Topic Area	Key Issues	Research Questions	Political Considerations, Action Items
INFRASTRUCTURE	-Need for more weather/climate data to plan resilient infrastructure -Impacts of changing dew point and increased humidity on cooling systems	Research needs: stormwater projections, rainwater and snowfall intensity/frequency, winter precipitation (ice storm) predictions, dew point days/high humidity	-Update infrastructure plans based on weather projections
	-Planning street layouts/dimensions for increased precipitation (winter & summer) -Better/different pavement	-Are there better strategies/chemicals/equipment for dealing with snow and ice on roads? -How to deal with contaminated snow & ice?	-Implement new infrastructure strategies, equipment, technologies for changing climate
	Population changes due to climate change	-How are we planning for population increases as people from warmer climates may begin to move?	-Planning for density and increased demand
	Housing/building issues: dealing with older buildings, updates to building codes, capacity for cooling centers	-What are the trade-offs of retrofitting old buildings vs. building new? What updates should we make to building codes to increase efficiencies?	-Update building codes based on higher efficiency goals, changing weather & precipitation events
ENERGY	-Impacts of severe weather on energy generation and transmission, reliability -Impacts of climate change on the river-water levels and temperatures- for energy and transportation	-What will the effects of climate change be on current energy generation and renewable energy (wind, solar, ground-source heat pumps, hydro)? -Where should cities be investing for reliability? Smart grid, buried vs. above-ground transmission lines, back-up systems, etc.	-Micro and smart grids for better reliability against extreme weather -Planning for extreme temperature changes, impacts on energy loads
	-Changes in energy demand due to changes in temp, increased cooling load	Need more information on: -Projected heating and cooling degree days -Project energy demand and energy pricing	-Adaptation as reactive vs. proactive -How to balance planning for increased density with adaptation
	-Changes in energy costs, energy pricing structures (time of use, etc.)	-How resilient do local governments need to be to prepare for variability in costs, reliability?	-Projected cost increases for electricity, not increased demand
	-Need for increased energy generation capacity	-Can the grid handle more demand? Can renewable energy meet the generation capacity of fossil fuels?	-Plan building hours based on cooling needs, extreme heat plans
	-Energy technology advancements (new cooling technology, renewable energy) -Flexibility in energy transmission systems, distributed generation	-How do local governments make decisions about where to invest in terms of energy systems? -How to prioritize energy improvement investments? -What is the best/most efficient cooling method?	-Update building codes to deal with new weather projections- e.g. ice vs. snow build-up
	Infrastructure design/technology changes	Research needs on: better cooling technologies, risks/vulnerability of existing power infrastructure, back-up energy technologies, local grid reliability	-More resistant/resilient grid -Need for back-up power source If gas or electricity supply is cut

STORMWATER	-Water quality vs. quantity management	How do you strike a balance between water quality and quantity issues? What are the areas where they are conflicting vs. collaborative?	-Timeframe for quantity (short) vs. quality (long)
	-Planning for increased precipitation in winter months, freeze-thaw cycles that don't allow for infiltration -Dealing with more freezing water, salt applications for safety	-What are BMPs for dealing with stormwater in winter, when there is limited infiltration? -What are the impacts of management activities for safety (salt) on water quality?	-Quantifying the benefits of BMPs when water is so cheap -Public and private role in implementing stormwater mgmt.
	-Increased flooding	-What are the impacts of a raised water table on the built environment, local businesses?	-Scale of management- property level to regional level

HEALTH	-Climate change impacts on ozone, PM 2.5 -Impacts on homeless & vulnerable populations -Ecosystem changes &vector borne disease -Heat mitigation and aging infrastructure	Research needs: -Mosquito breeding/vector borne disease risk -Drinking water contamination -Risk assessment data for air, water, heat days -New freeze/thaw cycle, impacts on water supply	-Need quality data with credible sources
	-Risk communication: the public is not convinced that heat days are a risk	How to communicate health risks related to climate change to the public?	-Policy impacts of warmers nights and longer summers
	-Drill down into the data and develop risk assessment -Projections based on data from other places, e.g. Kansas, strategies used there	-Is there adequate redundancy for Mpls/St. Paul extended drought, nuclear contamination, etc.? -What strategies have been used effectively in other communities with similar climate?	-Consider impacts on low-income communities -Need more planning

ECOSYSTEMS	-Changing plant zones -Shifting species, more new invasive species -Aggregating land for urban forests	-What do the changes in plant zones mean? What plants can survive in our zone now? -How do we avoid investments that will be impacted by future risks?	-Plant more trees- to reduce heat and impervious surfaces -Incentives and land control policy for urban forests
	-Changes in precipitation -Large rain events and infiltration, groundwater levels	-Impact of rain events on infiltration & groundwater -How can we capture upstream and winter precipitation to maintain natural water cycle?	-Retrofit streets to increase infiltration (Complete Streets, etc.)
	-Regulating beyond the 100-year floodplain	-What will the floodplain look like in the future? -Will there be more relocation and insurance costs? -How do we communicate with property owners about changes/risks?	-Education challenges to get people involved in changes -Decisions based not on science but rather aesthetics, costs
	-Projections related to river flow, water levels, impacts on other systems	Model projected river flow: water supply, power supply, floodplain management, downstream impacts	-Model river discharge to better predict risk

FOOD & AGRICULTURE	Climate change impacts on agriculture-based industries, changes in transport needs, types of crops being produced	-Data on positive changes from sustainable practices: compost, crop rotation, etc. -Shift in types of crops produced w/climate change	City-wide efforts to promote local food production: community & boulevard gardens
	Global food supply chain	-Where are the vulnerabilities in global food supply?	-Fertilizer, scarcity, late frost
	Land use: shifts in development needs, prices of farm land, demand for land for fuel/energy/food	-What impacts will climate change have on land use? -What are the conflicting demands between land use for food, fuel and energy?	-City initiatives to address food waste, promote composting
	Effects on food security	-How will changes in plant hardiness zones affect food security? What will the impacts of severe weather be on food production?	-Impacts of urban agriculture on stormwater run-off/management
	Food deserts in urban areas	-Examples of local efforts to address food deserts?	-Changing cost of food, impacts on low-income families

MITIGATION & ADAPTATION	Confluence of adaptation & mitigation strategies	-How to reduce the carbon impact of mitigation strategies? Finding the nexus, the "win-wins"	-Adaptation (cooling) conflicts with mitigation (energy, CO2, emissions)
	BMPs around renewables, distributed generation, green roofs, multi-use spaces, water re-use	Research into: BMPs for DG, solar & wind, green roofs , disease and climate resilient plants, dual purpose space usage (e.g. parking lots for stormwater storage), water re-use, grey water	-Quality of life and equity impacts on vulnerable communities -Reduce consumption & increase reliability
	Quantifying impacts of increased greenery	-What types of plants will thrive? How will seasonal precipitation variability affect plants?	-Increase greenery to address: heat island effect, stormwater, CO2
	Planning for extremes	-Research building and infrastructure science around green roofs, pervious surfaces, passive cooling, etc.	-Grid reliability- energy production vs. efficiency
	Emissions impacts of development and purchasing decisions	-Research into carbon impacts of urban sprawl -Life cycle analysis for purchasing and adaptation strategies, "carbon intensity lens" + cost	-Use for funding, policy decisions

EDUCATION, COMMUNICATION & OUTREACH	-Encouraging people to recognize the problem and take action on this issue	-How do we make this issue resonate with people? -What do these changes mean to the average resident- simplify it on a personal/local level?	-Shift the conversation from climate change to quality of life -Easier to educate young people
	-Perception that climate change is complex, all science & data	How do we make climate change and its interacting impacts more understandable?	-Better science education around climate change in schools
	-Shift from education & outreach to policy & systems change approach	What policies need to change to support environmental infrastructure changes that enable & encourage sustainable behaviors?	-Changes to zoning, ordinances, land use plans for adaptation -Policies that support white roofs, pervious surfaces, tree canopy, etc.
	-Local gov'ts need help to do more long-term planning (beyond election cycles)	-How do we get the public on board to support city decision related to climate adaptation?	-Identify communications strategies that resonate, engage residents