Conference – Michigan's Future – Energy, Economy, Environment
November 1-3, 2013, Thompsonville, Michigan, http://www.futuremichigan.org/

Friday, November 1
Foss, Nicole & Boomert, Laurence - A Century of Challenges

International experts Foss (Canada) and Boomert (NZ) describe unprecedented challenges the 21st century brings and appropriate responses. Climate change, natural resource depletion and fragile economic systems present a very different future. We can either be reactive or proactive. The new system conditions mandate personal and societal responses beyond those of the 20th century. Foss is Senior Editor of The Automatic Earth, and international speaker on global finance, energy and environmental issues. Boomert has a long history in contingency planning, green business development and community solutions. In the early 1990s, he founded the 500 member Environmental Business Network. He currently runs the Bank of Real Solutions.

Nicole discussed cycles of boom and bust through time as purchasing power stimulates demand, activity and credit (inflation), limits are reached and contraction or deflation then begins as promises are broken, liquidity crunches and economics depression begins. Inflation results as a result of currency inflation cuts and more money is printed or credit expansion, excess claims. In our future, liquidity will be more important as values of assets and consumer prices fall and value of cash rises. Liquidity represents uncommitted choices, preserves freedom of action. During a contraction phase (contagion), prices fall but purchasing power falls faster, unemployment and taxes rise. Affordability becomes the issue. De-globalization expected, local circumstances will matter much more, international and national institutions will become stranded assets from trust perspective. Exploding demand calls for local, community, pooling of resources, social capital and self-sufficiency. Conclusion – decentralization, expectations versus emerging reality.

Laurence explained why our current crisis actually constitutes an unprecedented opportunity for us to create a better future. Given the most expansive cultural possibilities in human history, our ability to foster positive change rests on empowering grassroots efforts all around the globe. Laurence see creating community, revitalization in neighbourhoods, supporting a reality revolution enabling technologies, evolved thinking. Green ethical business capability, social development, environmental restoration, democratic participation and new trading systems will support community economic development. Co-ops and community resilience projects are good functional models.

Passive House Film Premiere, produced by Community Solutions

48% of all CO2 generated and energy consumed in the US is from the construction and operation of buildings. Climate scientists and national governments agree that CO2 emissions must be reduced 80% by 2050. A building revolution requires deep energy retrofits, less than 80-90% energy use. Fracking and oil sands demonstrate future scarcity and need to be energy efficient. Conventional heating systems are not needed. The film contrasts the building energy standard of Passive House's 80% energy reduction goal with the 20-40% energy reduction goals of Energy Star, LEED, and the National

Association of Homebuilders' Green Building Program. It introduces Life Cycle Analysis showing how the 5-10% increase in the initial cost of building a Passive House yields far greater lifetime savings in energy bills. It also highlights America's super-insulated house movement of the 1970s, which led to the development of the Passive House standard in Germany in 1991. Over 40,000 Passive House buildings – homes and apartments as well as commercial, institution, and industrial buildings have been constructed worldwide.

The film introduces the importance of retrofitting the 116 million existing homes in the US. It showcases architects, builders, and homeowners from across the country as they share their experiences of building a new Passive House or doing a deep-energy retrofit.

Aaron Wassner, conference organizer – Local Future

Wissner is a public school teacher for Wayland Union Schools and founder of the Local Future non-profit. He is active at all levels of the National Education Association (national, state, local) and co-president of the Wayland Union Education Association. Peak oil, climate change, and economic upheavals suggest that the future may look very different than most expect. One possible future is a very local one, where almost all services, and most products, are produced and consumed locally. The emphasis is vision, action, leadership. We need to build and invest in a best possible future.

William Catton, The Future Won't Be What It Used to Be

Catton is an American sociologist best known for his work in environmental sociology and human ecology. Catton's repute extends beyond academic social science primarily due to his 1980 book, Overshoot: The Ecological Basis of Revolutionary Change. He has written three other books and numerous articles, book chapters and book reviews.

Catton reflected on the mentality of indefinite growth and how we are stealing from the future. Short-sited policy decisions are impacting our future and progress needs to be redefined. His wish is to see economists get rid of externalities in their analysis so the numbers are realistic. He sees Michigan as part of a world already stressed to support 7 billion people. With modern technology many have enormous appetites for a wide range of resources. Continued reliance on escalating use of various non-renewable resources is unrealistic. Supposing growth as the answer to our woes makes coming to grief our destiny. To plan our future as if growth of our numbers and our living standard were perpetually possible is to remain stubbornly adolescent. As adults, we must learn to understand the carrying capacity concept, and accept that life in a world with a carrying capacity deficit cannot boom as it did when there was a carrying capacity surplus.

Suggested reading:
Cottrell, Fred. 1955. Energy and Society. New York: McGraw-Hill.
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Ophuls, William, and A. Stephen Boyan, Jr. 1992. Ecology and the Politics of Scarcity Revisited: The Unraveling of the American Dream. New York: W. H. Freeman and Company.

Heinberg, Richard. 2003. The Party's Over: Oil, War and the Fate of Industrial Societies. Gabriola Island, BC: New Society Publishers.
Deffeyes, Kenneth S. 2005. Beyond Oil: The View from Hubbert's Peak. New York: Hill and Wang.
Grant, Lindsey. 2005. The Collapsing Bubble: Growth and Fossil Energy. Santa Ana, CA: Seven Locks Press.
Catton, William R., Jr. 2009. Bottleneck: Humanity's Impending Impasse. Bloomington, IN: Xlibris Corp.
Clugston, Christopher O. 2012. Scarcity: Humanity's Final Chapter? Port Charlotte, FL: Booklocker.com, Inc.

Barry Johnson, Leveraging Polarities: A useful response to polarization in the politics of Energy, Economy, and Environment.

Johnson, founder, Polarity Partnerships LLC, http://www.polaritypartnerships.com/ for the past 38 years, has been working to help create organizations that are good places to work, to own, to do business with and to have in the community. In the process, he has founded five organizations. The Polarity Map® and initial set of principles emerged out of his work as a Gestalt Therapist in 1975. Since then he has continued to develop polarity principles with a variety of organizations all over the world. In 1992, he published his book, Polarity Management, Identifying and Managing Unsolvable Problems. A second book in December 2009 was Managing Polarities in Congregations, Eight Keys for Thriving Faith Communities.

His research shows organizations that leverage polarities outperformance others. His mapping program allows for assessment, learning and leveraging to shift discussions using connections that synergize the parts within a whole showing their interdependence and the need to take care of both pole opposites and the whole. The first step is to see the polarity. Then one can be intentional about leveraging it. A polarity approach contributes to the speed and sustainability of any change effort.

Dennis McKee, Consumers Energy's (utility) Smart Energy Program

He is currently Communications Director and has worked in an array of governmental and public affairs roles for Consumers Energy, primarily in support of all forms of electric generation facilities. He is a former Capitol Hill staffer and US Department of State foreign relations officer.

Consumers Energy initiated a program in 2012 to upgrade meter technology for 1.8 million electric customers and 600,000 natural gas customers. The utility industry has made tremendous strides to become leaner and greener by investing in renewable and alternative technologies to enhance energy delivery. McKee discussed how meters have communication capacity, with daily data reports. 130,000 have been installed to date and customers can see their energy use daily. Future energy savings programs will create dynamic pricing shift to off peak hours. Air conditioning program cycles 15 minutes off during an hour in peak periods to shift load. Across the US, 40 million have meters.

James Olson, Bringing Horizontal Hydraulic Fracturing into Balance: The Duty of State and Local Governments to Prevent Degradation of the State's Air, Water, and Natural Resources

Olsen is a lawyer (1972) in the specialized practice of Environmental, Land Use, Municipal, Real Estate, Toxic Tort, Hazardous Waste and Natural Resources Law. He has a postgraduate Master of Law Degree from the University of Michigan Law School. He has lectured around the world and published several books, one on Michigan Environmental Law, and numerous articles on environmental and land use subjects. Olson is the founder and chair of FLOW, Traverse City, http://flowforwater.org/, whose mission is to advance public trust solutions to save the waters of the Great Lakes Basin.

Threats to the Great Lakes include: resource extraction, reduced water levels, wetland loss, oil and gas fracking, invasive species, pollution, and over consumption use. The Public Trust Doctrine holds that certain natural resources like navigable waters are preserved in perpetuity for public use and enjoyment. Applying a banking analogy, the state serves as a trustee to maintain the trust or common resources for the benefit of current and future generations who are the beneficiaries. Because many citizens are not aware that the public trust doctrine is part of their bundle of rights in their democracy, many leaders and big business are ignoring and violating these principles.

Fracking is the subject of scrutiny in a recent Integrative Assessment report series from the University of Michigan's Graham Sustainability Institute. On October 7, 2013, FLOW submitted comments recommending the State needs to a) improve land leasing and permitting regulatory process for fracking b) strengthen its groundwater laws and corresponding Water Withdrawal Assessment Tool to more accurately determine the localized impacts of short-term intensive water withdrawals.

FLOW is partnering with interested local townships in Michigan to develop local zoning or police power ordinances protective of water and industrial land-use impacts and risks of "fracking – a water intensive oil and gas extraction method. FLOW has also been involved with monitoring wells leased by companies like Nestle, and exempted oil and gas companies from federal environmental laws. FLOW is looking for more regulation.

Arnold Boezaart, Offshore Wind

Boezaart serves as Director of the Grand Valley State University operated Michigan Alternative and Renewable Energy Center (MAREC) in Muskegon, Michigan. Visit http://www.gvsu.edu/marec/. The Center is an economic development partnership of the City of Muskegon, State of Michigan and GVSU to promote renewable energy, business start-up incubators, a business accelerator program, energy related research, technologies.

Six thousand total square feet of photovoltaic panel covers the roof of the facility and produces up to 30 kW of power. A micro turbine supplies up to 30 kW of power and the heat recovered is utilized to augment the facility's sidewalk ice melt system. As part of the Offshore Wind Initiative, a 1.8 kW wind turbine was installed for demonstration purposes The 2009 Offshore Wind Assessment Project brought a state-of-the-art wind

research buoy to the Great Lakes expanding into the formation of West Michigan Energy, a broad based energy advocacy collaborative that promotes energy innovation and long-term energy planning using real time data. Current projects involve measuring the Great Lakes wind profile resulting from the Great Lakes Wind Council (2010) criteria to identify the most and least desirable areas for offshore wind energy development on the Great Lakes. 35-40% was considered favourable. Five priority areas are located in southern Lake Michigan near Berrien County, northern Lake Michigan near Delta County, central Lake Superior near Alger County, central Lake Huron (out from Saginaw Bay), and southern Lake Huron near Sanilac County. Offshore costs 3x that of onshore. Denmark has a 100% commitment to offshore wind. Scandinavia has 5 new pilots.

Gail Philbin, Less=More: Restoring the Balance to Michigan's Farming Landscape

Philbin is the Assistant Director for the Sierra Club's Michigan Chapter (30,000 members overall in Michigan) which has recently spearheaded Less=More, a coalition of groups, sustainable farmers and consumers calling for an end to subsidies for polluting factory farms, markets. Visit http://michigan.sierraclub.org. Philbin past work includes CNT, Energy West Michigan Gleaners (Feeding America) and Local First.

More Michiganders go out of their way to shop at farmers markets and places supporting sustainable farmers yet their tax dollars go to polluting factory farms, giving the polluters a huge, unfair advantage over the farmers they want to support. Factory farms threaten the environment, food system and public health. Of the 238 factory farms, 37 have been sited for violations and 26 fined but they continue to receive subsidies. They confine thousands of animals in warehouses or open feedlots and annually generate millions of gallons of contaminant-fillled wastes, leading to water, land and air pollution and state and federal law violations. Sierra Club's recent report documents the relationship between Michigan factory farm pollution and subsidies calling for State Conservationist Garry Lee, Natural Resources Conservation Service to reprioritize taxpayer monies. See http://michigan.sierraclub.org/pdfs/moreformichigan/less_more_white_paper.pdf.

Brian Keeley, Protection from 'Fracking' via Municipal Ordinances

Keeley is a co-founder and lead organizer for Kent County Water Conservation to protect water resources from being irresponsibly consumed or otherwise damaged throughout Michigan. Visit http://www.kentcountywaterconservation.org. He is a Johns Hopkins University graduate in Chemical and Biomolecular Engineering and has five years of experience in nanotechnology and epigenetic cancer research. On learning that land had been leased in and around his hometown for high-volume hydraulic fracturing, Brian turned his skills in research to find 400 communities across US have passed legislation.

Often, it is expected that state and national agencies are responsible for environmental protection, however, Michigan's Zoning and Enabling Act does not give townships jurisdiction on gas/oil locations. Currently, high-volume hydraulic fracturing ('fracking') is testing the public's awareness and the jurisdiction of municipalities in Michigan. Local protection via municipal ordinances and their importance in environmental protection is necessary to avoid permanent water loss, and chemicals polluting the water.

Tom Brandstetter, Renewable Energy Island, (from Local Future archive 2010)

Visit http://www.youtube.com/watch?v=VeJCU_6bWT. Brandstetter presented solutions to more expensive energy from Milwaukee Wisconsin, to Copenhagen and the Island of Aero in Denmark. Brandstetter is working to help his community to transition to the new energy future. On a trip to Denmark, he visited Copenhagen and Aero which have wind turbines, and solar thermal district heating, most of which is provided by guilds and cooperatives. Aero augments the solar thermal with the biomass including grass bails and wood for heating. The homes are built of sustainable materials to last hundreds of years.

Dr. Marija Ilić, Engineering IT - Enabled Sustainable Electricity Services: The Tale of Two Low-Cost Green Azores Islands

Ilić holds a joint appointment at Carnegie Mellon as Professor of Electrical & Computer Engineering and Engineering and Public Policy, where she has been a tenured faculty member since 2002. Her principal fields of interest include electric power systems modeling; design of monitoring, control, and pricing algorithms for electric power systems; normal and emergency control of electric power systems; control of large scale dynamic systems; nonlinear network and systems theory; modeling and control of economic and technical interactions in dynamical systems with applications to competitive energy systems. Dr. Ilić received her M.Sc. and D.Sc. degrees in Systems Science and Mathematics from Washington University in St. Louis and earned her MEE at the University of Belgrade. She is an IEEE Fellow and distinguished lecturer, a consultant for the electric power industry and founder of New Electricity Transmission Software Solution, Inc. From September 1999 until March 2001, Dr. Ilić was a Program Director for Control, Networks and Computational Intelligence at the National Science Foundation.

She discussed the islands of Sao Miguel and Flores to illustrate an end-to-end IT framework for enabling deployment of new hardware technologies into the existing electric power systems at value to evolve in synchrony with the existing utility control centers and their Supervisory Control and Data Acquisition (SCADA). Much more intelligence gets embedded into the new hardware technologies themselves (wind power plants, solar panels, responsive demand, smart wires) for managing temporal complexities and uncertainties in a distributed way. Today's SCADA gets transformed into interactive multi-layered communications systems which exchange information about the choices made by newly deployed hardware, on one side, and the embedded IT-enabled intelligence, on one side, and the centralized SCADA applications, on the other. This approach could transform the islands into green islands in which expensive diesel generation is replaced by a mix of wind and solar power plants, and fleets of electric vehicles through responsive demand, including PHEVs, according to the value they bring to those needing them. Most importantly, the overall operations and planning process of smart grid becomes much more manageable and simpler when enabled by the right IT.

Saturday, November 2
Chuck Conlen, DTE - Evolution of wind power in Michigan since the passage of Public Act 295

Conlen is Director of renewable energy (RE) for DTE Energy, and responsible for all of DTE's RE development. He has overseen the strategy, contracting and operation of nearly 1,000 MWs of wind energy as well as solar and biomass. Prior to joining DTE, he was an investment banker specializing in mergers and acquisitions in the power, industrial and financial institutions industries. He holds a B.S. in Power Engineering Systems from the US Merchant Marine Academy and an MBA in Finance and Strategy from the University of Michigan. He has also held the license and title of Chief Engineer on gas turbine, steam and diesel power propulsion systems.

Government-funded studies show wind speed at 230 feet above the ground to be 16-18 mph in the thumb of Michigan, some of the strongest on-shore winds within the state. Since early 2007, DTE has acquired wind development rights on over 100,000 acres of land. The first owned and constructed wind parks were commissioned (connected to the grid and generating power) in December 2012. Two are located in Huron County, and one in Sanilac County. These three wind parks have capacity to produce 110 MW/hour of renewable power on nearly 15,000 acres. A fourth wind park, the Echo Wind Park, is under development in Huron County. Echo will double their owned capacity to 220 MW.

Under the Solar Currents™ Utility-Owned pilot program, DTE obtained easement rights to locate large (100kW-500kW) solar arrays on suitable property in SE Michigan. DTE has allocated 15 MW (15,000 kW) for this program – one of the largest in the country. DTE plans to invest $137 million in solar energy projects. In 2010, the Solar Foundation reported that Michigan has the fourth-largest number of solar energy jobs in the country. DTE has installed 894 MW of renewable since 2009 (850 MW off wind). Better project siting, evolving technology and the continuation of Production Tax Credits (PTC's) have helped drive the cost of wind power down. However, there is significant uncertainty if this trend will continue or potentially reverse, as the continuation of PTC's is highly uncertain and as wind farm sites in Michigan become increasingly complex given supply versus demand, government pushback, community acceptance and cost. 120 meter towers and blades expected next with improved technology, more restrictions.

Dennis Marvin, A New Era In Michigan's Energy Future

Marvin is Public Affairs Director for Consumers Energy's New Generation group. A 30 plus year employee, he has considerable experience in building community support and permitting wind projects along with other experience in economic development and public affairs in CMS Energy's projects in Australia, Argentina, Morocco, as well as, helping lead Michigan private-public sector initiatives to attract companies from Asia including China, Korea, and Japan.

Consumers' provides electric and natural gas service to 6.5 million of Michigan's 10 million residents throughout the lower peninsula. It is the 5th largest utility in the US. Currently, 5% of electric sales is supplied from RE, plans are underway to double to 10% (500 MW) by 2015 to meet the state's new RE standard. Nearly 80,000 acres of easements secured to develop two wind farms: the Lake Winds Energy Park near Lake Michigan in Mason County and the Cross Winds Energy Park (2014-100 MW farm) in Tuscola and Huron counties in the state's thumb region. Purchases include more than 250

MW of new RE capacity, to come from three wind farms, several landfill gas facilities, several anaerobic digestion (or animal waste) facilities and one hydro facility.

Peter Sinclair, Climate Change: Knowing the Story, Changing the Story

Sinclair has been called "The sharpest climate denier debunker on YouTube" by Treehugger.com. His video series, "Climate Denial Crock of the Week", knocks down the shibboleths of climate denial in convincing, and often very humorous, fashion. He also produces a second series, "This is Not Cool", for the Yale Forum on Climate Change and the Media. He regularly speaks to scientific gatherings on climate science communication, and has participated in scientific expeditions charting climate impacts in the Northern Cascades Glaciers, and this past summer, on the Greenland Ice sheet.

His concerns include sea level rise, global warming, oceans heating, wet NW US, cold NE US, SW US dryness, as well as changes in the earth's total heat content due to Arctic ice melting, the new normal. Globally evident, heat rising in Russia, increased moisture in Pakistan, food issues given drought and military issues. Keeping in mind, Germany has less sun than all the US states, thus the importance of setting right policy, leading the globe. Germany and Denmark have an economic surplus, 5% unemployment. Utilities need to pay attention to peak hours. RE is turning utilities into dinosaurs of the energy world although they are becoming much better informed on technology.

Laura Rauch, MISO Planning 101: Planning for long term reliability, economics, and public policy

Rauch is a Manager of Expansion Planning at MISO, leading efforts to ensure long-term reliability for MISO members in Michigan, Indiana, Illinois, and Missouri including the evaluation of transmission service and generator interconnection requests for utilities. She was responsible for the business case development for MISO's Multi Value Project portfolio, a $5.2 billion set of transmission projects that will reliably enable RE mandates of the MISO states while providing benefits from 1.8 to 3.0 times the transmission's estimated cost. Laura graduated from Michigan Technological University in Electrical Engineering and Indiana University with a Master in Business Administration.

MISO is an essential link in delivery of electric power across all or parts of 15 US states and Manitoba. As a Regional Transmission Organization, MISO assures consumers of unbiased regional grid management and open access to the transmission facilities under MISO's functional control. This allows wholesale market participants, and ultimately energy consumers, to benefit from MISO's coordination of short and long-term planning and to plan the system with a goal of delivering least cost energy to consumers, maintaining system reliability and consensus for regional policy needs.

David Hughes, The Shale Revolution: Myths and Realities

Hughes is a geoscientist who has studied the energy resources of Canada for nearly four decades, including 32 years with the Geological Survey of Canada as a scientist and research manager. He developed the National Coal Inventory to determine the availability

and environmental constraints associated with Canada's coal resources. As Team Leader for Unconventional Gas on the Canadian Gas Potential Committee, he coordinated the recent publication of a comprehensive assessment of Canada's unconventional natural gas potential. Over the past decade, he has researched, published, and lectured widely on global energy and sustainability issues internationally. He is a Fellow of the Post Carbon Institute and currently President of Global Sustainability Research Inc., a consultancy.

Energy consumption has tripled in last 25 years, 89% which is not renewable today. The world's population has increased more than 5x since 1850, energy use 50x. 90% of our fossil fuels have been consumed since 1938. Beware of scale of future projections. Wind increasing in small proportions, growing expediently is biomass, solar, and geothermal. Unconventional sources include shale, tar sands, oil shale, gas to liquids, and coal liquidification. Shale represents 40% of US gas production. Reducing energy use is our most effective first step. Shale has temporarily reversed a terminal decline.

Jim MacInnes, Biophysical Economics: The Science Behind Economic Growth

MacInnes worked as a power engineer for the company that designed the 1872 MW Ludington pumped storage facility in Michigan. He is chairman of the Michigan Utility Consumer Participation Board and has testified on energy issues before the Michigan House and Senate Energy Policy Committees. He is a member of the IEEE Power and Energy Society, the IEEE USA Energy Policy Committee, the International Society for Ecological Economics, the advisory board of ASPO USA and the Michigan Chamber of Commerce energy policy committee. He is a licensed professional engineer and holds BSEE and MBA degrees from the University of California, Irvine. MacInnes is President and CEO of Crystal Mountain, a 1500 acre resort community in Michigan.

Biophysical Economics refers to a material world, which is usually, but not completely, covered by scientific knowledge and physical laws emanating from such areas as physics, chemistry, geology, biology, hydrology, meteorology and the like. The economy begins with the earth's natural resources such as trees, rocks, water, fossil fuels, etc. which are then creatively transformed using human ingenuity, labor, machines, and large amounts of energy into usable products and services that people consume. Economics must be more than just a social science but also completely beholden to the basic laws and principles of (natural) science. Nature's equilibrium is in disorder. We need to keep things in good repair acknowledging depreciation expense and the world's production of oil peaking 6-7 years ago. Energy is accessible 3 ways – fossil fuels and renewables, conservation to redirect savings to more productive use and energy efficiency, doing same job with less to release energy for more productive use. The market will demand a new energy infrastructure based on non-fossil fuel solutions.

Dr. Paul Isley, Michigan's Economy: Past, Present, Future

Isely is a Professor and currently Interim Associate Dean of the Seidman College of Business at Grand Valley State University (GVSU). He joined GVSU faculty in 1995, after earning his Ph.D. in Economics from Purdue University. He also holds an M.S. in Economics from Purdue and a dual B.S. in Physics and Economics from the University of

Wisconsin-Madison. He has written a number of articles on West Michigan's economy and relationship to the National and State Economies. Recent studies resulted in reports on the state of Entrepreneurship and Healthcare in West Michigan. Dr. Isely has also worked on reports evaluating wind power along the lake shore and valuing environmental cleanup in Muskegon Lake.

The Michigan economy has experienced a major reduction in auto manufacturing meaning those who easily got jobs in that industry without college education now have their wives out working. With cars going further distances, and smaller cars being built there is no impetus that the market will go up. The erosion of household wealth has improved, however, debt is starting to go up also and mortgage late payments are starting again (90 day delay). The west side of the state is an older population, the east side younger. Venture capital exists but the majority of it is found around Ann Arbour. Housing outlook is near schools and lakes, energy production is active so overall improvements are slow and different regions are taking different paths.

Charlie Hall, Peak Oil, Declining Net Energy Yields, and Your Financial Future

Hall is an American systems ecologist and ESF Foundation Distinguished Professor at State University of New York in the College of Environmental Science & Forestry. Hall received his PhD at the University of North Carolina. He is the author or editor of 11 books and some 300 scholarly articles, and was awarded last year the distinguished Hubbert-Simmons Prize for Energy Education. He is best known for his development of the concept of EROI, or energy return on investment, an examination of how organisms, including humans, invest energy into obtaining additional energy to improve biotic or social fitness. He has applied these approaches to fish migrations, carbon balance, tropical land use change and the extraction of petroleum and other fuels in both natural and human-dominated ecosystems. Presently he is developing a new field, biophysical economics, as a supplement or alternative to conventional neoclassical economics, while applying systems and EROI thinking to a broad series of resource and economic issues.

He discussed how present day economics is almost completely a social science even though the basis of economics is at least equally biophysical. Economics must address this issue while debunking many contemporary myths about energy. Wealth production appears to use more energy. Economics comes across as a study of how people transform nature to meet their needs but it involves raw materials used for consumption using a flow of energy into investment which is a more complex process. The market has not found more oil. In looking at countries like Cuba, resources are distributed more evenly. Hall has explored the relation between energy and the wealth explosion of the 20th century, the failure of markets to recognize or efficiently allocate diminishing resources, the economic consequences of peak oil, the EROI for finding and exploiting new oil fields, and whether alternative energy technologies such as wind and solar power meet the minimum EROI requirements needed to run our society as we know it.

Jan Mueller, Adapting to a New Energy Reality

Mueller is Executive Director of the Association for the Study of Peak Oil & Gas USA (ASPO-USA), a non-profit dedicated to helping America understand and adapt to a new energy reality. Mueller is an expert in energy issues related to transportation as well as local energy security strategies. Prior to joining ASPO-USA, he served as senior policy associate for transportation and community energy at the Environmental and Energy Study Institute (EESI). Mueller holds graduate degrees in natural resource policy and landscape architecture, and an undergraduate degree in economics, all from Michigan.

Oil demand is growing, supply growth is slowing, costs are rising, technology is becoming more expensive in getting off gas and oil while still affordable. Inflation is adjusting oil prices and increasing risks include wealth transfer to oil exporting nations, vulnerabilities and geopolitical constraints, macro economies, global financial system.

1 human = 100 watts, 1 HP = 746 watts, 1 large wind turbine = 500,000 watts, average American usage 11,000 watts, 1 square meter solar panel 30-50 watts. Michigan primary energy use 94 billion watts – 46% buildings, 24% factories, 24% transportation. US overall primary energy use 3.2 trillium watts. The unleashing of innovation is needed in new approaches to future energy exchange.

Nicole Foss, Peak Oil - 2013 Update

Finance operates in a virtual world and must be aligned to energy use. Energy returned on energy invested EROEI reality. Energy alternatives typically lower. As EROEI falls, gross production must rise to meet some demand, production being flat to falling. EROEI defines what an energy source is for a particular society, need to simplify. Finance prices are set by perception, fundamentals are secondary, subject to large speculative swings, prices move with ebb/flow of liquidity, prices can be extremely volatile, boom and bust dynamic, difficult for project with long term horizons. Shale mirage – hype depresses prices, expensive wells, huge debt loads, high financial risk, real estate bubble ending. US is only energy self-sufficient under demand collapse scenario. Looking ahead – available energy determines what is physically possible, approaching net energy cliff, supply alternatives all problematic, much lower energy use future.

Mueller, Foss, Hughes, Hydrocarbon Extraction Forecast

Resource depletion and climate change people are not connecting. Europe uses half the energy US citizens use and live well. Need to conserve so we are less impacted by coming change. Affordability will be the issue.

Sunday, November 3
Leslie Glustrom, Clean Energy Action - Peak Coal (from Local Future archive 2011)

Visit: http://www.youtube.com/watch?v=t0y3KPmM22g, www.cleanenergyaction.org. Every state has peaked with coal except Wyoming and Montana. 50 trainloads are moved daily from the west to the east. In the Powder River Basin over 70% is not accessible. 17% viewed recoverable, perhaps 6% the reality. The federal government owns most of the Basin. The nation will be fortunate if its coal supplies can stretch for another century.

If the US continues to use coal at current levels of output the supply issue will almost surely come to a head in many of the mines in as few as 10–20 years. Coal prices go up as extraction prices increase. Coal provides nearly one-quarter of the total energy consumed in the US. In 2010, a US geological survey completed an extensive analysis of Wyoming's Gillette coal field, the nation's largest and most productive, and determined that less than 6% of the coal in its biggest beds could be mined profitably, even at prices higher than today's. In 2006, output from the Gillette region totalled over 431 million short tons of coal, or over 37% of US's total yearly production. Wyoming coal has relatively lower energy content than Eastern coal, but it also has extremely low sulfur content. Thus, many coal-fired power plants in the US buy Wyoming coal to blend with other coal with higher sulfur content to meet Clean Air standards.

One early estimate of total coal resource in the Gillette field was just over 200 billion short tons. More recently, the development of coal bed methane (CBM) gas exploitation in the Gillette coal measures has added an entirely new set of hard data points to previous estimates. According to a recent USGS study (Assessment of Coal Geology, Resources and Reserves in the Gillette Coalfield, USGS open-file report 2008–1202), the coal reserve estimate for the Gillette coal field is 10.1 billion short tons, which is a mere 5% of the original 200 billion ton resource total. In other words, the USGS has just revised the Gillette resource base down by 95%. Other researchers are performing analyses in all US coal mining regions, using more of the updated data coming in from the field. But for setting energy policy, the US needs a detailed, mine-by-mine analysis of resources and reserves based on current data using all available geological and mathematical tools for modeling. In the end, we should not be surprised to learn that only a small fraction of previously estimated coal reserves will ever be economically recoverable.

Skip Pruss, Energy Markets In Transition: How Far Can We Go?

Stanley "Skip" Pruss is a principal and co-founder of 5 Lakes Energy LLC. Until August, 2010, he was the Director of the Department of Energy, Labor and Economic Growth and Michigan's Chief Energy Officer, responsible for design and implementing Michigan's clean energy economy diversification efforts. Skip also served as Governor Granholm's Special Advisor for RE and the Environment, Michigan's Chief Energy Officer, and Chair of the Great Lakes Offshore Wind Council. Prior to that, he was the Deputy Director of the Michigan Department of Environmental Quality. Until 2003, he served as the Assistant Attorney General in Charge of Michigan's Consumer Protection.

Numerous recent analyses focused on the feasibility of transitioning to clean energy generation resources have been undertaken by NREL, the International Energy Agency, the United Nations, the Rocky Mountain Institute, Stanford University, the University of Delaware, Google and others. These studies explore the requirements, barriers, resource availability, materials availability, logistics, and costs through a variety of analytical frameworks. Remarkably, they generally yield the same conclusion: A complete global transition to clean energy is both technically and economically feasible; the barriers that exist are social and political. The confluence of numerous factors and trends including, but not limited to, investment and market opportunities, cost reductions, technology innovation, and climate concerns constitutes a powerful impetus for high penetration of

advanced energy systems over time. There is clear, abundant evidence that the transition to a clean energy future is underway for 2050. Developed countries generally have targets of 80% reduction, we will need to be at 'zero' net energy.

Bill White, America's Power Plan: Rethinking Policy to Deliver a Clean Energy Future

White is President and Founder of Norton White Energy. He has more than 20 years of experience providing businesses, nonprofits, and government with policy, strategic, and analytical expertise in the areas of clean energy, sustainability, and energy efficiency. He developed and currently serves as Senior Advisor to Americans for a Clean Energy Grid, an initiative of the Energy Future Coalition. Previously, he was Senior Advisor to EPA Administrator Browner, where he represented EPA in the White House climate change policy process and on US delegations to the G-8, China, and Mexico. White earlier provided expert advice to diverse clients as Senior VP at David Gardiner & Associates. He also managed EPA's Energy Star program in New England, where he established innovative energy efficiency partnerships with businesses, utilities, municipal governments, and colleges and universities. White is a founding board member and current advisory board member of the Conversation Strategy Fund. He holds a B.A. in Biology from SUNY Buffalo and a Masters in Public Policy from Harvard University.

The nation's electricity system is undergoing a rapid transformation. NREL's RE electricity future study shows it is feasible to run on 80% RE. Plan for change or 'get run over'. Market forces, driven by public demand for cleaner and more efficient energy and technological innovation are redefining America's power sector. These trends will change the electricity system and utility businesses at their core. White briefly reviewed key drivers of change, including: the rapidly evolving relationship between consumers and businesses and energy providers, plummeting cost and explosive growth of RE, expansion of competitive energy markets, and the wave of technological innovation transforming energy efficiency, distributed generation, storage, and demand response. Barriers are not economic or technical but institutional.

Visit: www.america'spowerplan.org. More than 150 top energy experts have joined America's Power Plan designed to tackle the tough questions and propose a path to overcoming regulatory, legal and economic barriers to a cleaner more efficient energy future. Together, these papers provide a policy toolbox to guide decision makers on improving policies in seven key areas: power markets, utility business models, finance policy, distributed energy resources, distributed generation policy, transmission policy and siting of new power infrastructure. Regulators and utilities need freedom to discover new regulatory and business models and markets need to encourage flexibility.

James Olson, Water and the Hydrological Cycle: Toward a Unifying Principle for Water, Energy, and Climate Change

The commons includes shared resources – air, water, nature. Water is a commons held in public trust. The state and local governments have a duty to prevent degradation of the state's Air, Water, and Natural Resources. Where water is privatized, prices rise and services decline. Freshwater resources total 2.5%, 7 billion people on the planet are

consuming 55% of fresh water on our planet – 70% on agriculture, 20% industrial and 10% domestic. A person needs 10-12 gallons/day for drinking, cleaning and cooking. Meat requires 10x more water than grain. In Michigan, percentages are about the same except 71% is used for thermal electric plants, 8.5 billion gallons/day. Climate change impacts - increased temperatures, lack of ice cover, evaporation exceeding precipitation. Water levels are declining in Lakes Michigan and Huron. Other issues are algae blooms, invasive species, heat, sunlight penetration. Public trust is a solemn and perpetual duty.

Sarna Salzman, Regional Power Study - SEEDS

Salzman is Executive Director of the nonprofit SEEDS -ecology, education, design. She has a BA in Anthropology and Sociology from Kalamazoo College in Michigan and an MS in Community Development from the University of California at Davis. Visit http://www.ecoseeds.org.With the understanding that all systems are connected, SEEDS frame its work into three categories: 1) Building Community Locally 2) Energy and Environmental Analysis 3) Ecological Engineering & Design: ie water systems.

Salzman has been involved with a comprehensive energy consumption data gathering for 6-county region (NWMI). The Grand Vision Energy Network is a citizen-led effort to inform and develop a regional energy plan. Energy was one of the focus areas that arose out the Grand Vision and a community engagement process. As part of this work, an energy survey was conducted in December 2012 that collected data on energy utilization, production and choices for generating energy locally. The report provides the results from the survey. The framework involved reliability – efficiency first, ecology – 43% greenhouse gas emissions from electricity use, greater than 70% conversion energy, affordability and local economy. The survey showed reliability as a priority (by adults) and local economy (by youth). Visit www.thegrandvision.org/energy.

Bill Palladino, Local Food - Taking Our Place in Michigan's Economic Renewal

Palladino is Senior Policy Specialist with the Michigan Land Use Institute. He leads the Taste the Local Difference local food program. Bill's formal education was Broadcast Journalism and Nonprofit Management. He's been a small farmer, raising Arabian horses and American Yorkshire hogs. He comes from a line of restaurateurs, and has himself owned a solar powered bed & breakfast and a restaurant and bar. In northern Michigan he is best known as an expert on economic development for rural communities and as an advocate for small businesses. Most recently, and just prior to coming to MLUI, he was a partner in a Dallas-based leadership development consultancy specializing in change management and global innovation for Fortune 500 companies.

The Michigan Good Food Charter has stated an ambitious goal for the state, "Michigan farmers will profitably supply 20% of all Michigan institutional, retailer and consumer food purchases by 2020." The NW Michigan Food & Farming Network, a consortium representing farmers, producers, retailers, wholesalers, and institutions across ten counties has taken on this goal as its mission and intends to be the first region in the state to fulfill this promise. To help reach this goal, the Taste the Local Difference (TLD) has been refocused to become a full-fledged regional food marketing campaign. With a

serious strategy, TLD has already begun to change the way consumers discern and purchase locally grown and produced food in NW Michigan. The campaign emphasizes think big, consider consumers in all planning and design, research, create measurables. Visit: www.localdifference.org. Marketing includes shelf stickers, newsletters/coupons, liaison with special events to buy local, map and app and so on.

Bill Schoenlein, Innovations in Pumped Storage Electric Generation in Michigan - Consumers Energy and DTE's Enhancement Plan

The 1,872 MW Ludington Pumped Storage Plant, has six units and is 49% co-owned by DTE Energy, the rest with Consumers. It was the largest pumped storage facility ($327 million) in the world when completed in 1973. The plant benefits customers of both utility owners by using lower cost "off-peak" electricity available at night to power the world's physically largest motors to pump water into an 842 acre man-made reservoir to be used to generate lower cost electricity during the day than may typically be purchased in the "on-peak" spot market. Besides providing on-peak energy at a lower cost than most other peaking generation resources, the plant also provides essential services for the electric grid; including quick start, spinning reserve and black start capability. The plant, known locally as "The Project", supports regulation of the grid with its ability to vary generating unit output quickly to balance the variable nature of some forms of renewable electric generation. "The Project" is readying for an $800 million upgrade of the six pumping/generating units over a six year period, resulting in a cycle efficiency improvement of approximately 5% and a capacity increase of approximately 300 MW. Reservoir capacity is 27 billion gallons, 17 billion is usable, flow of 5.5 million gallons/ minute/unit, 33 million gallons. For every 10 MW of energy used to pump water to reservoir, 7 MW hours of energy is produced as generation. Process avoids having to buy peak power in summer or at night.

Jim MacInnes, Developing a Plan to Accelerate Plug-in Electric Vehicle Deployment in Michigan

The transportation sector consumes 71% of total US petroleum consumption. Motor gasoline represents 33% of Michigan's total energy bill at an annual cost of over $16 billion. Transitioning to plug-in electric vehicles has the potential to reduce Michigan's petroleum consumption by 50% and more while saving consumers billions of dollars each year. A number of strategies have been tabled – ie plan for and integrate peak vehicle demand for electricity in the state's power grid, expand use for private light and medium duty commercial fleets, leverage and augment technical and financial assistance of the US Department of Energy's Clean Cities program. 1 billion cars on the planet, next 1 billion within 20 years.

Aaron – Wissner, Designing the Future

A focus on local.