

WHAT CAN I DO? WHAT CAN WE DO TOGETHER?

The Regional Council of Mayors named “healthy and resilient communities” one of its 2017 priorities, and underneath that identified topics of interest and concern including water supply and management, stormwater management based on “Atlas 14” data, renewable energy, and the infrastructure impacts of climate change. To address these subjects, ULI MN and the RCM developed a two-part agenda to span the April and May RCM meetings.

For the April meeting, the RCM identified well-known meteorologist turned climate change speaker, Paul Douglas, to provide an expert’s view of climate change in the MSP region. The RCM was drawn to Douglas because of his previous skepticism of climate change and wanted to hear how his beliefs changed, why, and his insights into what will drive the movement to a greener economy. The event was held as a joint meeting of the RCM and the ULI MN Advisory Board which consists of regional leaders in real estate, land use, local government and from our sponsors. Attendance was also open to ULI’s general membership and members of the public to further maximize impact.

The May meeting picked up the conversation with a panel focused on community-level strategies for addressing climate and weather challenges including climate adaptation plans, state/regional programs that help cities become more sustainable, and insights from a private sector company regarding its work to “green” its business. Mayor Chris Coleman of Saint Paul addressed his city’s march toward sustainability, and reps from the Regional Indicators Initiative, GreenStep Cities, Xcel Energy, and Mortenson discussed strategies, programs, and solutions that communities can pursue.

CLIMATE CHANGE: FROM SKEPTIC TO BELIEVER

METEOROLOGIST PAUL DOUGLAS

BACKGROUND AND BELIEFS

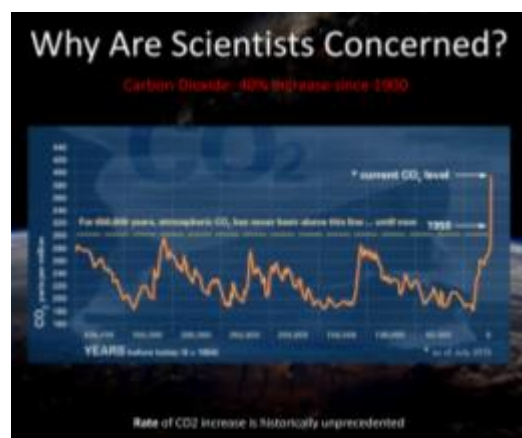
Meteorologist Paul Douglas has become a leading voice on climate change, and his career and personal beliefs have been critical in shaping how he approaches that topic. In addition to thirty-six years as a broadcast meteorologist, Douglas has a long entrepreneurial history having started numerous weather-related businesses that aim to join meteorology, technology and climate science to help individuals and companies better understand and act on weather data. He pioneered the use of computer generated graphics in television weather forecasting, and his 3D modeling of weather helped lead to his contributions to Stephen Spielberg films *Jurassic Park* and *Twister*, in which he made a brief cameo.

Beyond his weather-focused career, Douglas also distinguishes himself among those fighting climate change as an evangelical Christian and, in his words, a “recovering” Republican. He identifies with Roosevelt and Reagan approaches to conservatism, including Roosevelt’s belief that conservation is a great moral issue. Douglas describes himself as an “albino unicorn” for the combination of his ardent belief in the scientific data and risks of climate change and his political and religious conservatism. Rather than finding difficulty reconciling these beliefs, he sees them as complimentary.

MOVING FROM SKEPTIC TO BELIEVER

Douglas did not, however, set out to talk about climate volatility and from the 1980s through the mid 1990s he was skeptical of climatologists forecasting changes to climate caused by greenhouse gas emissions. He made a point of emphasizing that skepticism is a good thing. It helps ensure people learn and form their own conclusions. Still, our predisposition to short-term reactions to *weather* can make it difficult to connect with the long-term trends of a changing *climate*. People are wired to respond to weather, he noted. We ask ourselves, “do I need a jacket or can I wear shorts?” Douglas described climate as the ratio of jackets to shorts in your closet over time.

By the late 90s he was beginning to note the symptoms of a warmer climate translating into impacts on weather patterns. He used the term “an accumulation of coincidences” to describe his changing mind about climate change as weather began to consistently and significantly deviate from historical ranges and norms. Summer got longer. Winters got warmer. Rain storms got more severe. He offered a few recent data points—an accumulation of coincidences—as examples of how climate change is affecting the region, the country, and the globe.



- Fourteen of the fifteen warmest years worldwide have occurred since 2000 at odds of 650 million to 1.
- For 384 months in a row, global temperatures have been warmer than the 20th century average.
- The US saw five separate 1,000-year flood events in 2016.
- Last year, Minnesota had two “[mega-rain](#)” events in a single year for the first time.
- Minnesota has recorded thirteen mega-rains over the last 160 years, six of which happened since the year 2000.
- In 2016, Minnesota experienced a growing season length typical of Wichita Falls, TX.

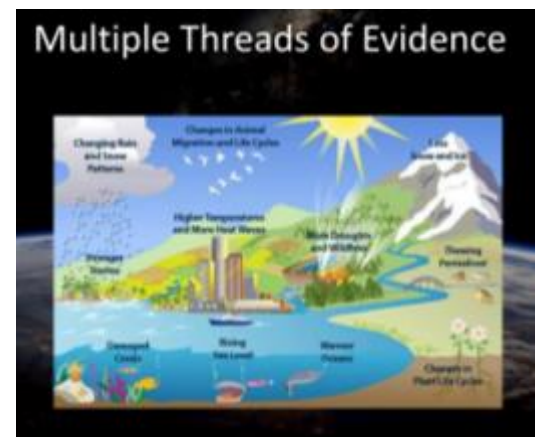
THE GREENHOUSE EFFECT AND GLOBAL WARMING

Douglas went on to explain more precisely how global warming works. The greenhouse effect is the process by which gases in the atmosphere like CO₂ trap radiation and keep the planet warmer than it would otherwise be if that radiation went out into space. It is what enables life to survive and thrive on earth. However, human activity has dramatically increased the amount of greenhouse gases in the atmosphere, changing its chemical composition and trapping more heat than it used to. Douglas said human activity adds approximately the equivalent of 400,000 Hiroshima atomic bombs to the climate system each day.

The increased heat trapped by the atmosphere creates volatility in the climate and changes weather patterns. A certain amount of volatility and disruption is normal, but human activity is “putting gasoline on the fire.” As the planet gets warmer on average, the disruption manifests differently across the world in the form of weather which could be hotter or colder, rainier or drier, sunnier or cloudier, depending on how local patterns are impacted by system-wide volatility.

Precisely how much warmer the planet will get is an unsettled question, dependent on many variables including how humanity does or does not address the rate and quantity of greenhouse gases being added to the atmosphere. Douglas offered a range. On the low end, a planet that is two degrees warmer than historical norms means that humanity must adapt, and doing so is unpleasant. On the high end, an eight-degree increase means we live on a fundamentally different planet than what we know today.

Minnesota, Douglas said, has already warmed roughly three degrees across the seasons when removing the effects of the “[urban heat island](#).” To those who say that two or three degrees is a small amount, Douglas compared this change to what happens with humans. At 98.6° on average, a human is healthy while a three degree increase to 101° means a human is suffering from either a fever or hyperthermia.



SYMPTOMS AND IMPACTS

One of the major symptoms of this “fever” is that the hydrologic cycle is on fast-forward, increasing the frequency and intensity of precipitation events. This has significantly changed flood patterns, and Federal Emergency Management Agency (FEMA) flood plain maps are outdated as a result. Historically, river flooding has been the most common type of flood problem our communities face, and our water management systems were designed for that. Today, heavier rains are straining outdated infrastructure in “drainage events” where areas outside of traditional flood plains overflow suddenly and unexpectedly.

With 92% of the increased warming being funneled into oceans, the warming climate has also caused polar sea ice to decline 40% since 1984 with a corresponding rise in sea levels. Even a few centimeters each year adds up to significant change relatively quickly. As a coastal location, Miami is now prone to flooding during a full moon when the tides come in high, independent of any other weather event.

Across our climate system, the volatility exacerbated by the massive increase in atmospheric greenhouse gas concentrations is causing more “weather whiplash,” as Douglas put it. For example, where some areas see much stronger and more frequent rainfalls, others are seeing longer and more severe droughts.

These changes to the climate, and the energy and resource consumption that cause them, translate into direct impacts on human lives, too. Roughly 70,000 Americans die prematurely each year because of air pollution. That number grows to 5 million worldwide. One in three American children suffers from asthma, allergies, ADHD, or autism and the changing climate is a suspected culprit in the increased incidence of all these conditions.

“Climate change isn’t sparking storms, but it’s adding fuel to storms that are already formed.”

THE ARC OF TECHNOLOGY FAVORS PROGRESS

Climate change and global warming remain politically contentious, but Douglas believes economic forces and energy security will drive de-carbonization rather than politics. The US military recognized climate change as a “threat magnifier” in the Department of Defense’s 2014 Quadrennial Defense Review saying:

The impacts of climate change may increase the frequency, scale, and complexity of future missions, including defense support to civil authorities, while at the same time undermining the capacity of our domestic installations to support training activities. Our actions to increase energy and water security, including investments in energy efficiency, new technologies, and renewable energy sources, will increase the resiliency of our installations and help mitigate these effects.

The military's belief in the problem can help accelerate some pieces of the climate change solution, and economic imperatives should help with the rest. Douglas pointed out that unsubsidized solar power is now the cheapest form of new electricity to produce and energy storage is rapidly improving with battery costs down 50% since just 2014. He estimated that in about three years, electric vehicles—which are easier and cheaper to manufacture and maintain due to fewer moving parts—will be able to reliably travel 500 miles or more on a charge. Onshore wind energy costs have dropped 40% and the potential for energy generation along the coasts is four times current demand.

Douglas emphasized the economic opportunities in renewable energy. Letting markets work and encouraging competition will save people money and create well-paying jobs. Already, there are 374,000 jobs associated with US solar power compared to around 187,000 in oil, natural gas, and coal combined.

CAUTIOUS OPTIMISM

Though the challenge of climate change is great and the impacts have begun to occur, Douglas believes we will make the shift to a lower carbon energy system because doing so is, “a technological no-brainer.” As he put it, everyone likes to save money, and the cost savings and economic upside in terms of jobs and new industries make clean, renewable energy the obvious choice. Moreover, he sees a gradual shift in public opinion accelerating the rate at which we will adapt. He believes young people are especially less cynical about the imperative to fight climate change and will embrace solutions quickly.

With a highly educated and skilled workforce, Douglas also thinks Minnesota has unique opportunities to be a leader in the climate change fight. Resilient infrastructure of all kinds—roads, the electrical grid, sewers—will be critical to mitigating impacts at the community level. Where better to develop solutions to the problems of increased storm water and runoff than the “land of 10,000 lakes?” Agriculture's important role in the state's economy means researching and developing flood and drought-tolerant crops is another place where Minnesota could lead.

Bringing his message home for the mayors in the audience, Douglas encouraged cities to lead by example where they could. Cities can begin converting vehicle fleets to electric, encourage more public transit and bicycling, and mitigate the urban heat island effect by planting more trees and vegetation. Aging infrastructure and the increasing intensity of rainfalls means cities will need to embrace innovative water managements solutions that look different than today's systems.



“The situation is not hopeless and we are not helpless.”

By taking advantage of the solar revolution, cities can pass savings on to citizens and businesses in their communities. Saving people money is the fastest way to convert them, he said. It is also important to demonstrate that there are solutions ready to be implemented right now and not off in some distant future. It helps fight the feeling that the problem is too large to be solved.

Calling back to his position that conservation is of moral importance, Douglas offered a couple of examples of his own work to make a difference. In addition to his many speaking appearances and op-eds, he co-wrote a book called [Caring for Creation: The Evangelical's Guide to Climate Change and a Healthy Environment](#) with the Reverend Mitch Hescox. Douglas also sits on the board of the [Evangelical Environmental Network](#), of which Rev. Hescox is president and CEO.

In the end, Paul Douglas expressed cautious optimism about humanity's ability to address climate change and the likelihood we will do so effectively. In a presentation filled with scientific data and a litany of technological advancements, near the end of his remarks Douglas provided the most important, overarching takeaway, saying, “the situation is not hopeless and we are not helpless.”

ADDITIONAL INFORMATION ON THE IMPACTS OF CLIMATE CHANGE IN MINNESOTA

To learn more about how climate change is affecting our region and state, check out the presentation below from Dr. Mark Seeley, a University of Minnesota professor in the Department of Soil, Water and Climate and frequent contributor on Minnesota Public Radio.

[Dr. Mark Seeley: Minnesota's Changing Climate](#)

PLANNING FOR A SUSTAINABLE FUTURE

MAYOR CHRIS COLEMAN, CITY OF SAINT PAUL

Mayor Coleman recounted Saint Paul's first steps toward resiliency planning under his administration with Environmental Policy Director Anne Hunt in 2005 and the US Conference of Mayors Climate Protection Agreement. In the intervening years, he has begun to see the impacts of climate change, particularly on water and transportation infrastructure. Severe weather events are having a significant economic impact on city infrastructure and on private businesses. For example, Polaris has seen a major decline in snowmobile sales as winters have grown warmer and the winter recreational season has gotten shorter.

These changes are also making city functions like road clearing in the winter more difficult. When snowfalls were more predictable, cities had reliable protocols for pre-treating roads so they would then be easier to clear once the snow fell. Now, places like Saint Paul face trickier decisions about when and whether to send out pretreatment at all due to the increased risk that temperatures will not stay cold enough to prevent predicted snowfall from instead becoming sleet or rain. The warmer winters also translate to more frequent freeze and thaw cycles, which wear down roads faster. More extreme spring rain events are challenging our aging water infrastructure as well.

EMISSIONS REDUCTIONS AND COST SAVINGS

Saint Paul approached the challenge of a changing climate with two goals—reduce the city's emissions and save money. During Mayor Coleman's tenure, the city has seen over \$1M in energy savings and an addition \$1M in rebates from Xcel Energy. The City also developed a "sustainable building policy" which requires a high level of environmental and sustainability commitment for city buildings including fire stations, police stations, rec centers and more.

Although state policy prohibits setting higher standards at the city level than exist at the state level, Saint Paul's policy ended up "LEED"ing the private sector by example, in the mayor's words, playing on the Leadership in Energy and Environmental Design (LEED) standards for buildings. What the city found was that private developers began striving to meet the city's green building standards despite not being required to do so. Saint Paul has also expanded its usage of renewable energy, including getting 25% from community solar with a goal of moving to 50% in two years. The city has also begun purchasing electric vehicles and installing EV charging stations.

THE ROLE OF CITIES

Mayor Coleman emphasized that he sees being innovative at the local level as an important, ongoing challenge. Cities are both big contributors to climate change and a vital part of the solution. "There is no solution to climate change that does not involve sustainable cities," he said. He recalled attending the Paris 21 climate conference and meeting with mayors from other river cities. He was impressed with how much mayors and cities across the world were taking the lead on climate change solutions for transportation, drinking water, agriculture and more while the representatives at the national level struggled to get agreement on much of anything.

His primary takeaway from that experience and his recommendation for mayors and city staff was to assess at the local level what the biggest opportunities in their communities might be. Ask what you can do with the services your city provides to make a difference, and know that service continuity plans are important in an era of more extreme weather events that increase the likelihood of service disruptions. Cities should assess vulnerabilities, measure emissions, and then develop strategies to mitigate.

He also expressed support for looking at climate change solutions from a regional perspective and encouraged the mayors to continue working on the issue collectively. Minnesota cannot afford to ignore climate change, he said. It is critically important for both regional well-being and economic competitiveness.

CLIMATE ACTION PLAN IMPLEMENTATION STRATEGIES

REGIONAL INDICATORS INITIATIVE/LOGOPEP

RICK CARTER, ARCHITECT AND COMMERCIAL FOCUS LEADER, LHB

BECKY ALEXANDER, ARCHITECT AND RESEARCHER, LHB

Rick Carter provided an update on the [Regional Indicators Initiative](#) (RII). Looking back across the number of years for which RII has data, there is a total of 189 greenhouse gas emissions inventories. Additionally, 22 of the 27 cities for which the RII collects data are members of the Regional Council of Mayors. RII cities represent around 33% of Minnesota's total population and about 50% of the population for the seven county metro.

The Regional Indicators Initiative is helping cities see their progress on lowering emissions over time and trying to help them measure and determine whether the actions they take truly make a difference. Energy is difficult to measure because there is no single source for data for all cities, and every city has a unique energy portfolio. There is a goal to get a statewide, voluntary energy registry to try to improve this situation.

Funding from the McKnight Foundation and the Met Council is helping the effort to get additional cities from outside the MSP metro to participate in the RII, and there is a hope that some cities that are not participating in GreenStep Cities will join for comparison purposes.

CHANGES IN RII DATA OVER TIME

Becky Alexander took over to share how RII data is changing. Though automobiles are closely associated with the image of pollution and emissions, non-travel energy use in residential and commercial buildings is the largest contributor to emissions in RII cities. There has been some progress, however. Since the launch of the RII, there has been a major decline in the amount of waste going to landfills and a 13% decline in overall greenhouse gas emissions since 2007. Most of the greenhouse gas decline is due to grid improvements. So far, we are not seeing major gains due to conservation and efficiency efforts.

RII NEXT STEPS: LOGOPEP

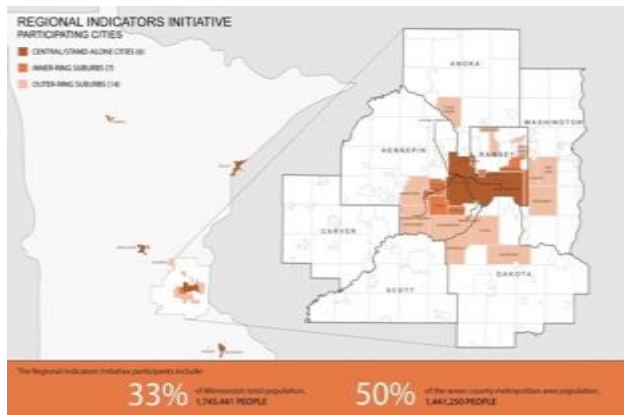
The RII supports cities integrating energy plans into 2040 Comprehensive Planning as an important next step. To help with this, RII created the [Local Government Project for Energy Planning](#) (LoGoPEP) to assist cities with case studies, a "wedge diagram tool" which allows cities to estimate the impact of various tactics to reduce energy use, and energy planning templates. The project began in January of 2016 and is funded through 2018. It is currently working with partner cities that were selected by an application process to test and refine the tools. The five LoGoPEP pilot cities are St. Louis Park, Maplewood, Eden Prairie, Falcon Heights, and Oakdale.

Providing workshops on these tools will help cities leverage them in Comp Plans. The RII also hopes to expand statewide by attracting as many cities as possible to provide data through an easy to use online database. They have learned that the hardest thing for cities to provide for this kind of work is simply staff time to do the work, and the RII has therefore focused on trying to cut the amount of time necessary to contribute data as dramatically as possible through streamlining and automating data collection.

CALL TO ACTION

After all the presentations, Rick and Becky returned to outline a three-step call to action for cities in the room.

1. Incorporate climate planning into Comp Plan updates using LoGoPEP's [energy planning workbook](#) and [guide](#)
2. Pursue community-wide programs (e.g. GreenStep and Xcel Energy's renewable programs)
3. Advocate for state-level action



7-YEAR TRENDS GREENHOUSE GAS EMISSIONS



GREENSTEP CITIES

PHILIPP MUESSIG, MINNESOTA POLLUTION CONTROL AGENCY

Developed for and by cities, [Minnesota GreenStep Cities](#) is a voluntary challenge, assistance and recognition program for accelerating sustainability actions. Across Minnesota, 109 cities and 3 tribes participate in GreenStep, 31 of which are RCM cities. This represents 42% of Minnesota’s population, and the program has participation from both large (290K) and small cities (as low as 260) and both urban and rural communities.

BEST PRACTICES AND ACTIONS

The concept emerged initially as “Green Star” cities, a sustainability-focused spin on Minnesota’s Star City program. GreenStep Cities is built around 29 distinct best practices with a total of 170 best practice actions identified underneath them. For each best practice action, cities report the steps they took, the outcomes of that action, and who in the city is responsible for each one. Cities are then rated from one to three stars for their “good,” “better,” “best” level of progress on each of the 170 actions. Cities are also recognized for where they stand on five steps of progress. These steps, and the number of cities at each one, are:

Developed by and for Cities

- 2007: “Green” Star City concept emerges @ CERTs, GPI, Hunt Utilities Group
- 2008: Legislature asks for a report
- 2009: Advisory & technical committees convened
- 2010: Program launch @ League of MN cities conference
- 2012, 2016: Awards from Environmental Initiative & University of MN
- 2016: Step 4 city performance metrics

Minnesota GreenStep Cities
A report to the Minnesota legislature regarding Green Star award expansion and a program proposal to assist local governments in taking the next step to expanded carbon reduction and other environmental actions.

STEP	CITIES
1. Join GreenStep CITIES	31
2. Complete 4–8 best practices. Requirements vary based on city capacity.	50
3. Complete 16 best practices including a few high priority ones.	23
4. Report city performance metrics.	6
5. Show metric improvement	2

PLANS FOR RENEWABLES AT XCEL ENERGY

PJ MARTIN, DIRECTOR OF RESOURCE PLANNING

KEVIN SCHWAIN, DIRECTOR OF PRODUCT STRATEGY AND DEVELOPMENT

As Xcel works on its 2019 energy resource plan, adding renewable energy to its portfolio has been a key focus in addition to natural gas and energy storage technology. The company is looking to retire almost its entire baseload fleet by 2040. This includes all current nuclear and coal facilities, though Xcel has made a commitment to carbon-free nuclear energy in the future. While understanding that renewables are the way forward, Xcel is also paying attention to the impacts on jobs and communities that come from retiring baseload facilities.

Wind energy has become an important piece of Xcel’s strategy and portfolio. The company has added 1,550 megawatts of new wind energy with 1,150 of that owned by the company and the remainder purchased through partnerships. Incentives, subsidies, and especially technology improvements have brought the cost of wind energy down to where it is cheaper than legacy sources. This makes wind especially valuable as a hedge against future price increases for natural gas and accelerates how quickly it displaces other fuels as well.

PROGRAMS FOR CITIES AND CITIZENS

Our energy system is getting cleaner and carbon intensity is decreasing. This is good, but some want to move faster and Xcel wants to be a part of that. To accelerate switching to renewable energy sources, Xcel offers programs that help people, businesses and governments create their own strategies for achieving goals related to conservation and emissions reduction.

Steel for Fuel

Wind displaces other resources



PARTNERS IN ENERGY

The Partners in Energy program reflects the fact that cities matter. It includes a suite of resources and tools including grants, marketing materials, data and activity tracking to help communities develop their own energy initiatives. Access the full flyer on what the Partners in Energy program can do at the link below.

[Partners in Energy](#)

RENEWABLE CONNECT

As its customers expressed desire for more control over what type of energy they use, Xcel developed programs to give people more choices to buy renewable energy. Renewable Connect is a new program that allows customers to choose to buy up to 100% of their energy from a mix of wind and solar sources with flexible contract terms and locked-in pricing. Cities can opt into this as well, and the company intends to launch Renewable Connect Government specifically for local government entities. Read more about Renewable Connect at the links below.

[Renewable Connect for Residences](#) and [Renewable Connect for Businesses](#)

RENEWABLE ENERGY AT MORTENSON

MARK DONAHUE, VP/GENERAL MANAGER, MORTENSON CONSTRUCTION

WHY RENEWABLES?

Mortenson's commitment to renewables goes back more than two decades, dating to when it first started building wind farms. In 2009, the company began building solar farms, too, and they have decided to stop doing "dirty" projects like coal plants altogether. In the field, Mortenson has begun using electric vehicles extensively. Skeptics said it could not be done in construction, and Mortenson's response was simply, "that's bogus."

Increased sustainability has also been a focus within office locations where overall energy consumption has been reduced 50%. This was done in part by adding solar panels to facilities, and the company has held floor-by-floor competitions to reduce energy consumption, creating a fun incentive for employees to come up with creative solutions. By 2030, the company will be net zero on energy consumption in all Mortenson facilities.



WORKING WITH CITIES AND RESIDENTS

Community education continues to be important, even as the general level of knowledge around renewable energy has improved. To help with this, the company produced two books, one for solar and one for wind, in the style of children's books to help communities understand the opportunities and impacts of renewable energy projects.

As Mortenson continues to build projects like solar gardens in Minnesota and elsewhere, cities themselves can help with educating their citizenry and adapting codes and permitting to be ready for such opportunities when they come. Particularly with solar projects, their often remains a gap between what is permitted and what is technologically possible and desirable. Modernizing city code to better enable solar will make it easier for cities to meet renewable energy goals.

[Learn more about Mortenson's "Discover Renewables" books](#)

WHAT'S NEXT?

Mortenson outlined three innovations and trends that are changing how renewable energy is delivered. They are:

ENERGY STORAGE	ADVANCED MICROGRIDS	COMMUNITY SOLAR GARDENS
Advancements in battery storage will allow energy to be harnessed more effectively. This includes both large utility projects and applications in homes and businesses.	By integrating battery storage with distributed power generation like solar, energy users can be protected from disruptions in the larger grid.	Homes, businesses and cities are choosing community solar gardens as a way buy into renewable energy without having to install solar panels directly.