CITY OF BLOOMINGTON

ADDENDUM I

BLOOMINGTON CITY COUNCIL AGENDA

MAY 13, 2013

ADDITION TO CONSENT AGENDA

Item 7B. Bills and Payroll. (Recommend that the bills and payroll be allowed and orders drawn on the Treasurer for the various amounts as funds are available.) *City Council Memorandum with Attachment 1.*

ADDITION TO REGULAR AGENDA

Item 8A. An Ordinance Authorizing Aggregation of Electrical Load and Approving a Plan of Operation and Governance for Municipal Opt-Out Electricity Aggregation and Designating the Mayor and Deputy City Manager to have the Authority to Approve Electrical Supplier on May 15, 2013. (Recommend that the Resolution be adopted and the Ordinance passed.) *Minutes from Public Hearings held on May 9, 2013 – two (2) hearings; handout provided by William Rau at the first Public Hearing; and additional written comments submitted by William Rau and Barbara Heyl.*

FOR COUNCIL: May 13, 2013

SUBJECT: Bills and Payroll

RECOMMENDATION/MOTION: That the bills and payroll be allowed and orders drawn on the Treasurer for the various amounts as funds are available.

STRATEGIC PLAN LINK: Goal 1. Financially sound City providing quality basic services

STRATEGIC PLAN SIGNIFICANCE: Objective 1.d. City services delivered in the most cost-effective, efficient manner.

FINANCIAL IMPACT: Total disbursements to be approved $6,559,188, (Payroll total $2,494,356.75 and Accounts Payable total $4,064,831.25).

Respectfully submitted for Council consideration.

Prepared by: Patti-Lynn Silva, Director of Finance

Recommended by:

David A. Hales
City Manager

(ON FILE IN CLERK'S OFFICE)

Attachment: Attachment 1. Bills and Payroll on file in the Clerk's office. Also available at www.cityblm.org.
Attachment 2. Summary Sheet Bills and Payroll Report

Motion: _____ Seconded by: _____

	Aye	Nay	Other		Aye	Nay	Other
Alderman Lower				Alderman Black			
Alderman Fazzini				Alderman Sage			
Alderman Fruin				Alderman Schmidt			
Alderman McDade				Alderman Stearns			
Alderman Mwilambwe							
				Mayor Renner			

ITEM 8A. AN ORDINANCE AUTHORIZING AGGREGATION OF ELECTRICAL LOAD AND APPROVING A PLAN OF OPERATION AND GOVERNANCE FOR MUNCIPAL OPT-OUT ELECTRICITY AGGREGATION AND DESIGNATING THE MAYOR AND DEPUTY CITY MANAGER TO HAVE THE AUTHORITY TO APPROVE ELECTRICAL SUPPLIER ON MAY 15, 2013.

A listing of additional documents:

Minutes of Public Hearing – 12:30 p.m.

Minutes of Public Hearing – 6:45 p.m.

Handout from William Rau entitled Reducing the Carbon Footprint of Buildings: A Case Study, by William C. Rau from 12:30 Public Hearing

Memorandum from William Rau regarding Choice of "Green Energy" (Renewable Energy Credits or RECs) under electric aggregation)

Letter from Barbara Heyl

PUBLIC HEARING
CORPORATE AUTHORITIES
City Hall Council Chambers
May 9, 2013

Council present: Aldermen Mboka Mwilambwe, Rob Fazzini and Karen Schmidt, and Mayor Tari Renner.

Council absent: Alderman Kevin Lower, David Sage, Judy Stearns, Jennifer McDade, Scott Black and Jim Fruin.

Staff present: David Hales, City Manager and Tracey Covert, City Clerk.

Others present: Charles de Casteja, Managing Partner and Jerod McMorris, Energy Consultant, GoodEnergy.

Mayor Renner called the Public Hearing to order at 12:30 p.m.

David Hales, City Manager, addressed the Council. He stated that two (2) Public Hearings would be held this date: 1.) at 12:30 p.m. and 2.) at 6:45 p.m. He noted that the referendum on Municipal Aggregation was approved on April 6, 2013. He cited City staff's efforts on this issue. The Public Hearing would address the Municipal Aggregation Plan of Operation and Governance, (APOG). He informed the Council that Charles de Casteja, Managing Partner and Jerod McMorris, Energy Consultant, GoodEnergy, were present.

Charles de Casteja, Good Energy's Managing Partner, addressed the Council. In his role as Managing Partner, he oversaw municipal aggregation in the state of Illinois. The City retained GoodEnergy in December 2011 to assist with municipal aggregation. He noted that municipal aggregation had appeared on the ballot twice. It was successful on the second attempt. The Plan of Operation and Governance stated how the program would operate in the City. It addressed eligibility, participation, opt- out, program operation and energy mix, (traditional, renewable). The plan was amendable. GoodEnergy represented 170 communities or over 400,000 households in Ameren's service area. This would be the third round of municipal aggregation in Central Illinois. Thirty-nine (39) communities were involved. The City was the largest.

Mayor Renner opened the Public Hearing. An individual's comments would be limited to three (3) minutes. Comments should address the agreement/plan. The referendum has passed. Comments should be focused and effective. Written comments may be submitted to the City Clerk's Office by noon on Friday, May 10, 2013.

William Rau, 313 Vista Dr., addressed the Council. He encouraged the Council to consider renewable energy. He cited wind as an example. Renewal energy was cost competitive. The carbon foot print of a home could be reduced by forty to sixty percent, (40 – 60%). He cited his personal experience. There were real advantages. The Council needed to do the right thing.

Renewal energy provided a stable power supply. He planned to provide written comments. He again encouraged the Council to select renewable energy. He presented Tracey Covert, City Clerk, with a document entitled Reducing the Carbon Footprint of Buildings: A Case Study, by William C. Rau.

Richard Heiser, 810 W. Jefferson, addressed the Council. He also encouraged the City to select renewable energy. Renewal energy was cost competitive. He expressed his concern regarding climate change. This was a good opportunity for the City to be of assistance to the residents. Sustainable energy was a part of the future. No infrastructure change was needed. The City needed to keep all options open. He cited recent telephone calls and being solicited to purchase energy. The City needed to work with the media and tell citizens to take a wait and see approach. The City should assist the residents to avoid being victimized.

Gary Lambert, 3018 E. Oakland Ave., addressed the Council. He expressed his concern regarding granting three (3) people only three (3) minutes to speak. He cited the notice in the Pantagraph. He noted the civic contribution – one tenth of one percent (1%). He addressed the current municipal charge on his monthly electric bill. He believed that municipal aggregation would be a tax increase that would bring the total municipal tax to 7 2/3%.

He also noted that at the City's option it could require up to 100% renewable energy. He noted statements that renewable energy was price competitive. He questioned if this claim was due to direct subsidies from the federal and/or state government.

He addressed the phrase demand size managed reduction. He questioned what this meant. He believed that there should have been better advertisement regarding this issue before the election. He informed the Council that he had resided in Woodford County. The Woodford County Board had expressed its concern that local government would make a profit off potential consumer savings.

Mr. de Casteja readdressed the Council in response to the comments made. He directed the Council to *APOG Item 9) Green Power – Renewal Energy*. Retail electricity was subject to IL Renewal Portfolio Standard (RPS). The Request for Proposal will specify the quantity of renewable power. It would be satisfied by using Renewal Energy Certificates.

Mr. de Casteja directed the Council to *APOG Item 13) Pricing Methodology*. The Council would have the option to require a civic contribution up to one tenth of a cent per kilowatt hour. He added that other Central Illinois cities had taken this action. He noted City staff time spent on municipal aggregation. These funds could be used to hire staff to provide energy programs.

Mr. de Casteja directed the Council to *APOG Item 11) Demand Management and Energy Efficiency Initiative*. This item addressed energy efficiency programs. This item is contained in state statute. Municipal aggregation was a commodity contract. The electric service would be supplied by Ameren. Generally, direct mail offers could not compete with aggregation. These programs were also opt- in. GoodEnergy could assist the City with press releases. It was important for citizens to know what they have.

Alderman Fazzini questioned if the electricity could be shut off based upon usage. Mr. de Casteja responded negatively. There were not any demand meters in the state of Illinois.

Mr. Hales questioned the civic formula. Mr. de Casteja stated that eighty-five percent (85%) of communities adopt the one tenth of a cent per kilowatt hour. Mayor Renner compared civic contribution to an administrative fee to cover costs. Mr. de Casteja restated that staff time would be involved. He restated the civic contribution maximum was one tenth of a cent per kilowatt hour. Mr. Hales noted that these dollars could be directed towards the education initiative, (*see APOG Item 10) Program Education Initiative*). Mr. de Casteja added that the goal of the educational program was to reduce the usage of electricity. City staff would be responsible for the educational component. There were Central Illinois cities which already have educational programs.

Alderman Fazzini questioned the typical annual household savings in Central Illinois. Mr. de Casteja estimated the savings at $100 per year in what would be round three. Annual savings were higher in the first two (2) rounds.

Mr. de Casteja addressed opting out of municipal aggregation. Citizens would have two (2) opportunities. There would be two (2) opt-out periods. The second option would be called a "Letter of Rescission". He directed the Council to *APOG Item 3) Opt-Out Process*. He added that there were no exit fees. He directed the Council to *APOG Item 8*) *Enrollment and Opt-Out During Program*.

Alderman Schmidt questioned the impact upon landlords, (i.e. turn over in tenants, tenants' abilities to make decisions). Mr. de Casteja stated that there was a perpetual opt-out. There were no penalties to leave. He directed the Council to *APOG Item 7) Program Move-Ins and Move-Outs*. Ameren data would be received monthly. New accounts would be contacted.

Mayor Renner restated that revised/extended remarks could be submitted to the City Clerk's Office by noon on Friday, May 10, 2013.

Mayor Renner closed the Public Hearing. Time 12:55 p.m.

Respectfully submitted,

Tracey Covert
City Clerk

PUBLIC HEARING
CORPORATE AUTHORITIES
City Hall Council Chambers
May 9, 2013

Council present: Aldermen Kevin Lower, Jennifer McDade, Karen Schmidt, Scott Black, and Jim Fruin and Mayor Tari Renner.

Council absent: Alderman David Sage, Mboka Mwilambwe, Judy Stearns, and Rob Fazzini.

Staff present: David Hales, City Manager and Tracey Covert, City Clerk.

Others present: Charles de Casteja, Managing Partner and Jerod McMorris, Energy Consultant, GoodEnergy.

Mayor Renner called the Public Hearing to order at 6:45 p.m.

David Hales, City Manager, addressed the Council. This was the second Public Hearing regarding the Municipal Aggregation Plan of Operation and Governance, (APOG) which would be held this date. This first Public Hearing was held at 12:30 p.m. The draft plan had been placed on the City's web site. The Council would take comments. The Council would vote on this item at their May 13, 2013 meeting. He noted that the referendum on Municipal Aggregation was approved on April 6, 2013. Municipal aggregation allowed energy to be purchased in bulk which would result in lower electric rates. He informed the Council that Charles de Casteja, Managing Partner and Jerod McMorris, Energy Consultant, GoodEnergy, were present. Mr. de Casteja would address the plan's highlights.

Charles de Casteja, Good Energy's Managing Partner, addressed the Council. Good Energy was a national energy consulting firm. In his role as Managing Partner, he oversaw municipal aggregation in the state of Illinois. The City retained GoodEnergy to assist with municipal aggregation. The City's first attempt had failed. Municipal aggregation was approved on April 6, 2013. The APOG was an operating document. This document covered bidding, types of energy, eligibility, opt-out process, and exit fees. At the first hearing, there were questions regarding renewal energy. There was a state mandate that seven percent (7%) of the energy must be renewable. GoodEnergy represented a number of Central Illinois cities. The majority had chosen 100% renewable. The civic contribution was generally used to cover a city's administrative costs.

Alderman McDade arrived at 6:51 p.m.

He added that eighty-three percent, (83%) of households in Ameren territory had selected aggregation. The maximum civic contribution was one tenth of one percent (1%). There

were no exit fees due to the fact that there were no financial risks. People do not leave municipal aggregation. Relocations would not be an issue.

Mayor Renner opened the Public Hearing.

Barbara Heyl, 313 Vista Dr., addressed the Council. She requested that the Council consider 100% renewable energy. In 2009, she had changed suppliers. She might join aggregation. Renewable energy was important to her. She added her concern regarding fracking. Natural Gas was being used to produce electricity. Fracking used and contaminated water. She noted that wind power did not produce carbon.

Mayor Renner stated that revised/extended remarks could be submitted to the City Clerk's Office by noon on Friday, May 10, 2013.

Sid Smart, 323 Vista Dr., addressed the Council. He was present at the hearing to learn. He had questions after reading the plan document. He cited references to the consultant. He questioned how the consultant would be paid, by whom and in what amount. He believed that the consultant would have an ongoing role. He also cited the opt-in/opt-out and educational programs.

His second question addressed the placement of municipal aggregation on the April 6, 2013 ballot. Municipal aggregation was voted down the first time that it appeared before the voters. The City stood to gain $250,000 from this program. He cited openness. He restated that the taxpayers had voted municipal aggregation down.

He had other concerns. He believed that the Council would be open to criticism. He believed that aggregation would extend Ameren's monopoly. A number of communities had contracted with Homefield Energy. This was an alias/assumed name for Ameren Energy Marketing. Ameren was using aggregation and appeared to be the low bidder. Ameren was financially able to withstand aggregation. Ameren was competing with itself. He restated his opinion that Ameren was extending its monopoly. Corn Belt Energy published Illinois Country Living. He cited a recent article, "Importance of Being Prudent". The article questioned long term considerations regarding the benefits of aggregation. These benefits might be temporary. He had done some research on this issue.

Mayor Renner stated that the civic contribution would help the City to recover the administrative costs. The maximum allowed was one tenth of a cent per kilowatt hour. He could not address the question of motivation as he was not Mayor at that time.

Mr. Hales directed the Council to the *APOG Item 13) Pricing Methodology*. The consultant fees would be paid by the electric customers at the rate of ¾ of one tenth of one cent per kilowatt hour or .00075/kWh.

Alderman Black left the meeting at 7:05 p.m.

Mr. de Casteja acknowledged that Ameren was d/b/a Homefield Energy. Businesses have been able to purchase from Ameren Energy Marketing since 2007. Homefield Energy addressed residential customers. In state rates were set in three (3) year increments. Homefield Energy has been purchased and will be an independent company. He noted that Ameren/Homefield had been awarded two thirds (2/3) or 120 communities under municipal aggregation.

Mr. Hales questioned if there were other bidders. Mr. de Casteja noted that there had been four to five (4 – 5) bidders. An Alternative Retail Electric Suppliers (ARES) must have a track record and be a substantial operator.

Mr. Hales questioned why the program would not be opt-in. Mr. de Casteja stated that this program would offer no fees to opt-out or opt-in. ARES believed that account holders would remain in the program.

Mayor Renner restated that revised/extended remarks could be submitted to the City Clerk's Office by noon on Friday, May 10, 2013.

Mayor Renner closed the Public Hearing. Time 7:09 p.m.

Respectfully submitted,

Tracey Covert
City Clerk

Reducing the Carbon Footprint of Buildings: A Case Study, by William C. Rau (wcrau@ilstu.edu - 5/4/2013)

Cut the CO_2 output of your home, apartment, or church by: (1) improving air sealing, insulation & HVAC units; (2) eliminating waste [negawatts]; (3) swapping wind power for coal-generated electricity.

I strongly support efficiency & negawatts strategies, but the quickest & easiest way to **immediately** cut a home's CO_2 footprint by 40% to 60% (depending on your therm-KWh mix) is to stop buying dirty, coal-fired electricity and purchase wind power instead. Note below that we dropped our CO_2 footprint ***by 85%*** from 2009 to 2010 (7.6 to 1.1metric tons of CO_2) by purchasing of wind power - and **88%** for same year comparisons. The CO_2 drop since 1993 is ~93%.

We use a ground-source heat pump ("geothermal") for heating & cooling. *Geothermal +100% renewable energy credits = a carbon killing combo.* We cook with electricity (no radon from gas) and use a close line.

In the past we bought our 100% RECs from BlueStar Energy. With 10 RESs now in the area, there are more choices; RECs via electric aggregation is the best choice.

Effects of Efficiency Upgrades, Negawatts Campaigns & Renewable Energy on Greenhouse Gas at 313 Vista Drive, Bloomington IL

	Nat. gas	Therms as:	Electric	Total kWh	Energy Measures			Partial List of Insulation, Efficiency, Negawatts & Renewable Energy Actions
Year	Therms	kWh	kWh		EII[1]	ES YS[2]	Mt. GHG[3]	*Note: Below, a number of things in the "wrong order" -- An energy audit is "Job #1"*
1993	*~1,300*	*38,090*	~6,500	*44,590*	*16.6*	*~3.1*	*~13.0*	Therms & kWh = Ballpark estimates; Home purchased 8/93
1994	1,046	30,648	5,899	36,547	13.6	6.0	9.9	From 50-55% efficient to >90% eff. Furnace: 12/93, 4.5 yr payback *(Do Manual J sizing!.)*
1996	822	24,085	6,950	31,035	11.6	6.7	9.5	Fiberglass attic insulation here? *(Mistake! Air seal first, then blow in lots of cellulose.)*
2001	661	19,367	8,278	27,645	10.3	6.7	9.7	1st floor: from single-pane wood to double-pane windows (1997?)
2002	672	19,690	10,809	30,499	11.4	5.1	*11.6*	Basement: from single to double-pane windows, 6/10/03 (So-so windows - do homework!)
2004[4]	323	9,464	12,751	22,215	8.3	5.2	11.2	Geothermal Installed, 7/30/03; Energy audit, 10/27/05 (1993 would have been much smarter.)
2006	200	5,860	*12,816*	18,676	7.0	6.4	10.6	New siding + cellulose dense pack, 4/06 (Improving insulation = continuing kWh drop)
2008	195	5,714	10,588	16,302	6.1	8.1	8.9	15" cellulose blown into attic, 12/15/08; new doors; So. basement wall, R-10; So. rim joist, R-15
2009	164	4,805	9,056	13,861	5.2	8.9	7.6	Liv.Rm 3-pane window, 3/11/09; New H_2O Tank, 6/25/09; Garage closet insulation, 7/14/09.
2009	*164*		*9,056*				*1.0*[5]	*[5] Carbon footprint IF electricity had been purchased from Blue Star in 2009*
2010	192	5,626	9,392	15,018	5.6	9.1	1.1	Blue Star wind power begins 12/21/09
2011	161	4,727	8,548	13,275	5.0	9.4	0.9	3-pane French door & kitchen window; DC motor for HVAC; clothes lines; (1/2 N. rim joist, R-25)
2012	146	4,290	7,473	11,763	4.4	9.7	0.8	So. Basement wall: R-20, rim joist, R-31; Bsmnt BR: R-15, rim joist, R-31
2013	*Close to maxed out w. diminishing returns*							*Might squeeze out ~500-800 kWh w. same degree days; time to move to rainwater harvesting*

[1] EII = Energy Intensity Index = kWh / ft^2 (or BTU / ft^2) - Includes both natural gas and electricity: a key metric used by energy audit professionals.
1 therm = 29.3 kWh. 164 * 29.3 = 4805 kWh + 9,056 kWh = 13,861 total / 2,680 ft^2 = 5.2 kWh / ft^2 per year; Energy Star standard = 9.62 kWh / ft^2 per year.

[2] ES YS = Energy Star Yardstick: 5.0 = Average Home, same size; 10=Highest Score (http://www.energystar.gov/index.cfm?fuseaction=HOME_ENERGY_YARDSTICK.showGetStarted)

[3] Mt. GHG = Metric tons of greenhouse gases which are mostly (~80%) CO_2. A metric ton = 2,205 pounds.

[4] Geothermal estimated at ~4,000 kWh / Yr for 2006 to 2008 (4,000 kWh = 137 Therms). This is for both heating & cooling.

[5] Land-based wind power has a life cycle carbon cost of ~10 grams per kWh* (1 metric ton = 1,000,000 grams). 1 therm = .005 metric tons of GHG.
2009 estimate: (9,056 kWh * 10 / 1,000,000 = 0.09056 Mt). + (164 therms * .005 = 0.82 + .82);).09056 + 0.82 = .91 metric ton

* Source: Gore, Al. 2009. *Our Choice: A Plan to Solve the Climate Crisis* (Emmaus, PA: Rodale. p. 165)

Insulation & Negawatts Strategies

Buildings are responsible for ~27% of CO_2 emissions in the U.S. That is larger than the CO_2 released by all of our cars (~22%), which is why it is so important to reduce the CO_2 footprints of our homes.

If you shift to wind power but want to reduce CO_2 even more, you will have to also cut natural gas consumption for **home heating** and **hot water**. These **are "big ticket" energy items - #1 & #3 targets in a CO_2 reduction campaign (air conditioning is #2).** If you have an older home (pre-1980s), or a new home that was not air sealed and insulated properly (very likely), then you should be able to reduce natural gas consumption by 25 to 50% with air sealing /insulation & window "attachments or retrofits," and by replacing an old, inefficient, poorly insulated H_2O tank, if you still have one. (*Be sure to look at air-source heat pump water heaters.)*

Caveat: Improve air sealing & insulation, opt for window "retrofits" (e.g., interior storms) **before replacing a furnace.** A thorough building retrofit will allow you to downsize your furnace size by 25% to 50%. Also, be sure that a furnace contractor uses **Manual J software to properly size a furnace**, or you are likely to end up with a significantly oversized, less efficient furnace or AC.

Retrofit plans require self-study or help from a certified energy auditor. Other than air sealing (rim joist, attic), create a thoroughly-researched, written plan; or you will probably do "the wrong things in the wrong order" (Lovins), which is what I did.

Start with an efficiency or negawatts campaign. For January 2012 wind power cost us $0.058/kWh compared to $0.063 for Ameren power. Even if wind power costs less, I urge ongoing reductions in kilowatt hours. Start by finding phantom kW loads with a Kill A Watt™ meter and use power strips & Bye Bye Standby™ controls to shut down electric devices that still draw watts when "turned off."

Next, test large kW guzzlers, esp. your fridge. **New fridges are so much more efficient that you can come out $$ ahead by junking an old unit.**

Don't forget lights. We had 60 watt halogen lights in our windowless master bathroom. CFLs would not fit in the fixtures but 40 watt eq. PAR20 LEDs did fit while offering higher quality light at the same brightness.

End result? A 2.5 year payback due to an 86% cut in electricity usage with similar gains on lights over our dining room table. We also have LEDs in our living room, front porch & exterior garage.

Simple Payback: Replacing two 60 watt halogens w. two 8 watt, PAR20 LEDs

Type	Brand	Outlet	Watts	Life (Hrs)	Cost
Halogen	GE Edison Flood	Lowe's	60	2,000	$8.18
LED	LSG EcoSmart	Home Depot	8	50,000	$24.97

Hours	Hours per Year	Energy Cost		Savings per Year	Payback (Years)
		Halogen	LED		
3	1095	$15.51	$2.07	$13.44	2.50
4	1460	$20.67	$2.76	$17.92	1.87
8	2920	$41.35	$5.51	$35.83	0.94
12	4380	$62.02	$8.27	$53.75	0.62
24	8760	$124.04	$16.54	$107.50	0.31

Example calculations @ 3 hrs (3 * 365 = 1095 hrs / yr):

Halogen: 1095 * 120 watts / 1,000 = 131.4 kWh / y * $0 .118/kWh = $15.51
LED: 1095 * 16 watts / 1,000 = 17.5 kWh / yr * $0.118/kWh = $2.07
"Bulb" cost difference (2 "bulbs"): $49.94 - $16.36 = $33.58 /13.44 = 2.5 Years

Comments: Prices on LED bulbs should decline about 15% *per year* over the next 3-5 years. Spot or recessed-fixture LEDs have quick paybacks and have similar or better light quality than incandescents and halogens. *And, at a price point of $18, a 120 lumen/watt LED will use 88% less electricity than an incandescent and will have a payback of less than 3 years.*

CFLs are cheaper than equivalent LEDs and will probably remain so until LEDs drop below $10/$15. However, LEDs provide far superior light quality than CFLs & can make sense on a life-cycle cost basis as replacements for burned out CFLs even before the $10/$15 price point. So, watch for price drops and lumen per watt increases for LED lights at Lowe's, Home Depot, etc.

Next, if you plan to buy a new TV or computer monitor, be sure to get LED edge backlighting. Result: ***up to 40% less energy than LCD displays with florescent backlighting*** and better color contrast, longevity, and viewing in bright light, which is why all smart phones use LED backlighting.

10 May 2013

TO: Mayor Tari Renner & City Council Members

FM: William C. Rau, 313 Vista Drive, Bloomington, IL (wcrau@ilstu.edu; 309-662-1605)
Professor Emeritus, Illinois State University

RE: Choice of "Green Energy" (Renewable Energy Credits or RECs) under electric aggregation

There are many reasons why Green Energy is the prudent source of electricity in a municipal; or electric aggregation contract. Here are six reasons:

1. **Cost.** Wind energy (the chief energy source in a RECs contract) is now cost competitive with fossil-fueled electricity. RECs may be inconsequentially higher due to the need for "Green-e Certification," an accounting system to ensure that a power producer does not sell the same renewable energy kilowatt hours (kWh) to two or more customers. I have attached a brief explanation of RECs ("UUBN Board Opts for Green Power").

2. **Large, fast reductions in greenhouse gas emissions (GHG).** Bloomington can be insured of 40% to 60% reductions in the greenhouse gas emissions or the carbon footprint of homes and apartments in just one year's time. Wind power yields ~10-11 grams of CO_2 equivalent emissions per kWh (Dolan & Heath 2012; http://onlinelibrary.wiley.com/doi/10.1111/j.1530-9290.2012.00464.x/pdf) compared to about 500 and 900-1,000 grams per kWh for gas- and coal-fired electricity generation respectively. The figure for gas-fired generation may be seriously underestimated because it appears that the federal government has not fully accounted for significant fugitive emissions of raw methane in natural gas production, processing and delivery. Release of raw methane into the atmosphere is more than 100 times more potent than CO_2 as a greenhouse gas agent over 20 years (Ingraffea 2013: http://www.youtube.com/watch?v=o78j77I7XUw)

   My calculations for six Bloomington-Normal homes and one church established carbon footprint reductions for homes that ranged from 48% to 88% (see Table A1). For example, the Unitarian-Universalist Church opted to buy RECs from MidAmerican Energy. In the process we reduced our building's carbon footprint by ~50% while also cutting our electricity bill by about $200 during the first year of the contract.

   My calculations rely on EPA utility data (e.g., Ameren power generation for electricity) to establish a base greenhouse gas number for a home's annual electricity and natural gas consumption. (go to: ttps://www.energystar.gov/index.cfm?fuseaction=HOME_ENERGY_YARDSTICK.showGetStarted) I then determine the greenhouse gas emissions with wind substituting for fossil-fueled electricity.

   There is, in short, no faster and essentially cost-free method for a city to reduce its carbon footprint than to opt for RECs under a municipal aggregation contract.

3. **Improved community image.** Communities with green power have a competitive advantage in efforts to attract young professionals and draw high tech businesses. At the moment, Peoria, Champaign-Urbana, and Normal have "green bragging rights"; we don't. Let's level the playing field.

4. **Fulfilling Abraham Lincoln's dream.** In an April 6, 1858 speech to the Young Men's Association of Bloomington, Abraham Lincoln uttered the following words:

   > All the power exerted by all the men, and beasts, and running-water, and steam, over and upon it, shall not equal the one hundredth part of what is exerted by the blowing of the wind over and upon the same space. . . . As yet, the wind is an untamed, and unharnessed force; and quite

possibly one of the greatest discoveries hereafter to be made, will be the taming, and harnessing of the wind (http://showcase.netins.net/web/creative/lincoln/speeches/discoveries.htm).

We bave now tamed and harnessed the wind. Let us be true to our heritage and put it to good use in Bloomington.

5. **Close to carbon-free transportation with electric cars.** When an electric car is plugged into a renewable energy source, it becomes a **"carbon-killer app,"** in a manner similar to air- and ground-source heat pumps for heating and cooling buildings. By opting for RECs Bloomington-Normal will help to (1) enable the next transportation revolution by making electric cars even more attractive (Union of Concerned Scientists, 2012. *State of Charge;* http://www.ucsusa.org/clean_vehicles/); (2) give Mitsubishi good grounds to return to B-N for another round of advertisements for their "I" car; and (3) provide an intangible yet possibly important inducement for Mitsubishi to eventually locate I car manufacturing to our community.

   Mark my words: ***when the second generation of electric cars are released, with cheaper and longer-range batteries, sales will increase briskly.***

6. **Price Stability**. Since renewable energy "fuel" is free and, in the case of wind, uses virtually no water during power generation, we can be insured of price stability in the future. Wind has entered a virtuous circle of increasing efficiency and declining capital costs per kWh: increased hub height and blade sweep, improved materials, especially improved carbon composites in turbine blades, increased wind capacity factors, gains via direct drive turbines (improved power output, substantially reduced maintenance), rationalized manufacture of turbines (move from small to large batch manufacturing = reduced production costs), more efficient and streamlined construction of wind farms, and substantially reduced operations and maintenance costs. (IRENA , 2012. Renewable Power Generation Costs. http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=277). In contrast, the BTU content per ton of coal has been declining for over 30 years (higher energy coal is largely "mined out"), while mining and transportation costs have increased. Even without a carbon tax, coal is less and less competitive, a trend that is likely to continue.

   Do not buy into the myths about shale gas. Shale gas production costs exceed the natural gas market price by a factor of about two. Last winter contracts for natural gas ran in the 3 dollar range for a million BTUs whereas the production cost for shale gas runs between $4 and $8 /MMBTU (see: Mazur, Karol. 2012 [October 3]. "Economics of Shale Gas." http://www.energybiz.com/article/12/10/economics-shale-gas; Baihly, et al.. 2011 "Study Assesses Shale Decline Rates"; http://www.slb.com/~/media/Files/dcs/industry_articles/201105_aogr_shale_baihly.ashx; Berman &. Pittinger 2011. "U.S. Shale Gas: Less Abundance, Higher Cost." *The Oil Drum*: http://www.theoildrum.com/node/8212.)

   In sum, there is a very high probability that natural gas, historically one of the most volatile commodities in America, will be headed sharply higher. If Bill Powers is correct, natural gas could double or triple in price in the near future (Horn, 2013. Bill Powers on *Cold, Hungry, and in the Dark:* http://www.huffingtonpost.com/steve-horn/bill-powers-shale-gas_b_3240166.html?view=print&comm_ref=false).

In sum, the choice of RECs is a vote for a clean energy future. It is a vote for stable energy prices and it is a vote for a far safer, indefinitely plentiful, water conserving , and environmentally benign energy source. The choice of green energy will allow Bloomington to play its role in shaping the 21st Century.

If you have any questions, individually or collectively, please feel free to call or email me.

UUBN Board Opts for Green Power.

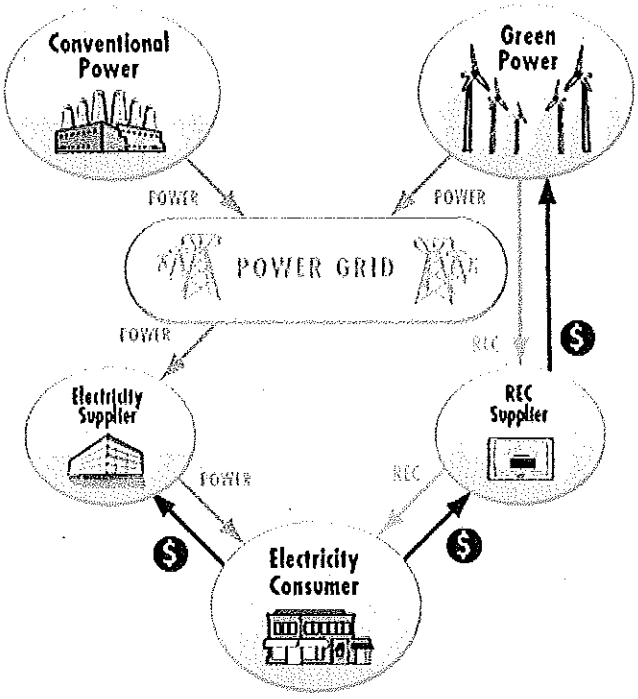
At the request of the Green Sanctuary Task Force, the UUBN Board voted to approve the purchase of 100% Green-e certified Renewable Energy Credits (RECs) from MidAmerican Energy beginning May 25, 2011. *This decision will mean that our church's carbon footprint will drop from about 50 to 25 metric tons of carbon dioxide per year.* Better yet, we will pay no more - indeed, may pay slightly less - than what we were paying for the power from Ameren's 40- to 50-year old coal-fired plants.

MidAmerican is a Berkshire Hathaway or Warren Buffett-owned company that has first-place service ratings, great financial strength, and substantial ownership of wind farms in Iowa. Our RECs will be certified by Sterling Planet, the company that developed Green-e RECs. Sterling Planet also received the US Department of Energy's Renewable Energy Marketer of the Year award for 2007 and 2008.

Here's how RECs work. Our 29,000 kilowatt hours of power per year will be generated from a green power source as represented on the right side of Figure 4. These kilowatt hours will be delivered by MidAmerican to a tie-in point for Ameren's power grid. At that point it is no longer possible to distinguish "green" electrons from "fossil fuel" electrons. In short we cannot say that all of the electricity delivered to our door is green. However, our purchasing power is shifting *the production of 29,000 kW hours electricity from the left to the right side of Figure 4.* And in the final analysis, that's what really counts. We are helping to shrink the supply of environmentally destructive coal-generated power while increasing the supply of clean, renewable power. We can therefore claim with full certitude that we are shrinking the carbon footprint of UUBN by 50%.

And it won't even cost us a dime.

Figure 4. Renewable energy certificate (REC) transaction path in a voluntary green power market



Note: Figure 4 is not intended to represent a comprehensive view of all the possible ways a REC can be traded and used.

Source: EPA. 2010. *Guide to Purchasing Green Power.*
http://www.epa.gov/greenpower/documents/purchasing_guide_for_web.pdf

Table A1. Energy Consumption & Intensity of 7 B-N Buildings: Coal versus Wind Power CO_2 Numbers, 2010

Bldg.	Year	Sq.Ft	kWh	Therms	Therms as kWh[1]	Total kWh	kWh/ ft^2-yr^2	Mt. CO_2		CO_2 Drop
								Coal+NG	NG+Wind	
1[3]	1964	2,680	9,382	192	5,627	15,009	5.60	9.0	1.05	88%
2	1926	1,642	3,677	635	18,610	19,245	11.72	6.0	3.11	48%
3	1968	1,920	8,767	691	20,251	29,018	15.11	11.0	3.55	68%
4	1965	2,000	12,982	786	23,035	36,017	18.01	15.0	4.06	73%
5	1995	3,600	8,311	1,005	29,454	37,765	10.49	12.0	5.11	57%
6	1989	3,000	14,045	834	24,442	38,487	12.83	16.0	4.58	71%
7[4]	1960	10,300	29,040	4,983	146,037	175,077	17.00	50.0	25.21	50%

[1] One (1) therm = 100,067 BTUs = 29.3071 kWh. This conversion reveals the huge amount of energy needed to heat most homes.

[2] kWh / ft^2-year is an "energy intensity" metric used by green energy auditors & architects. Total kWh consumption is arguably a more useful measure for Transition Towns. It would also require larger homes to be more energy efficient than smaller homes.

[3] Building #1 (Rau-Heyl residence at 313 Vista Drive, Bloomington) uses a ground-source heat pump ("geothermal") for heating and air conditioning. For every one (1) unit of energy input, geothermal units extract about three (3) units of free energy from the ground. The end result is a quantum jump in HVAC efficiency. It is also a **"carbon killing app"** when paired with renewable power. Wind power, for example, has a life-cycle carbon cost of only 10 grams of CO_2 per kWh compared to ~900 grams for coal-fired power (Gore, Al. 2009. *Our Choice: A Plan to Solve the Climate Crisis* (Emmaus, PA: Rodale. p. 165).

[4] Building #7 is the Unitarian Universalist Church of Bloomington-Normal (UUBN). This spring, the UUBN Board opted to buy wind power from MidAmerican Energy, thus cutting the church's carbon footprint in half while also slightly reducing its electricity bill. The building may be retrofitted in 2012. This and other energy efficiency measures lead to further reductions in the church's aggregate energy consumption. We just replaced the church's old fridge which will cut electricity use by ~1,000 kWh / year.

* Source: Data gathered by William C. Rau (wcrau@ilstu.edu)

)

Reducing the Carbon Footprint of Buildings: A Case Study, by William C. Rau (wcrau@ilstu.edu - 5/4/2013)

Cut the CO_2 output of your home, apartment, or church by: (1) improving air sealing, insulation & HVAC units; (2) eliminating waste [negawatts]; (3) swapping wind power for coal-generated electricity.

I strongly support efficiency & negawatts strategies, but the quickest & easiest way to **immediately** cut a home's CO_2 footprint by 40% to 60% (depending on your therm-KWh mix) is to stop buying dirty, coal-fired electricity and purchase wind power instead. Note below that we dropped our CO_2 footprint ***by 85%*** from 2009 to 2010 (7.6 to 1.1metric tons of CO_2) by purchasing of wind power - and **88%** for same year comparisons. The CO_2 drop since 1993 is ~93%.

We use a ground-source heat pump ("geothermal") for heating & cooling. *Geothermal +100% renewable energy credits = a carbon killing combo.* We use cook with electricity (no radon from gas) and use a close line.

In the past we bought our 100% RECs from BlueStar Energy. With 10 RESs now in the area, there are more choices; RECs via electric aggregation is the best choice.

Effects of Efficiency Upgrades, Negawatts Campaigns & Renewable Energy on Greenhouse Gas at 313 Vista Drive, Bloomington IL

	Nat. gas	Therms as:	Electric	Total kWh	Energy Measures			Partial List of Insulation, Efficiency, Negawatts & Renewable Energy Actions
Year	Therms	kWh	kWh		EII[1]	ES YS[2]	Mt. GHG[3]	*Note: Below, a number of things in the "wrong order" -- An energy audit is "Job #1"*
1993	*~1,300*	*38,090*	~6,500	*44,590*	*16.6*	*~3.1*	*~13.0*	Therms & kWh = Ballpark estimates; Home purchased 8/93
1994	1,046	30,648	5,899	36,547	13.6	6.0	9.9	From 50-55% efficient to >90% eff. Furnace: 12/93, 4.5 yr payback *(Do Manual J sizing!.)*
1996	822	24,085	6,950	31,035	11.6	6.7	9.5	Fiberglass attic insulation here? *(Mistake! Air seal first, then blow in lots of cellulose.)*
2001	661	19,367	8,278	27,645	10.3	6.7	9.7	1st floor: from single-pane wood to double-pane windows (1997?)
2002	672	19,690	10,809	30,499	11.4	5.1	*11.6*	Basement: from single to double-pane windows, 6/10/03 (So-so windows - do homework!)
2004[4]	323	9,464	12,751	22,215	8.3	5.2	11.2	Geothermal Installed, 7/30/03; Energy audit, 10/27/05 (1993 would have been much smarter.)
2006	200	5,860	*12,816*	18,676	7.0	6.4	10.6	New siding + cellulose dense pack, 4/06 (Improving insulation = continuing kWh drop)
2008	195	5,714	10,588	16,302	6.1	8.1	8.9	15" cellulose blown into attic, 12/15/08; new doors; So. basement wall, R-10; So. rim joist, R-15
2009	164	4,805	9,056	13,861	5.2	8.9	7.6	Liv.Rm 3-pane window, 3/11/09; New H_2O Tank, 6/25/09; Garage closet insulation, 7/14/09.
2009	*164*		*9,056*				*1.0*[5]	*[5] Carbon footprint IF electricity had been purchased from Blue Star in 2009*
2010	192	5,626	9,392	15,018	5.6	9.1	1.1	Blue Star wind power begins 12/21/09
2011	161	4,727	8,548	13,275	5.0	9.4	0.9	3-pane French door & kitchen window; DC motor for HVAC; clothes lines; (1/2 N. rim joist, R-25)
2012	146	4,290	7,473	11,763	4.4	9.7	0.8	So. Basement wall: R-20, rim joist, R-31; Bsmnt BR: R-15, rim joist, R-31
2013	*Close to maxed out w. diminishing returns*							*Might squeeze out ~500-800 kWh w. same degree days; time to move to rainwater harvesting*

[1] EII = Energy Intensity Index = kWh / ft² (or BTU / ft²) - Includes both natural gas and electricity: a key metric used by energy audit professionals.
1 therm = 29.3 kWh. 164 * 29.3 = 4805 kWh + 9,056 kWh = 13,861 total / 2,680 ft² = 5.2 kWh / ft² per year; Energy Star standard = 9.62 kWh / ft² per year.

[2] ES YS = Energy Star Yardstick: 5.0 = Average Home, same size; 10=Highest Score (http://www.energystar.gov/index.cfm?fuseaction=HOME_ENERGY_YARDSTICK.showGetStarted)

[3] Mt. GHG = Metric tons of greenhouse gases which are mostly (~80%) CO_2. A metric ton = 2,205 pounds.

[4] Geothermal estimated at ~4,000 kWh / Yr for 2006 to 2008 (4,000 kWh = 137 Therms). This is for both heating & cooling.

[5] Land-based wind power has a life cycle carbon cost of ~10 grams per kWh* (1 metric ton = 1,000,000 grams). 1 therm = .005 metric tons of GHG.
2009 estimate: (9,056 kWh * 10 / 1,000,000 = 0.09056 Mt). + (164 therms * .005 = 0.82 + .82);).09056 + 0.82 = .91 metric ton

* Source: Gore, Al. 2009. *Our Choice: A Plan to Solve the Climate Crisis* (Emmaus, PA: Rodale. p. 165)

Insulation & Negawatts Strategies

Buildings are responsible for ~27% of CO_2 emissions in the U.S. That is larger than the CO_2 released by all of our cars (~22%), which is why it is so important to reduce the CO_2 footprints of our homes.

If you shift to wind power but want to reduce CO_2 even more, you will have to also cut natural gas consumption for **home heating** and **hot water.** These **are "big ticket" energy items - #1 & #3 targets in a CO_2 reduction campaign (air conditioning is #2).** If you have an older home (pre-1980s), or a new home that was not air sealed and insulated properly (very likely), then you should be able to reduce natural gas consumption by 25 to 50% with air sealing /insulation & window "attachments or retrofits," and by replacing an old, inefficient, poorly insulated H_2O tank, should you still have one. (*Be sure to look at air-source heat pump water heaters.)*

Caveat: Improve air sealing & insulation, opt for window "retrofits" (e.g., interior storms) **before replacing a furnace.** A thorough building retrofit will allow you to downsize your furnace size by 25% to 50%. Also, be sure that a furnace contractor uses **Manual J software to properly size a furnace**, or you are likely to end up with a significantly oversized, less efficient furnace or AC.

Retrofit plans require self-study or help from a certified energy auditor. Other than air sealing (rim joist, attic), create a thoroughly-researched, written plan; or you will probably do "the wrong things in the wrong order" (Lovins), which is what I did.

Start with an efficiency or negawatts campaign. For January 2012 wind power cost us $0.058/kWh compared to $0.063 for Ameren power. Even if wind power costs less, I urge ongoing reductions in kilowatt hours. Start by finding phantom kW loads with a Kill A Watt™ meter and use power strips & Bye Bye Standby™ controls to shut down electric devices that still draw watts when "turned off."

Next, test large kW guzzlers, esp. your fridge. **New fridges are so much more efficient that you can come out $$ ahead by junking an old unit.**

Don't forget lights. We had 60 watt halogen lights in our windowless master bathroom. CFLs would not fit in the fixtures but 40 watt eq. PAR20 LEDs did fit while offering higher quality light at the same brightness.

End result? A 2.5 year payback due to an 86% cut in electricity usage with similar gains on lights over our dining room table. We also have LEDs in our living room, front porch & exterior garage.

Simple Payback: Replacing two 60 watt halogens w. two 8 watt, PAR20 LEDs

Type	Brand	Outlet	Watts	Life (Hrs)	Cost
Halogen	GE Edison Flood	Lowe's	60	2,000	$8.18
LED	LSG EcoSmart	Home Depot	8	50,000	$24.97

Hours	Hours per Year	Energy Cost		Savings per Year	Payback (Years)
		Halogen	LED		
3	1095	$15.51	$2.07	$13.44	2.50
4	1460	$20.67	$2.76	$17.92	1.87
8	2920	$41.35	$5.51	$35.83	0.94
12	4380	$62.02	$8.27	$53.75	0.62
24	8760	$124.04	$16.54	$107.50	0.31

Example calculations @ 3 hrs (3 * 365 = 1095 hrs / yr):

Halogen: 1095 * 120 watts / 1,000 = 131.4 kWh / y * $0 .118/kWh = $15.51
LED: 1095 * 16 watts / 1,000 = 17.5 kWh / yr * $0.118/kWh = $2.07
"Bulb" cost difference (2 "bulbs"): $49.94 - $16.36 = $33.58 /13.44 = 2.5 Years

Comments: Prices on LED bulbs should decline about 15% *per year* over the next 3-5 years. Spot or recessed-fixture LEDs have quick paybacks and have similar or better light quality than incandescents and halogens. *And, at a price point of $18, a 120 lumen/watt LED will use 88% less electricity than an incandescent and will have a payback of less than 3 years.*

CFLs are cheaper than equivalent LEDs and will probably remain so until LEDs drop below $10/$15. However, LEDs provide far superior light quality than CFLs & can make sense on a life-cycle cost basis as replacements for burned out CFLs even before the $10/$15 price point. So, watch for price drops and lumen per watt increases for LED lights at Lowe's, Home Depot, etc.

Next, if you plan to buy a new TV or computer monitor, be sure to get LED edge backlighting. Result: ***up to 40% less energy than LCD displays with florescent backlighting*** and better color contrast, longevity, and viewing in bright light, which is why all smart phones use LED backlighting.

Comments from Barbara Heyl (313 Vista Dr., Bloomington, IL) at the Public Hearing on Electric Aggregation in Bloomington on the evening of May 9, 2013 before the Bloomington City Council:

I would like to encourage Bloomington to seek out an energy supplier for the new municipal aggregation program that can provide our pool of residents and small businesses with 100% renewable energy sources. Since December 2009 my family has purchased our electricity from renewable sources through an alternative energy supplier. In these past 3 1/2 years we have never had to pay much more, and sometimes paid even some less, for electricity than did our friends on Ameren.

If Bloomington chooses green power, we would gladly switch to become part of the electric aggregation pool. If not, we will stay where we are.

These steps taken toward renewable energy sources are important to me. An increasing percentage of electric energy generated by fossil fuel sources today is coming from natural gas, which can come from the process of hydraulic fracturing of shale all over the US. Any time individuals, churches, and communities switch to renewable electricity sources, it supports those supplying green energy and hopefully will help reduce our reliance on fossil fuels in the electricity sector. In any case, we know that renewable energy supplies do not use massive quantities of water or add carbon to the atmosphere. Drilling and fracking on an industrial scale (literally thousands of wells) has resulted in large scale environmental damage and health risks in other states.

Thank you.

Barbara Heyl

309-662-1605