the power line which, coupled with DOE-federal stimulus grants/incentives-IDA subsidies, etc..., would pay for construction costs. However, no demand materialized, no actual market existed, and no merchant contracts were signed. NYRI then petitioned FERC for a special surcharge on all ratepayers to shift construction costs from investors to the public. FERC denied the outrageous surcharge request at which time NYRI's lack of a credible business plan was unmasked. When the private investors refused to risk their own money, NYRI withdrew its application before the PSC which then, on April 21, 2009, dismissed the NYRI application "with Prejudice."

-- During 2010, the Champlain Hudson Power Express (CHPE) applied to the PSC for a transmission-only submarine power cable permit to deliver 2,000 MGW of electricity from Canada to the NY Metro region and to New England. During July, 2010, CHPE abruptly withdrew half of its proposal due to lack of demand. A 1,000 MGW proposal targeting the NY Metro market is still under review.

Because of declining demand, existing generators have curtailed production accordingly. The DEIS must inventory the power suppliers serving the NYISO market to record rated capacity, peak capacity, normal output plus reserve capability, and actual daily output to NYISO consumers during the past five year period. How much total supply is available, and how much consumption/demand actually is in play? How much unused capacity really exists?

The DEIS must describe how suppliers trade electricity: whether by NYISO auction process, or by bilateral contracts, or by some other exchange including export-import action beyond the NYISO service area. 30-5

The DEIS must describe the mechanisms of how the NYISO purchase auction system actually works since CVE has no current utility contracts and will be dependant on the NYISO system to absorb its electric output. 30-6

The DEIS must evaluate the impact of pending new power supply proposals under review which will compete with CVE for customers, such as the Cross-Hudson cable from NJ to the 49th Street sub-station in Manhattan which will link Con Ed to the PJM transmission system west of the Hudson River; or the CHPE 1,000 MGW transmission cable from Canada to New York City; or the 800 MGW NRG Astoria, Queens gas-fired power plant; or the 630 MGW Competitive Power Ventures power plant in the Town of Wawayanda, Orange County; or the NYC DEP hydro projects using reservoir spillways, etc... How will all that new supply capacity affect CVE, and how will CVE impact the pending competing proposals? NYISO data clearly confirms that not one of the above noted proposals, including CVE, is needed. 30-7

RANGE OF ALTERNATIVES/NO ACTION ALTERNATIVE

The DEIS must consider the full range of reasonable, realistic alternatives to the purpose and objectives of the CVE Project, and must consider the financial capabilities of the project sponsor especially in the context of current market conditions, environmental degradation, conflicting public policies, and the expenditure of federal-state-local public funds/subsidies required to underwrite the CVE Project. 30-8

Alternatives are not limited to property locations, but include alternate sources, solutions and technologies that could produce the same or better outcomes than that promised by CVE.

Further, electric generating facilities require a closer scrutiny to be consistent with the state energy plan. For instance, it is not reasonable for CVE to claim that its smoke stack emissions will be cleaner than other power plants when zero-emission options are available. It is not reasonable when CVE production is not needed but will cause a net increase in air pollution and greenhouse gas emissions that are unnecessary and could be completely avoided at no public expense or health risk in the first place.

If there really is increased demand and a need for additional supply, many alternatives exist beyond the reflexive response to increase generating capacity. The DEIS must evaluate the impacts of the full range of alternatives that would accomplish the stated CVE purpose. The DEIS must evaluate competing proposals/ technologies; efficiency and conservation initiatives; changing

development/construction code trends; and, changing economic/ consumption conditions as required by the state RPS and consistent with state and national policy to reduce greenhouse gas emissions.

-- The DEIS must consider the example of efficiency represented by the Lovett power plant/O & R substation power line upgrade described above that demonstrates the significance of the state/merchant priority to modernize the transmission/distribution grid which must occur anyway.

-- The DEIS must evaluate the full range of Demand-Side-Management (DSM) strategies and technologies from dynamic time-of-day congestion pricing to various digital metering systems within a home that regulate appliance on and off cycles and sequential use, to grid-based, system-wide controls and bulk wholesale flow management systems such as those being created by IBM. The radio-telephone controlled thermostats for cooling systems in large NYC buildings that were installed by Con Ed to reduce NYC peak load during the July 2010 and 2011 heat waves is a good example of a relatively low-tech, low cost solution.

-- The DEIS must include the findings of the January 9, 2008, DOE report which shows that implementing the system-wide technology of digital time-of-day temperature and price metering could reduce peak electric loads by up to 15 percent a year and thus save over $70 billion no longer needed to build 30+ new power plants such as the proposed CVE Project. Such a strategy would simultaneously remedy pollution of air and water, smog production and health dangers, climate change emissions, supply concerns, and reduce consumer expenses.

-- The DEIS must evaluate the unused, available reserve capacity of all power plants supplying the NY Metro region. For example, the Bow Line power plant on the Hudson River is producing minimum power due to low demand and high costs. However, Bow Line can quickly ramp up its maximum capacity if needed at peak load times. Also, one or both of the Indian Point nuclear units are off line for extended periods with no service interruptions to consumers.

-- The DEIS must consider the New York City regulations that require the ability to produce 80 percent of peak load from generation facilities located within the City limits. The CVE Project has no role in fulfilling that NYC requirement.

-- The DEIS must evaluate all of the alternate supply, efficiency, and conservation programs conducted by the NYS Energy Research and Development Authority (NYSERDA) which contribute to make the CVE Project unnecessary.

-- The DEIS must examine the impact on reduced power consumption due to state and local improved building construction codes and code enforcement. A recent example was O & R Utilities contracting with Bechtel Corp. to construct three gas-fired power

plants in anticipation of projected population growth in Orange County, the fastest growing county in the State. The population estimates were correct, but the expected energy consumption per household plummeted due to improved building insulation practices. That decline in energy need made the take-or-pay contracts cost prohibitive for the utility and for all customers. Those power plants were never constructed, but O & R still had to litigate in State Supreme Court to have the take-or-pay contracts with Bechtel rescinded.

-- The DEIS must examine the impact of the '09 American Recovery and Reinvestment Act's funding of weatherization and other energy efficiency programs designed to reduce and conserve energy.

-- The DEIS must evaluate the impact of all the solar energy products which are replacing traditional electric generation sources and which also reduce the need for new transmission facilities. The Solar Energy Consortium in Kingston, NY, has created over 400 production jobs during 2010. Commercial and residential net-meter programs, solar-thermal hot water systems, solar powered LED street and building lighting have not only produced renewable "clean power," but also have removed those sources from the power line, thus making more grid capacity available to other merchants.

-- The DEIS must evaluate the projected impact of the LIDAR project and of the recently enacted "Remote Net-Metering" legislation, and the proposed "Feed-in Tariff" legislation that would facilitate commercial grade, high output electricity from solar panel installation. Especially timely is the aerial photo LIDAR survey of NY City rooftops sponsored by CUNY which concluded that 66 percent of the city's buildings could support solar installations which could generate over 5,800 MGW of electricity that could provide half of the city's peak demand needs.(N.Y.Times, June 16, 2011.)

-- The DEIS must evaluate the impact of decentralized, land-based and off-shore wind power proposed for Long Island and the New Jersey coastline that would serve the NY Metro region.

The greatest gain in energy supply in recent years has been through the development of "negawatts," the freeing up of existing power through reduced consumption supported by the state energy plan. The DEIS must consider all cost-effective outcomes in its full range of alternatives which support the NO ACTION ALTERNATIVE, and which demonstrate the CVE Project to be unnecessary.

FINANCIAL/MARKET FEASIBILITY OF THE CVE PROJECT

The DEIS must document and evaluate the total public subsidies for which this Project is eligible including all federal, state and local incentives such as DOE energy credits and direct funding, Federal '08 and '09 stimulus package incentives, NYS and local IDA

30-9

sales tax waivers, reduced below market rate interest financing, property tax exemptions, reduced property/plant tax assessments, etc.... The CVE site qualifies for Superfund monies, and also an extra bonus for being an energy company locating on a Superfund site.

30-9 cont.

Further, the DEIS must detail how subsidies awarded to this Project will absorb available finite public resources that will displace and/or delay renewable energy priorities of the RPS and job creation in solar/wind/smart grid programs promoted by the state energy plan.

30-10

The DEIS must evaluate the effect of the economic recession on energy trends and on the transformation of industry and lifestyles that need less, rather than more energy, especially in a bleak, protracted economic downturn compounded by financial speculation in energy commodity trading, and wildly fluctuating fuel prices.

30-11

Remarkably, the CVE Project seeks to enter an energy market that already has an oversupply of electricity at a time of contracting economic activity and in a business climate fostering energy efficiency and conservation initiatives that collectively are reducing the demand even further.

The fact remains, however, that CVE does not serve a public need, has no market, has no purchase contracts, and has no business plan other than to obtain construction permits and to harvest public subsidies.

The CVE Project is facing the same questionable future as the NRG Astoria power plant as reported in the N.Y. Times on January 21, 2011: "Queens Power Plant Receives Final Approval for Construction." The construction, however, will be delayed and may never take place since no buyers will sign long-term contracts. Con Ed has no plans to buy power directly from the NRG plant. And why would any sane utility/consumer sign a long-term, take-or-pay contract in a market having a glut of natural gas with downward pressure on prices in a real world of declining demand? This is just like the O & R/Bechtel scenario described above. The producer, on the other hand, needs the long-term contract for financial survival.

The DEIS must evaluate the economic impact that CVE will have on all competing producers/merchants who generate/supply electricity to any and all utility/distributors via the NYISO auction process and the open access grid throughout New York State and surrounding states and Canada.

30-12

The DEIS must evaluate the risk of financial default requiring a NYS and U.S. government financial rescue. Is the Project cost-effective and viable at all in today's market? Will revenue be sufficient and sustainable to cover debt service and operating expenses without additional public subsidies or a total bailout? What risk and exposure would the investor, the customer, the general taxpayer, and other merchants have in the event of default

30-13

30-13 cont.

and bankruptcy? How would town, county and school district property taxes be affected? The bankruptcy of Mirant (Lovett and Bow Line) and the financial collapse of Dynegy(Roseton and Danskammer) are instructive: the property taxes in the Towns of Stony Point, Haverstraw, Newburgh and Marlboro were dramatically increased...

30-14

The DEIS should address practical responses requiring system-wide adjustments to an economy having excess capacity and diminishing demand for power in general. In fact, on May 14, 2010, the NYS PSC directed all utility companies/merchants to prepare austerity plans to respond to the decline in demand.

An honest public policy reality check must take place throughout government and the electric power industry and must consider which facilities to close or to consolidate much like the review of unused military bases or the closing of empty state prison cells. In the case of the CVE Project, if the required "hard look" is not taken, public subsidies will be misallocated and lost, while forfeiting the opportunity to fund more worthwhile energy initiatives that are in the public interest.

Respectfully submitted,

Jürgen Wekerle, Co-Chair
Sterling Forest/Highlands Committee
Sierra Club, Atlantic Chapter

JW/idi

Interactive Map Shows, Rooftop by Rooftop, City's Great Potential for Solar Power

By MIREYA NAVARRO

Two-thirds of New York City's rooftops are suitable for solar panels and could jointly generate enough energy to meet half the city's demand for electricity at peak periods, according to a new, highly detailed interactive map to be made public on Thursday.

The map, which shows the solar potential of each of the city's one-million-plus buildings, is a result of a series of flights over the city by an airplane equipped with a laser system known as Lidar, for light detection and ranging.

Swooping over the five boroughs last year, the plane collected precise information about the shape, angle and size of the city's rooftops and the shading provided from trees and structures around them.

The map is at the Web site of the City University of New York. City officials said the information should advance efforts to increase the city's reliance on solar power as part of its energy mix, reducing the metropolis's greenhouse gas emissions.

"The quality of the Lidar information is so remarkable that it will much more rapidly unlock usable sites," said Stephen Goldsmith, the deputy mayor for operations.

Over all, the images show that 66.4 percent of the city's buildings have roof space suitable for solar panels, said the CUNY team, which developed the map in partnership with the city and the federal Department of Energy. The rooftops could generate up to 5,847 megawatts from hundreds of thousands of buildings, the team said, compared with the negligible 6.5 megawatts yielded now from about 400 installations.

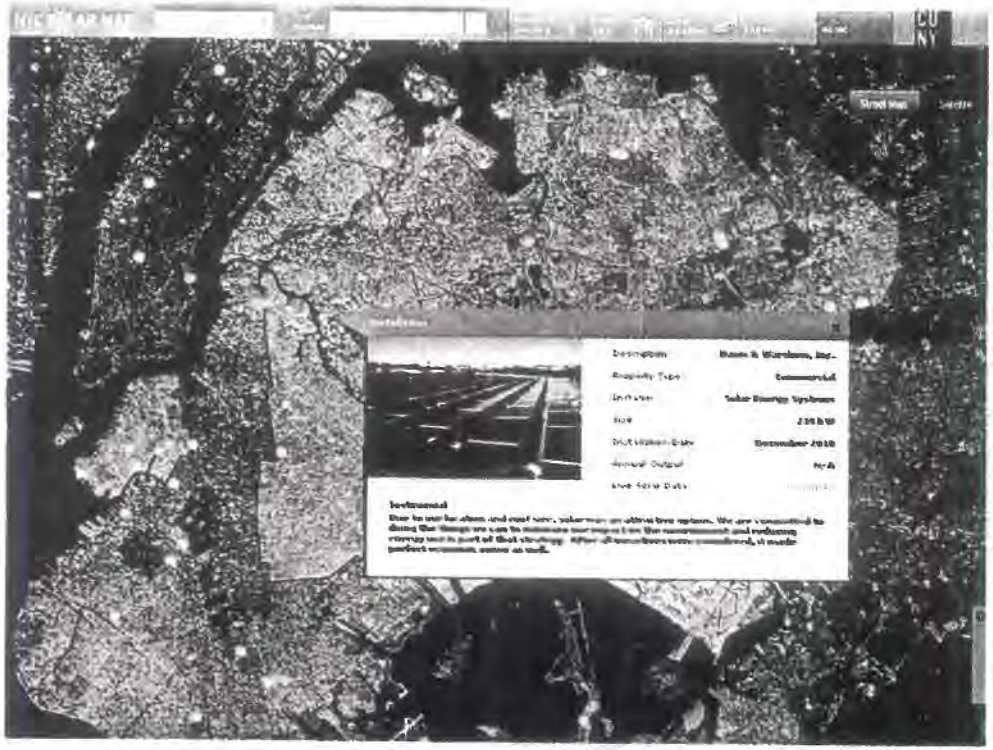
At those output levels, the panels could meet 49.7 percent of the current estimated daytime peak demand and about 14 percent of the city's total annual electricity use, the officials said. The figures consider typical weather conditions.

Yet harnessing solar power also involves overcoming barriers like the upfront costs of installation, the availability of installers and the ability of utilities to integrate solar power into their grid. Solar power is projected to grow into a $12-billion-a-year industry this year, according to the Solar Energy Industries Association, but the sector is still in its infancy.

Nationwide, the installed solar capacity is just 2,300 megawatts, less than half the rooftop potential of New York City.

"We're just really beginning," said Rhone Resch, president of the trade group.

The solar map will allow New Yorkers to type in the address of a building where they live or work and find out how much solar power the roof can yield and at what cost. The Web site indicates what government financial incentives are available to help cover the costs and calculates how long it would take a building's owner to recoup the costs in energy savings.



SUSTAINABLE CUNY

People interested in solar power can now check the suitability of any city address for solar panels and what their impact would be. Details are also available for properties that have panels, above.

Most buildings are seen as suitable to harness the sun.

For the more environmentally minded, the map also shows how much carbon dioxide emissions each property would avoid, in pounds and by the number of trees that, if planted, could absorb that amount of emissions.

The solar map alone cost $210,000 and was financed by the federal Department of Energy's Solar America Cities program. The city provided $450,000 for the Lidar flights.

Lidar produces images of structures, trees, wetlands and other surface terrain by shooting laser pulses from an aircraft and measuring the time it takes the pulses to bounce back. Its data will also be used to update flood maps.

More than a dozen cities already use similar maps, although not necessarily prepared with the Lidar system, and some of the maps have contributed to broadening the use of solar power. In San Francisco, the number of solar installations on private roofs rose to more than 2,300 this year, from 551 in 2007, when the solar map was introduced along with financial incentives like tax credits and rebates.

"It's sort of a one-stop shop for people to understand what the technology is, does it make financial sense, are others doing this," said Danielle Murray, the renewable energy program manager for San Francisco's Environment Department. "You realize that you're not alone, and that it's a smart investment."

In New York, David Bragdon, director of the Mayor's Office of Long-Term Planning and Sustainability, said the city could realistically add "thousands of megawatts" in solar power.

To that end, Mr. Bragdon said, it has been working on streamlining the installation permit process and relaxing building regulations to accommodate the panels, in addition to pursuing larger-scale solar projects at landfills and other sites.

Officials with Con Edison, the utility that supplies electric service to most of the city, said they were developing a centralized Web site to reduce the cost and time of going through all the paperwork required to install the panels, which currently can take up to a year.

The city had already identified some "solar empowerment zones" where solar energy would be most beneficial, based on growing demand for power and other factors. The solar map now will offer roof-by-roof information within those zones, allowing planners to locate and aid owners in areas with the highest demand on hot and sunny days.

"This map can serve as a key foundation toward building a new infrastructure, a clean energy infrastructure, for New York City," said Tria Case, the director of sustainability for CUNY.

Climatic Change
DOI 10.1007/s10584-011-0061-5

LETTER

Methane and the greenhouse-gas footprint of natural gas from shale formations

A letter

Robert W. Howarth · Renee Santoro · Anthony Ingraffea

Received: 12 November 2010 / Accepted: 13 March 2011

Abstract We evaluate the greenhouse gas footprint of natural gas obtained by high-volume hydraulic fracturing from shale formations, focusing on methane emissions. Natural gas is composed largely of methane, and 3.6% to 7.9% of the methane from shale-gas production escapes to the atmosphere in venting and leaks over the lifetime of a well. These methane emissions are at least 30% more than and perhaps more than twice as great as those from conventional gas. The higher emissions from shale gas occur at the time wells are hydraulically fractured—as methane escapes from flow-back return fluids—and during drill out following the fracturing. Methane is a powerful greenhouse gas, with a global warming potential that is far greater than that of carbon dioxide, particularly over the time horizon of the first few decades following emission. Methane contributes substantially to the greenhouse gas footprint of shale gas on shorter time scales, dominating it on a 20-year time horizon. The footprint for shale gas is greater than that for conventional gas or oil when viewed on any time horizon, but particularly so over 20 years. Compared to coal, the footprint of shale gas is at least 20% greater and perhaps more than twice as great on the 20-year horizon and is comparable when compared over 100 years.

Keywords Methane · Greenhouse gases · Global warming · Natural gas · Shale gas · Unconventional gas · Fugitive emissions · Lifecycle analysis · LCA · Bridge fuel · Transitional fuel · Global warming potential · GWP

Electronic supplementary material The online version of this article (doi:10.1007/s10584-011-0061-5) contains supplementary material, which is available to authorized users.

R. W. Howarth (✉) · R. Santoro
Department of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY 14853, USA
e-mail: rwh2@cornell.edu

A. Ingraffea
School of Civil and Environmental Engineering, Cornell University, Ithaca, NY 14853, USA

Many view natural gas as a transitional fuel, allowing continued dependence on fossil fuels yet reducing greenhouse gas (GHG) emissions compared to oil or coal over coming decades (Pacala and Socolow 2004). Development of "unconventional" gas dispersed in shale is part of this vision, as the potential resource may be large, and in many regions conventional reserves are becoming depleted (Wood et al. 2011). Domestic production in the U.S. was predominantly from conventional reservoirs through the 1990s, but by 2009 U.S. unconventional production exceeded that of conventional gas. The Department of Energy predicts that by 2035 total domestic production will grow by 20%, with unconventional gas providing 75% of the total (EIA 2010a). The greatest growth is predicted for shale gas, increasing from 16% of total production in 2009 to an expected 45% in 2035.

Although natural gas is promoted as a bridge fuel over the coming few decades, in part because of its presumed benefit for global warming compared to other fossil fuels, very little is known about the GHG footprint of unconventional gas. Here, we define the GHG footprint as the total GHG emissions from developing and using the gas, expressed as equivalents of carbon dioxide, per unit of energy obtained during combustion. The GHG footprint of shale gas has received little study or scrutiny, although many have voiced concern. The National Research Council (2009) noted emissions from shale-gas extraction may be greater than from conventional gas. The Council of Scientific Society Presidents (2010) wrote to President Obama, warning that some potential energy bridges such as shale gas have received insufficient analysis and may aggravate rather than mitigate global warming. And in late 2010, the U.S. Environmental Protection Agency issued a report concluding that fugitive emissions of methane from unconventional gas may be far greater than for conventional gas (EPA 2010).

Fugitive emissions of methane are of particular concern. Methane is the major component of natural gas and a powerful greenhouse gas. As such, small leakages are important. Recent modeling indicates methane has an even greater global warming potential than previously believed, when the indirect effects of methane on atmospheric aerosols are considered (Shindell et al. 2009). The global methane budget is poorly constrained, with multiple sources and sinks all having large uncertainties. The radiocarbon content of atmospheric methane suggests fossil fuels may be a far larger source of atmospheric methane than generally thought (Lassey et al. 2007).

The GHG footprint of shale gas consists of the direct emissions of CO_2 from end-use consumption, indirect emissions of CO_2 from fossil fuels used to extract, develop, and transport the gas, and methane fugitive emissions and venting. Despite the high level of industrial activity involved in developing shale gas, the indirect emissions of CO_2 are relatively small compared to those from the direct combustion of the fuel: 1 to 1.5 g C MJ^{-1} (Santoro et al. 2011) vs 15 g C MJ^{-1} for direct emissions (Hayhoe et al. 2002). Indirect emissions from shale gas are estimated to be only 0.04 to 0.45 g C MJ^{-1} greater than those for conventional gas (Wood et al. 2011). Thus, for both conventional and shale gas, the GHG footprint is dominated by the direct CO_2 emissions and fugitive methane emissions. Here we present estimates for methane emissions as contributors to the GHG footprint of shale gas compared to conventional gas.

Our analysis uses the most recently available data, relying particularly on a technical background document on GHG emissions from the oil and gas industry (EPA 2010) and materials discussed in that report, and a report on natural gas losses on federal lands from the General Accountability Office (GAO 2010). The

EPA (2010) report is the first update on emission factors by the agency since 1996 (Harrison et al. 1996). The earlier report served as the basis for the national GHG inventory for the past decade. However, that study was not based on random sampling or a comprehensive assessment of actual industry practices, but rather only analyzed facilities of companies that voluntarily participated (Kirchgessner et al. 1997). The new EPA (2010) report notes that the 1996 "study was conducted at a time when methane emissions were not a significant concern in the discussion about GHG emissions" and that emission factors from the 1996 report "are outdated and potentially understated for some emissions sources." Indeed, emission factors presented in EPA (2010) are much higher, by orders of magnitude for some sources.

1 Fugitive methane emissions during well completion

Shale gas is extracted by high-volume hydraulic fracturing. Large volumes of water are forced under pressure into the shale to fracture and re-fracture the rock to boost gas flow. A significant amount of this water returns to the surface as flow-back within the first few days to weeks after injection and is accompanied by large quantities of methane (EPA 2010). The amount of methane is far more than could be dissolved in the flow-back fluids, reflecting a mixture of fracture-return fluids and methane gas. We have compiled data from 2 shale gas formations and 3 tight-sand gas formations in the U.S. Between 0.6% and 3.2% of the life-time production of gas from wells is emitted as methane during the flow-back period (Table 1). We include tight-sand formations since flow-back emissions and the patterns of gas production over time are similar to those for shale (EPA 2010). Note that the rate of methane emitted during flow-back (column B in Table 1) correlates well to the initial production rate for the well following completion (column C in Table 1). Although the data are limited, the variation across the basins seems reasonable: the highest methane emissions during flow-back were in the Haynesville, where initial pressures and initial production were very high, and the lowest emissions were in the Uinta, where the flow-back period was the shortest and initial production following well completion was low. However, we note that the data used in Table 1 are not well documented, with many values based on PowerPoint slides from EPA-sponsored workshops. For this paper, we therefore choose to represent gas losses from flow-back fluids as the mean value from Table 1: 1.6%.

More methane is emitted during "drill-out," the stage in developing unconventional gas in which the plugs set to separate fracturing stages are drilled out to release gas for production. EPA (2007) estimates drill-out emissions at 142×10^3 to 425×10^3 m^3 per well. Using the mean drill-out emissions estimate of 280×10^3 m^3 (EPA 2007) and the mean life-time gas production for the 5 formations in Table 1 (85×10^6 m^3), we estimate that 0.33% of the total life-time production of wells is emitted as methane during the drill-out stage. If we instead use the average life-time production for a larger set of data on 12 formations (Wood et al. 2011), 45×10^6 m^3, we estimate a percentage emission of 0.62%. More effort is needed to determine drill-out emissions on individual formation. Meanwhile, in this paper we use the conservative estimate of 0.33% for drill-out emissions.

Combining losses associated with flow-back fluids (1.6%) and drill out (0.33%), we estimate that 1.9% of the total production of gas from an unconventional shale-gas

Table 1 Methane emissions during the flow-back period following hydraulic fracturing, initial gas production rates following well completion, life-time gas production of wells, and the methane emitted during flow-back expressed as a percentage of the life-time production for five unconventional wells in the United States

	(A) Methane emitted during flow-back (10^3 m^3)[a]	(B) Methane emitted per day during flow-back (10^3 m^3 day^{-1})[b]	(C) Initial gas production at well completion (10^3 m^3 day^{-1})[c]	(D) Life-time production of well (10^6 m^3)[d]	(E) Methane emitted during flow-back as % of life-time production[e]
Haynesville (Louisiana, shale)	6,800	680	640	210	3.2
Barnett (Texas, shale)	370	41	37	35	1.1
Piceance (Colorado, tight sand)	710	79	57	55	1.3
Uinta (Utah, tight sand)	255	51	42	40	0.6
Den-Jules (Colorado, tight sand)	140	12	11	?	?

Flow-back is the return of hydraulic fracturing fluids to the surface immediately after fracturing and before well completion. For these wells, the flow-back period ranged from 5 to 12 days

[a] Haynesville: average from Eckhardt et al. (2009); Piceance: EPA (2007); Barnett: EPA (2004); Uinta: Samuels (2010); Denver-Julesburg: Bracken (2008)

[b] Calculated by dividing the total methane emitted during flow-back (column A) by the duration of flow-back. Flow-back durations were 9 days for Barnett (EPA 2004), 8 days for Piceance (EPA 2007), 5 days for Uinta (Samuels 2010), and 12 days for Denver-Julesburg (Bracken 2008); median value of 10 days for flow-back was assumed for Haynesville

[c] Haynesville: http://shale.typepad.com/haynesvilleshale/2009/07/chesapeake-energy-haynesville-shale-decline-curve.html1/7/2011 and http://oilshalegas.com/haynesvilleshalestocks.html; Barnett: http://oilshalegas.com/barnettshale.html; Piceance: Kruuskraa (2004) and Henke (2010); Uinta: http://www.epmag.com/archives/newsComments/6242.htm; Denver-Julesburg: http://www.businesswire.com/news/home/20100924005169/en/Synergy-Resources-Corporation-Reports-Initial-Production-Rates

[d] Based on averages for these basins. Haynesville: http://shale.typepad.com/haynesvilleshale/decline-curve/); Barnett: http://www.aapg.org/explorer/2002/07jul/barnett_shale.cfm and Wood et al. (2011); Piceance: Kruuskraa (2004); Uinta: http://www.epmag.com/archives/newsComments/6242.htm

[e] Calculated by dividing column (A) by column (D)

Table 2 Fugitive methane emissions associated with development of natural gas from conventional wells and from shale formations (expressed as the percentage of methane produced over the lifecycle of a well)

	Conventional gas	Shale gas
Emissions during well completion	0.01%	1.9%
Routine venting and equipment leaks at well site	0.3 to 1.9%	0.3 to 1.9%
Emissions during liquid unloading	0 to 0.26%	0 to 0.26%
Emissions during gas processing	0 to 0.19%	0 to 0.19%
Emissions during transport, storage, and distribution	1.4 to 3.6%	1.4 to 3.6%
Total emissions	1.7 to 6.0%	3.6 to 7.9%

See text for derivation of estimates and supporting information

well is emitted as methane during well completion (Table 2). Again, this estimate is uncertain but conservative.

Emissions are far lower for conventional natural gas wells during completion, since conventional wells have no flow-back and no drill out. An average of 1.04×10^3 m^3 of methane is released per well completed for conventional gas (EPA 2010), corresponding to 1.32×10^3 m^3 natural gas (assuming 78.8% methane content of the gas). In 2007, 19,819 conventional wells were completed in the US (EPA 2010), so we estimate a total national emission of 26×10^6 m^3 natural gas. The total national production of onshore conventional gas in 2007 was 384×10^9 m^3 (EIA 2010b). Therefore, we estimate the average fugitive emissions at well completion for conventional gas as 0.01% of the life-time production of a well (Table 2), three orders of magnitude less than for shale gas.

2 Routine venting and equipment leaks

After completion, some fugitive emissions continue at the well site over its lifetime. A typical well has 55 to 150 connections to equipment such as heaters, meters, dehydrators, compressors, and vapor-recovery apparatus. Many of these potentially leak, and many pressure relief valves are designed to purposefully vent gas. Emissions from pneumatic pumps and dehydrators are a major part of the leakage (GAO 2010). Once a well is completed and connected to a pipeline, the same technologies are used for both conventional and shale gas; we assume that these post-completion fugitive emissions are the same for shale and conventional gas. GAO (2010) concluded that 0.3% to 1.9% of the life-time production of a well is lost due to routine venting and equipment leaks (Table 2). Previous studies have estimated routine well-site fugitive emissions as approximately 0.5% or less (Hayhoe et al. 2002; Armendariz 2009) and 0.95% (Shires et al. 2009). Note that none of these estimates include accidents or emergency vents. Data on emissions during emergencies are not available and have never, as far as we can determine, been used in any estimate of emissions from natural gas production. Thus, our estimate of 0.3% to 1.9% leakage is conservative. As we discuss below, the 0.3% reflects use of best available technology.

Additional venting occurs during "liquid unloading." Conventional wells frequently require multiple liquid-unloading events as they mature to mitigate water intrusion as reservoir pressure drops. Though not as common, some unconventional wells may also require unloading. Empirical data from 4 gas basins indicate that 0.02

to 0.26% of total life-time production of a well is vented as methane during liquid unloading (GAO 2010). Since not all wells require unloading, we set the range at 0 to 0.26% (Table 2).

3 Processing losses

Some natural gas, whether conventional or from shale, is of sufficient quality to be "pipeline ready" without further processing. Other gas contains sufficient amounts of heavy hydrocarbons and impurities such as sulfur gases to require removal through processing before the gas is piped. Note that the quality of gas can vary even within a formation. For example, gas from the Marcellus shale in northeastern Pennsylvania needs little or no processing, while gas from southwestern Pennsylvania must be processed (NYDEC 2009). Some methane is emitted during this processing. The default EPA facility-level fugitive emission factor for gas processing indicates a loss of 0.19% of production (Shires et al. 2009). We therefore give a range of 0% (i.e. no processing, for wells that produce "pipeline ready" gas) to 0.19% of gas produced as our estimate of processing losses (Table 2). Actual measurements of processing plant emissions in Canada showed fourfold greater leakage than standard emission factors of the sort used by Shires et al. (2009) would indicate (Chambers 2004), so again, our estimates are very conservative.

4 Transport, storage, and distribution losses

Further fugitive emissions occur during transport, storage, and distribution of natural gas. Direct measurements of leakage from transmission are limited, but two studies give similar leakage rates in both the U.S. (as part of the 1996 EPA emission factor study; mean value of 0.53%; Harrison et al. 1996; Kirchgessner et al. 1997) and in Russia (0.7% mean estimate, with a range of 0.4% to 1.6%; Lelieveld et al. 2005). Direct estimates of distribution losses are even more limited, but the 1996 EPA study estimates losses at 0.35% of production (Harrison et al. 1996; Kirchgessner et al. 1997). Lelieveld et al. (2005) used the 1996 emission factors for natural gas storage and distribution together with their transmission estimates to suggest an overall average loss rate of 1.4% (range of 1.0% to 2.5%). We use this 1.4% leakage as the likely lower limit (Table 2). As noted above, the EPA 1996 emission estimates are based on limited data, and Revkin and Krauss (2009) reported "government scientists and industry officials caution that the real figure is almost certainly higher." Furthermore, the IPCC (2007) cautions that these "bottom-up" approaches for methane inventories often underestimate fluxes.

Another way to estimate pipeline leakage is to examine "lost and unaccounted for gas," e.g. the difference between the measured volume of gas at the wellhead and that actually purchased and used by consumers. At the global scale, this method has estimated pipeline leakage at 2.5% to 10% (Crutzen 1987; Cicerone and Oremland 1988; Hayhoe et al. 2002), although the higher value reflects poorly maintained pipelines in Russia during the Soviet collapse, and leakages in Russia are now far less (Lelieveld et al. 2005; Reshetnikov et al. 2000). Kirchgessner et al. (1997) argue against this approach, stating it is "subject to numerous errors including gas theft, variations in

temperature and pressure, billing cycle differences, and meter inaccuracies." With the exception of theft, however, errors should be randomly distributed and should not bias the leakage estimate high or low. Few recent data on lost and unaccounted gas are publicly available, but statewide data for Texas averaged 2.3% in 2000 and 4.9% in 2007 (Percival 2010). In 2007, the State of Texas passed new legislation to regulate lost and unaccounted for gas; the legislation originally proposed a 5% hard cap which was dropped in the face of industry opposition (Liu 2008; Percival 2010). We take the mean of the 2000 and 2007 Texas data for missing and unaccounted gas (3.6%) as the upper limit of downstream losses (Table 2), assuming that the higher value for 2007 and lower value for 2000 may potentially reflect random variation in billing cycle differences. We believe this is a conservative upper limit, particularly given the industry resistance to a 5% hard cap.

Our conservative estimate of 1.4% to 3.6% leakage of gas during transmission, storage, and distribution is remarkably similar to the 2.5% "best estimate" used by Hayhoe et al. (2002). They considered the possible range as 0.2% and 10%.

5 Contribution of methane emissions to the GHG footprints of shale gas and conventional gas

Summing all estimated losses, we calculate that during the life cycle of an average shale-gas well, 3.6 to 7.9% of the total production of the well is emitted to the atmosphere as methane (Table 2). This is at least 30% more and perhaps more than twice as great as the life-cycle methane emissions we estimate for conventional gas, 1.7% to 6%. Methane is a far more potent GHG than is CO_2, but methane also has a tenfold shorter residence time in the atmosphere, so its effect on global warming attenuates more rapidly (IPCC 2007). Consequently, to compare the global warming potential of methane and CO_2 requires a specific time horizon. We follow Lelieveld et al. (2005) and present analyses for both 20-year and 100-year time horizons. Though the 100-year horizon is commonly used, we agree with Nisbet et al. (2000) that the 20-year horizon is critical, given the need to reduce global warming in coming decades (IPCC 2007). We use recently modeled values for the global warming potential of methane compared to CO_2: 105 and 33 on a mass-to-mass basis for 20 and 100 years, respectively, with an uncertainty of plus or minus 23% (Shindell et al. 2009). These are somewhat higher than those presented in the 4th assessment report of the IPCC (2007), but better account for the interaction of methane with aerosols. Note that carbon-trading markets use a lower global-warming potential yet of only 21 on the 100-year horizon, but this is based on the 2nd IPCC (1995) assessment, which is clearly out of date on this topic. See Electronic Supplemental Materials for the methodology for calculating the effect of methane on GHG in terms of CO_2 equivalents.

Methane dominates the GHG footprint for shale gas on the 20-year time horizon, contributing 1.4- to 3-times more than does direct CO_2 emission (Fig. 1a). At this time scale, the GHG footprint for shale gas is 22% to 43% greater than that for conventional gas. When viewed at a time 100 years after the emissions, methane emissions still contribute significantly to the GHG footprints, but the effect is diminished by the relatively short residence time of methane in the atmosphere. On this time frame, the GHG footprint for shale gas is 14% to 19% greater than that for conventional gas (Fig. 1b).

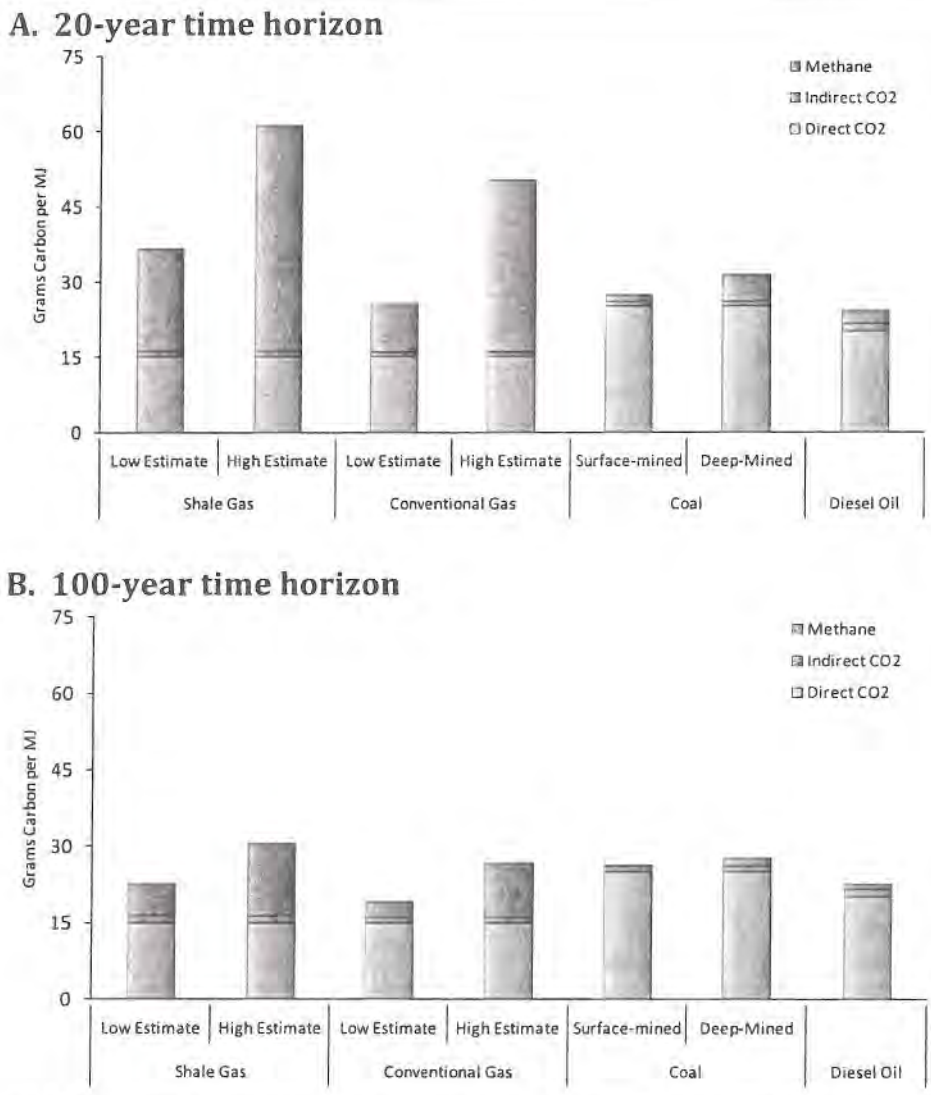


Fig. 1 Comparison of greenhouse gas emissions from shale gas with low and high estimates of fugitive methane emissions, conventional natural gas with low and high estimates of fugitive methane emissions, surface-mined coal, deep-mined coal, and diesel oil. **a** is for a 20-year time horizon, and **b** is for a 100-year time horizon. Estimates include direct emissions of CO_2 during combustion (*blue bars*), indirect emissions of CO_2 necessary to develop and use the energy source (*red bars*), and fugitive emissions of methane, converted to equivalent value of CO_2 as described in the text (*pink bars*). Emissions are normalized to the quantity of energy released at the time of combustion. The conversion of methane to CO_2 equivalents is based on global warming potentials from Shindell et al. (2009) that include both direct and indirect influences of methane on aerosols. Mean values from Shindell et al. (2009) are used here. Shindell et al. (2009) present an uncertainty in these mean values of plus or minus 23%, which is not included in this figure

6 Shale gas versus other fossil fuels

Considering the 20-year horizon, the GHG footprint for shale gas is at least 20% greater than and perhaps more than twice as great as that for coal when expressed per quantity of energy available during combustion (Fig. 1a; see Electronic Supplemental Materials for derivation of the estimates for diesel oil and coal). Over the 100-year frame, the GHG footprint is comparable to that for coal: the low-end shale-gas emissions are 18% lower than deep-mined coal, and the high-end shale-gas emissions are 15% greater than surface-mined coal emissions (Fig. 1b). For the 20 year horizon, the GHG footprint of shale gas is at least 50% greater than for oil, and perhaps 2.5-times greater. At the 100-year time scale, the footprint for shale gas is similar to or 35% greater than for oil.

We know of no other estimates for the GHG footprint of shale gas in the peer-reviewed literature. However, we can compare our estimates for conventional gas with three previous peer-reviewed studies on the GHG emissions of conventional natural gas and coal: Hayhoe et al. (2002), Lelieveld et al. (2005), and Jamarillo et al. (2007). All concluded that GHG emissions for conventional gas are less than for coal, when considering the contribution of methane over 100 years. In contrast, our analysis indicates that conventional gas has little or no advantage over coal even over the 100-year time period (Fig. 1b). Our estimates for conventional-gas methane emissions are in the range of those in Hayhoe et al. (2002) but are higher than those in Lelieveld et al. (2005) and Jamarillo et al. (2007) who used 1996 EPA emission factors now known to be too low (EPA 2010). To evaluate the effect of methane, all three of these studies also used global warming potentials now believed to be too low (Shindell et al. 2009). Still, Hayhoe et al. (2002) concluded that under many of the scenarios evaluated, a switch from coal to conventional natural gas could aggravate global warming on time scales of up to several decades. Even with the lower global warming potential value, Lelieveld et al. (2005) concluded that natural gas has a greater GHG footprint than oil if methane emissions exceeded 3.1% and worse than coal if the emissions exceeded 5.6% on the 20-year time scale. They used a methane global warming potential value for methane from IPCC (1995) that is only 57% of the new value from Shindell et al. (2009), suggesting that in fact methane emissions of only 2% to 3% make the GHG footprint of conventional gas worse than oil and coal. Our estimates for fugitive shale-gas emissions are 3.6 to 7.9%.

Our analysis does not consider the efficiency of final use. If fuels are used to generate electricity, natural gas gains some advantage over coal because of greater efficiencies of generation (see Electronic Supplemental Materials). However, this does not greatly affect our overall conclusion: the GHG footprint of shale gas approaches or exceeds coal even when used to generate electricity (Table in Electronic Supplemental Materials). Further, shale-gas is promoted for other uses, including as a heating and transportation fuel, where there is little evidence that efficiencies are superior to diesel oil.

7 Can methane emissions be reduced?

The EPA estimates that 'green' technologies can reduce gas-industry methane emissions by 40% (GAO 2010). For instance, liquid-unloading emissions can be greatly

reduced with plunger lifts (EPA 2006; GAO 2010); industry reports a 99% venting reduction in the San Juan basin with the use of smart-automated plunger lifts (GAO 2010). Use of flash-tank separators or vapor recovery units can reduce dehydrator emissions by 90% (Fernandez et al. 2005). Note, however, that our lower range of estimates for 3 out of the 5 sources as shown in Table 2 already reflect the use of best technology: 0.3% lower-end estimate for routine venting and leaks at well sites (GAO 2010), 0% lower-end estimate for emissions during liquid unloading, and 0% during processing.

Methane emissions during the flow-back period in theory can be reduced by up to 90% through Reduced Emission Completions technologies, or REC (EPA 2010). However, REC technologies require that pipelines to the well are in place prior to completion, which is not always possible in emerging development areas. In any event, these technologies are currently not in wide use (EPA 2010).

If emissions during transmission, storage, and distribution are at the high end of our estimate (3.6%; Table 2), these could probably be reduced through use of better storage tanks and compressors and through improved monitoring for leaks. Industry has shown little interest in making the investments needed to reduce these emission sources, however (Percival 2010).

Better regulation can help push industry towards reduced emissions. In reconciling a wide range of emissions, the GAO (2010) noted that lower emissions in the Piceance basin in Colorado relative to the Uinta basin in Utah are largely due to a higher use of low-bleed pneumatics in the former due to stricter state regulations.

8 Conclusions and implications

The GHG footprint of shale gas is significantly larger than that from conventional gas, due to methane emissions with flow-back fluids and from drill out of wells during well completion. Routine production and downstream methane emissions are also large, but are the same for conventional and shale gas. Our estimates for these routine and downstream methane emission sources are within the range of those reported by most other peer-reviewed publications inventories (Hayhoe et al. 2002; Lelieveld et al. 2005). Despite this broad agreement, the uncertainty in the magnitude of fugitive emissions is large. Given the importance of methane in global warming, these emissions deserve far greater study than has occurred in the past. We urge both more direct measurements and refined accounting to better quantify lost and unaccounted for gas.

The large GHG footprint of shale gas undercuts the logic of its use as a bridging fuel over coming decades, if the goal is to reduce global warming. We do not intend that our study be used to justify the continued use of either oil or coal, but rather to demonstrate that substituting shale gas for these other fossil fuels may not have the desired effect of mitigating climate warming.

Finally, we note that carbon-trading markets at present under-value the greenhouse warming consequences of methane, by focusing on a 100-year time horizon and by using out-of-date global warming potentials for methane. This should be corrected, and the full GHG footprint of unconventional gas should be used in planning for alternative energy futures that adequately consider global climate change.

Acknowledgements Preparation of this paper was supported by a grant from the Park Foundation and by an endowment funds of the David R. Atkinson Professorship in Ecology & Environmental Biology at Cornell University. We thank R. Alvarez, C. Arnold, P. Artaxo, A. Chambers, D. Farnham, P. Jamarillo, N. Mahowald, R. Marino, R. McCoy, J. Northrup, S. Porder, M. Robertson, B. Sell, D. Shrag, L. Spaeth, and D. Strahan for information, encouragement, advice, and feedback on our analysis and manuscript. We thank M. Hayn for assistance with the figures. Two anonymous reviewers and Michael Oppenheimer provided very useful comments on an earlier version of this paper.

References

Armendariz A (2009) Emissions from natural gas production in the Barnett shale area and opportunities for cost-effective improvements. Report prepared for Environmental Defense Fund, Austin TX

Bracken K (2008) Reduced emission completions in DJ basin and natural buttes. Presentation given at EPA/GasSTAR Producers Technology Transfer Workshop. Rock Springs Wyoming, 1 May 2008. http://www.epa.gov/gasstar/documents/workshops/2008-tech-transfer/rocksprings5.pdf

Chambers AK (2004) Optical measurement technology for fugitive emissions from upstream oil and gas facilities. Report prepared for Petroleum Technology Alliance Canada by Carbon and Energy Management, Alberta Research Council, Edmonton, Alberta

Cicerone RJ, Oremland R (1988) Biogeochemical aspects of atmospheric methane. Global Biogeochem. Cycles 2:299–327

Council of Scientific Society Presidents (2010) Letter from the council to President Obama and senior administration officials, dated May 4, 2010. Council of Scientific Society Presidents, 1155 16th Avenue NW, Washington, DC 20036. Available at http://www.eeb.cornell.edu/howarth/CCSP%20letter%20on%20energy%20&%20environment.pdf

Crutzen PJ (1987) Role of the tropics in atmospheric chemistry. In: Dickinson R (ed) Geophysiology of Amazonia. Wiley, NY, pp 107–129

Eckhardt M, Knowles B, Maker E, Stork P (2009) IHS U.S. Industry Highlights. (IHS) Houston, TX, Feb–Mar 2009. http://www.geconline.com/2009-prt-7-final-reviews

EIA (2010a) Annual energy outlook 2011 early release overview. DOE/EIA-0383ER(2011). Energy Information Agency, U.S. Department of Energy. http://www.eia.gov/forecasts/aeo/pdf/0383er(2011).pdf. Accessed 3 January 2011

EIA (2010b) Natural gas navigator. Natural gas gross withdrawals and production. http://www.eia.gov/dnav/ng/ng_prod_sum_dcu_NUS_m.htm

EPA (2004) Green completions. Natural Gas STAR Producer's Technology Transfer Workshop, 21 September 2004. http://epa.gov/gasstar/workshops/techtransfer/2004/houston-02.html

EPA (2006) Lessons learned: options for reducing methane emissions from pneumatic devices in the natural gas industry. U.S. EPA/ Gas STAR. http://www.epa.gov/gasstar/documents/ll_pneumatics.pdf

EPA (2007) Reducing methane emissions during completion operations. Natural Gas STAR Producer's Technology Transfer Workshop, 11 September 2007. http://epa.gov/gasstar/documents/workshops/glenwood-2007/04_recs.pdf

EPA (2010) Greenhouse gas emissions reporting from the petroleum and natural gas industry. Background Technical Support Document. http://www.epa.gov/climatechange/emissions/downloads10/Subpart-W_TSD.pdf. Accessed 3 January 2011

Fernandez R, Petrusak R, Robinson D, Zavadil D (2005) Cost-Effective methane emissions reductions for small and midsize natural gas producers. Reprinted from the June 2005 issue of Journal of Petroleum Technology. http://www.icfi.com/Markets/Environment/doc_files/methane-emissions.pdf

GAO (2010) Federal oil and gas leases: opportunities exist to capture vented and flared natural gas, which would increase royalty payments and reduce greenhouse gases. GAO-11-34 U.S. General Accountability Office Washington DC. http://www.gao.gov/new.items/d1134.pdf

Harrison MR, Shires TM, Wessels JK, Cowgill RM (1996) Methane emissions from the natural gas industry. Executive summary, vol 1. EPA-600/R-96-080a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC

Hayhoe K, Kheshgi HS, Jain AK, Wuebbles DJ (2002) Substitution of natural gas for coal: climatic effects of utility sector emissions. Climatic Change 54:107–139

Henke D (2010) Encana. USA division overview. Encana Natural Gas, investors presentation. http://www.encana.com/investors/presentations/investorday/pdfs/usa-division-overview.pdf

Intergovernmental Panel on Climate Change (1995) IPCC second assessment. Climate Change, 1995. http://www.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf

Intergovernmental Panel on Climate Change (2007) IPCC fourth assessment report (AR4). Working Group 1, The Physical Science Basis. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html

Jamarillo P, Griffin WM, Mathews HS (2007) Comparative life-cycle air emissions of coal, domestic natural gas, LNG, and SNG for electricity generation. Environ Sci Technol 41:6290–6296

Kirchgessner DA, Lott RA, Cowgill RM, Harrison MR, Shires TM (1997) Estimate of methane emissions from the US natural gas industry. Chemosphere 35: 1365–1390

Kruuskraa VA (2004) Tight gas sands development—How to dramatically improve recovery efficiency. GasTIPS, Winter 2004. http://media.godashboard.com/gti/4ReportsPubs/4_7GasTips/Winter04/TightGasSandsDEvelopment-HowToDramaticallyImproveRecoveryEfficiency.pdf

Lassey KR, Lowe DC, Smith AM (2007) The atmospheric cycling of radiomethane and the "fossil fraction" of the methane source. Atmos Chem Phys 7:2141–2149

Lelieveld J, Lechtenbohmer S, Assonov SS, Brenninkmeijer CAM, Dinest C, Fischedick M, Hanke T (2005) Low methane leakage from gas pipelines. Nature 434:841–842

Liu AE (2008) Overview: pipeline accounting and leak detection by mass balance, theory and hardware implementation. Quantum Dynamics, Woodland Hills. Available at http://www.pstrust.org/library/docs/massbalance_ld.pdf

National Research Council (2009) Hidden costs of energy: unpriced consequences of energy production and use. National Academy of Sciences Press, Washington

New York Department of Environmental Conservation (2009) Draft supplemental generic environmental impact statement on the oil, gas and solution mining regulatory program. http://www.dec.ny.gov/energy/58440.html

Nisbet EG, Manning MR, Lowry D, Lassey KR (2000) Methane and the framework convention on climate change, A61F-10, Eos Trans. AGU 81(48), Fall Meet, Suppl

Pacala S, Socolow R (2004) Stablization wedges: solving the climate problem for the next 50 years with current technologies. Science 305:968–972

Percival P (2010) Update on "lost and unaccounted for" natural gas in Texas. Basin Oil and Gas. Issue 32. http://fwbog.com/index.php?page=article&article=248

Reshetnikov AI, Paramonova NN, Shashkov AA (2000) An evaluation of historical methane emissions from the Soviet gas industry. JGR 105:3517–3529

Revkin A, Krauss C (2009) By degrees: curbing emissions by sealing gas leaks. New York Times, 14 October 2009. Available at http://www.nytimes.com/2009/10/15/business/energy-environment/15degrees.html

Samuels J (2010) Emission reduction strategies in the greater natural buttes. Anadarko Petroleum Corporation. EPA Gas STAR, Producers Technology Transfer Workshop Vernal, Utah, 23 March 2010. http://www.epa.gov/gasstar/documents/workshops/vernal-2010/03_anadarko.pdf

Santoro R, Howarth RW, Ingraffea T (2011) Life cycle greenhouse gas emissions inventory of Marcellus shale gas. Technical report of the Agriculture, Energy, & Environment Program, Cornell University, Ithaca, NY. To be archived and made available on-line

Shindell DT, Faluvegi G, Koch DM, Schmidt GA, Unger N, Bauer SE (2009) Improved attribution of climate forcing to emissions. Science 326:716–718

Shires TM, Loughran, CJ, Jones S, Hopkins E (2009) Compendium of greenhouse gas emissions methodologies for the oil and natural gas industry. Prepared by URS Corporation for the American Petroleum Institute (API). API, Washington DC

Wood R, Gilbert P, Sharmina M, Anderson K, Fottitt A, Glynn S, Nicholls F (2011) Shale gas: a provisional assessment of climate change and environmental impacts. Tyndall Center, University of Manchester, Manchester, England. http://www.tyndall.ac.uk/sites/default/files/tyndall-coop_shale_gas_report_final.pdf