Pima County Environmental Quality Advisory Council
150 W. Congress, Suite 109
Tucson, AZ 85701

Summary Minutes
Main Library Fourth Floor Conference Room
101 N. Stone, Tucson, AZ

March 21, 2007
1:30 p.m.

Members Present:
Mr. Warren Thompson
Mr. Allan MacDonald
Dr. Mark Witten
Dr. Roger Caldwell
Mr. Daniel G. Rowe
Dr. Eric Betterton

Members Absent:
Mr. Ben Dorris
Mr. Antonio Gomez
Mr. Peter Livingston
Mr. William R. Reilly

Others Present:
Ursula Kramer, Director, PDEQ
Frances Dominguez, Program Coordinator, PDEQ
Vicki Bennie, Council Secretary, PDEQ
Dennis Dickerson, PAG
Tom Hansen, TEP
Linda Douglas Worthy, TEP
Yves Khawam, Pima County Chief Building Official
Dan Ice, Pima County, Green Building Program Manager

I. CALL TO ORDER AND INTRODUCTIONS

Mr. Thompson called the meeting to order and introductions were made. Handouts were:

II. APPROVAL OF THE JANUARY 17, 2007, MINUTES

Mr. Rowe made a motion, seconded by Dr. Betterton, to approve the January 17, 2007, minutes. The motion passed with a unanimous vote.

III. TUCSON ELECTRIC POWER (TEP) PRESENTATION

Mr. Tom Hansen, Vice President for Environmental Services, Conservation and Renewable Energy Program, provided information regarding TEP's Solar System located at the Springerville Generating Station.

Arizona's Primary Energy Sources are:

- Biomass & Biogas – 100 MW to 300 MW sustainable
- Geothermal – Not yet found in commercial generation grade temperatures and quantities
- Hydropower – 12% of energy from hydro, little left that is economic to develop.
- Wind – Potential 25,000 MW of capacity developable at 15% to 25% capacity factor. Cost and intermittency issues must be managed.
- Solar – The sky is literally the limit. Twenty percent of AZ land surface could support 2,260,000 MW of generation at 15% to 20% annual capacity factor. Cost and intermittency issues must be managed.

Generation Biomass

- Proven technology available and developing technologies also
- EPAct2005 provides very attractive incentives for biomass technology as does USDA and USFS.
- Reciprocating engines, combustion turbines, fuel cells, traditional boilers
- Performance
  - Gasifier reliability improving in the short term – 80% availability
  - Long term reliability still very unclear
- Cost – Resource Sensitive
  - $0.065 to collect and transport forest waste biomass resource
  - $0.05 to $0.12 range of delivered energy cost
  - Subsidies available from Forest Service, USDA & PTC
- Somewhat location specific, near the source of fuel
- Fuel availability subject to political process
- Permitting
  - Emissions
  - Land use
  - Transmission required
  - Ash disposal

Generation Biogas

- Proven and developing technology, government incentives, performance and reciprocating engines, combustion turbines, fuel cells and traditional boilers the same as generation biomass.
- Generation reliability proven in the short term – 95% availability
- Long term reliability still a bit unclear
- Cost – Resource Sensitive
  - $0.065 for sewage digester gas generation
  - $0.08 to $0.12 range for feedstock waste to energy processes
  - Some subsidies available from USDA & PTC
- Location specific – must be very close to the source of fuel
- Fuel Availability subject to political process
- Permitting
  - Emissions
  - Land Use
  - Fuel Availability

Generation Geothermal

- Proven technology available and developing technologies also
- EPAct2005 provides some incentives for geothermal generation technology.
- Performance
  - High efficiency heat recovery processes
  - New conversion cycles in development
  - Highly reliable generation
  - Long term resource viability risk – hot rocks can cool over short time
- Cost – Competitive
  - $0.04/kWh energy with PTC
- Very Location Specific – at the source of heat
- Permitting
  - Visual impact
  - Land use
  - Water use
  - Transmission required

Generation Wind

- Reliable, intermittent non-firm, non-dispatchable generation type
- Nearly zero incremental fuel cost, expected to be highly stable over the short and long term
- Low fixed operating costs

- Medium capital costs - $1500 to $2500/kW depending on remoteness of location and number of installed turbines
- Integration - 10% of UNS generating capacity could be AZ based wind without some energy storage capacity or use of combustion turbines to manage intermittency.
- Uncontrolled, partially predictable high output ramp rate capability
- Long term fuel cost has very little risk associated with blade surface smoothness degradation
- No carbon risk, little water use of 0.01 gal/kWh
- Proven technology available and developing technologies also
- EPAct2005 provides good incentives for wind generation technology.
- Performance
  - Reliability improving in the short term – 98% availability
  - Long term – 10 year - reliability still a bit unclear
- Cost – Very sensitive to wind resource
  - 50% CF resource produces $0.035/kWh energy with PTC
  - 20% CF resource produces $0.100/kWh energy with PTC
- Intermittent Resource Concerns
- Very Location Specific – typically not near loads
- Permitting
  - Visual impact
  - Wildlife impact
  - Land use
  - Transmission required

Generation Solar

- Reliable, intermittent non-firm, non-dispatchable generation type
- Nearly zero incremental fuel cost, expected to be highly stable over the short and long term
- Low to medium fixed operating costs
- Very high capital costs - $3000 to $6000/kW depending on remoteness of location and type of technology employed
- Cost has high potential for reduction in the future
- Integration - 10% of UNS generating capacity could be true solar without some energy storage capacity or combustion turbines to manage intermittency
- Uncontrolled, partially predictable very high output ramp rate capability
- Solar options available for non power generation applications
- No carbon risk, no to significant water use of 0.00 to 2.00 gal/kWh depending on technology employed
- Proven technology available and developing technologies also
- EPAct2005 provides excellent incentives for solar generation technology.
- Performance
  - PV reliability improving in the short term – 99+% availability
  - Long term reliability of inverters is still a bit unclear
  - Some promising solar technologies are unproven or have poor track records to date.
- Cost – Very sensitive to solar resource
  - Currently the highest cost renewable resource
  - Best resources – 20% capacity factor produce $0.18/kWh energy using solar trough
  - Average resources – 15% capacity factor produce $0.50/kWh energy using photovoltaics
  - Currently two federal incentives including a 30% Investment Tax Credit (ITC) for commercial owners.
  - Numerous state incentive programs
- Intermittent Resource Concerns
- Ubiquitous Resource – Available everywhere
  - However, some sites have more sunlight than others
  - The best solar technology for a given application is very much site specific
- Permitting

- Visual impact
- Wildlife impact
- Land use
- Transmission
- Water use

- Several Different Solar Technology Types
  - Photovoltaic
  - Solar Engine
  - Solar Thermal Trough
  - Solar Thermal Central Tower
  - Solar to Wind Tower
- Differing Characteristics
  - Thermal technologies can be dispatchable firm, but use water
  - Engine technologies require low cloud areas
  - PV technologies adapt better to varying terrain and allow for modular growth with incremental funding.

Hybrid Generation Technology

- Combinations of biomass, coal, natural gas, solar, wind and hydro projects.
- Apply strengths of one energy source to reduce detrimental impacts of another energy source.
- Biomass/Solar, Natural Gas/Solar, Coal/Solar, Solar/Hydro
- Wind/Hydro
- Desalination options
- Can create reliable, firm, dispatchable renewable generation type.
- Integration - 10% of UNS generating capacity could be true solar without some energy storage capacity, but 70% could be solar/fueled hybrid.
- EPAct2005 provides excellent incentives for hybrid renewable generation technologies.

Customer Technologies

- Customers individual demand for electricity continues to grow despite conservation programs.
- Home Entertainment
  - Plasma HDTV
  - Large Screen LCD HDTV (LCD uses less electricity than HDTV)
  - More time at home – more HVAC and lighting
- Audio/Video – Computer Convergence
  - Machines left on continuously for On Demand Information/Entertainment
  - Personal communications devices – always on
  - 1000 watt power supplies offered by Dell
- Transportation – Private and Public
  - Plug in vehicle at home to charge vehicle battery
  - Plug in vehicle at home to power home
- Converting swamp coolers to refrigeration

Conclusions

- The global primary energy market is in transition.
- Per capita energy use is increasing across all segments of society and in all geographic areas, despite energy conservation measures.
- Maintaining the energy status quo is not an option.
- Reliable, relatively low cost renewable energy technologies are available, with more options soon.
- A balanced, carefully planned portfolio of primary energy sources is needed to minimize overall risk from future regulation and global energy demand.
- Local primary energy attributes must be considered for best fit and energy security opportunities.
- The long term view of energy opportunities is essential.

IV. LEUKEMIA CLUSTER UPDATE

Dr. Witten provided the latest information on the research into the leukemia clusters in Sierra Vista and Fallon, NV.

V. LEED PRESENTATION

Dr. Yves Khawam, PhD, PC Chief Building Official, provided information regarding the Leadership in Energy and Environmental Design (LEED) System. LEED is a leading-edge system for certifying design, construction and operations of the greenest buildings in the world. Green Buildings worldwide are certified with a voluntary, consensus-based rating system. The U.S. Green Building Council (USGBC) has four levels of LEED. Using this system, scores are tallied for different aspects of efficiency and design in appropriate categories:

- Site Planning
- Water Management
- Energy Management
- Material Use
- Indoor Environmental Air Quality
- Innovation & Design Process

The USGBC is a community of leaders working to transform the way buildings and communities are designed, built, and operated. They envision an environmentally responsible, healthy, and prosperous environment. The USGBC membership growth reflects the expansion of green buildings in the market.

The average savings of Green Buildings are:

Energy Savings between 30 to 70 %	Water Use Savings 30-50%
Carbon Savings 35%	Waste Cost Savings 50-90%

Average Productivity Gains of LEED buildings:
High-performance lighting enhances productivity 6.7%
Individual temperature control enhances productivity 3.6%
Schools – better test performance of about 20%
Hospitals – earlier discharge
Retail – increase in sales per square foot
Factories – increased production
Offices – between 2 and 16% productivity increase

Occupants and tenants perceive the benefits of working in a Green Building to be better for their health, overall environmental benefit, reduced energy consumption, increased productivity (reduced absenteeism, enhanced recruitment, improved employee morale), lower operating costs and has positive marketing and promotion value.

The EQAC thanked Dr. Khawam for the LEEDS presentation.

VI. SOLID WASTE PROPOSED BOND PROJECTS

Ursula Kramer provided a power point presentation that included an overview of the existing Pima County Solid Waste (SW) facilities, status of previously authorized bonds and the proposed 2008 SW bonds. The SW Division of PDEQ currently operates four landfills, two transfer stations and numerous rural collection sites. Current fees are:
Tangerine Landfill: Commercial rates of $19, $20, $21 and $23.50/ton; residential rates of $2/car, $5/truck and $10/large trailer
Sahuarita Landfill: Commercial rates of $19, $20, $21 and $23.50/ton; residential rates of $2/car, $5/truck and $10/large trailer

Ina Road Landfill: $18/ton for green waste (minimum $5.00) and $23.50/ton for construction debris (minimum $10)
Catalina Transfer Station: Residential use only $2/car, $5/truck vehicle, $10/large trailer
No charge at Ajo Landfill, Ryan Field Transfer Station or Rural Collection Sites

Staff is requesting PDEQ/SWM future bond funding:
Tangerine closure - $6 Million
Sahuarita Landfill Development - $4.8 Million
Solid Waste Management Office - $2.5 Million
Ajo Landfill Development - $.05 Million
Ina Road Landfill Development - $5 Million

In the bond process, all of the projects are competing against each other. The voters decide which projects to fund.

VII. CALL TO THE PUBLIC

Mr. Thompson asked if anyone wished to speak. There was no response.

VIII. PDEQ STAFF REPORT

Ms. Kramer reported that PDEQ has taken over the final inspection of septic systems from Development Services. We have hired three new staff people to perform this function.

IX. NEXT MEETING

The next EQAC meeting will be on Wednesday, May 16, 2007, at 1:30 p.m. in the Main Library fourth floor conference room, located at 101 N. Stone, Tucson.

May, 2007, EQAC meeting
Light Pollution (health, plant and animal life)
Rainwater Harvesting requested by Beth Gorman
Bufflegrass Report – D. Dickerson, PAG
Solid Waste Report – U. Kramer

July, 2007 EQAC meeting
Rapid growth of Arizona and implication on AQ – requested by Mr. Thompson
High Resolution Weather Modeling Project (tentative) – Mike Leuthold
Rosemont Mine – possible agenda item

Dr. Betterton suggested rotating through major categories such as Air, water, solid waste and have PDEQ staff provide updates. Ms. Kramer agreed.