

FUTUREGEN INDUSTRIAL ALLIANCE, INC.

ILLINOIS COMMERCE COMMISSION

DOCKET NO. 12-0598

TESTIMONY OF

KENNETH K. HUMPHREYS

Chief Executive Officer,
FutureGen Industrial Alliance, Inc.

FUTUREGEN 2.0 PROJECT

**POTENTIAL NEGATIVE IMPACTS OF ATXI'S PRIMARY ROUTE FOR
ILLINOIS RIVERS TRANSMISSION LINE PROJECT ON THE CARBON
DIOXIDE PIPELINE AND STORAGE COMPONENTS OF THE FUTUREGEN
2.0 PROJECT**

March 29, 2013

1 TESTIMONY OF

2 Kenneth K. Humphreys

3 Chief Executive Officer,
4 FutureGen Industrial Alliance, Inc.
5 FUTUREGEN 2.0 PROJECT

6 **Q. Please state your name, current position and business address.**

7 A. I am Kenneth K. Humphreys, chief executive officer of the FutureGen
8 Industrial Alliance, Inc. (“FutureGen Alliance”), a non-profit international
9 consortium of companies that is developing, and intends to construct and
10 operate, a clean coal oxy-combustion electric generating plant (“Power
11 Plant”) and an integrated carbon dioxide pipeline (“CO₂ Pipeline”) and
12 storage facility (“Storage Facility”) for the FutureGen 2.0 Clean Energy
13 Project (“FutureGen 2.0 Project”) to be located in Morgan County,
14 Illinois. The business address of the FutureGen Alliance is 1101
15 Pennsylvania Ave., NW, Washington, D.C., 20004.

16 **Q. Would you briefly describe your educational and professional**
17 **background?**

18 A. Prior to my current position, I was responsible for technology
19 development of near-zero emission power systems with carbon dioxide
20 capture and storage at Battelle Memorial Institute (“Battelle”). Battelle is
21 based in Columbus, Ohio and is the world’s largest nonprofit research and
22 development organization with over 20,000 employees at more than 100
23 locations globally. Battelle conducts research and development in the
24 areas of laboratory management, national security, health and life
25 sciences, energy, environment and material sciences and education.

1 Including Battelle, I have worked the last 25 years in the energy sector on
2 public and private ventures related to energy technology development and
3 energy project economics. I graduated from West Virginia University
4 with a bachelor's degree in petroleum engineering and I also hold a
5 master's degree in engineering management from Washington State
6 University.

7 **Q. What is the purpose of your direct testimony?**

8 A. The purpose of my direct testimony is to identify and explain the problems
9 presented by ATXI's proposed Illinois Rivers Project as it relates to the
10 development and operation of the FutureGen Alliance's CO₂ pipeline and
11 Storage Facility. In addition to the potential for conflicts arising from
12 overlapping construction schedules and increased community resistance
13 from multiple public works projects impacting the same landowners, the
14 most difficult impact to mitigate is electromagnetic field (EMF) effects on
15 the FutureGen Alliance's subsurface monitoring technologies. The EMF
16 is directly proportional to the line's voltage;¹ high voltage transmission
17 increases the problem over a larger area.

18 It is a well-established scientific fact that high voltage power lines
19 negatively impact many of the key monitoring technologies that will be
20 used to account for the carbon dioxide (CO₂) stored underground at the
21 FutureGen Alliance's CO₂ Storage Facility. Monitoring technologies

¹ Victorville 2 Hybrid Power Project Power Plant Licensing Case: Transmission line safety and Nuisance:
<http://www.energy.ca.gov/sitingcases/victorville2/documents/applicant/afc/6.14%20TLSN.pdf>

1 impacted include subsurface seismic surveys, electrical resistance
2 tomography (ERT), and borehole geophysical logs. The performance of
3 these monitoring technologies will be substantially degraded by the
4 Illinois Rivers Project's transmission line's EMF, which will partially
5 compromise the scientific purpose of the FutureGen 2.0 Project and the
6 ability to fulfill the FutureGen Alliance's regulatory monitoring
7 obligations.

8 The FutureGen Alliance is working with the Environmental
9 Protection Agency for permitting and operating an underground CO₂
10 Storage Facility. Regulatory requirements include monitoring and
11 accounting for all of the CO₂ injected into the subsurface. The primary
12 method for tracking the lateral extent of CO₂ within the target reservoir
13 and ensuring that the CO₂ is effectively contained within the reservoir is
14 through geophysical measurements.

15 Subsurface seismic surveys involve sending sound waves into the
16 subsurface. These sound waves reflect off subsurface formations and
17 return to the surface where microphones (i.e., geophones) pick up the
18 reflected sound waves. These waves generally range from 8 Hz (or lower)
19 to about 120 Hz. (*See Exhibit A (Goelectric Methods to track CO₂ in*
20 *subsurface).*) Effectively, the sound data allow scientists to construct a
21 picture of the subsurface geology. Power lines affect the quality of data
22 acquisition by generating a 60 Hz signal that is recorded along with
23 authentic seismic data. Although this frequency can be filtered during

1 processing, filtering can introduce anomalies or artifacts, remove actual
2 60Hz seismic signal, and can destroy amplitude and phase components of
3 the seismic data.² This results in poorer subsurface images and resolution,
4 both of which are critical in monitoring. Further, as there are small power
5 lines in the area of the FutureGen Project's Storage Facility, the addition
6 of a 345kV line coupled with the small power lines creates an extremely
7 complex EMF that will unquestionably make filtering out the effects on
8 seismic data extremely difficult and in some cases impossible.

9 In addition to negatively impacting the subsurface seismic surveys,
10 the EMF will directly impact the electrical resistivity surveys and the
11 borehole geophysical logging surveys which are critical to geologic
12 characterization and ongoing CO₂ storage monitoring. Geoelectric
13 methods based on electrical resistivity measurements will be used for both
14 structural imaging and for CO₂ monitoring of the subsurface. (*See Ex. A.*)
15 The electrical resistivity-based monitoring techniques would be directly
16 and negatively impacted by the EMF interference produced by a high
17 voltage power line.

18 The only way to adequately prevent the potential disruption to and
19 interference with subsurface monitoring technologies at the FutureGen 2.0
20 Project's Storage Facility is to avoid locating the Illinois Rivers Project's
21 transmission line near the FutureGen 2.0 Project's CO₂ Pipeline and

² Seismic Processing Steps and Pitfalls:
<http://crack.seismo.unr.edu/ftp/pub/louie/rg/proc.pdf>

1 Storage Facility. In furtherance of that objective, the FutureGen Alliance
2 and ATXI have entered into a Stipulation, attached hereto as Exhibit B,
3 under which ATXI has committed to request the Illinois Commerce
4 Commission's approval to locate the Illinois Rivers Project's transmission
5 line along ATXI's Alternate Route from Meredosia to Pawnee, instead of
6 the ATXI's Primary Route, which would interfere with and intersect the
7 FutureGen 2.0 Project's CO₂ Pipeline and Storage Facility. Should
8 ATXI's Alternate Route be approved, in accordance with Stipulation, this
9 will resolve any concerns the FutureGen Alliance has with the location of
10 the transmission line associated with the Illinois Rivers Project.

11 **Q. Does this conclude your testimony?**

12 A. Yes.

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