Cook County's Clean Energy Plan

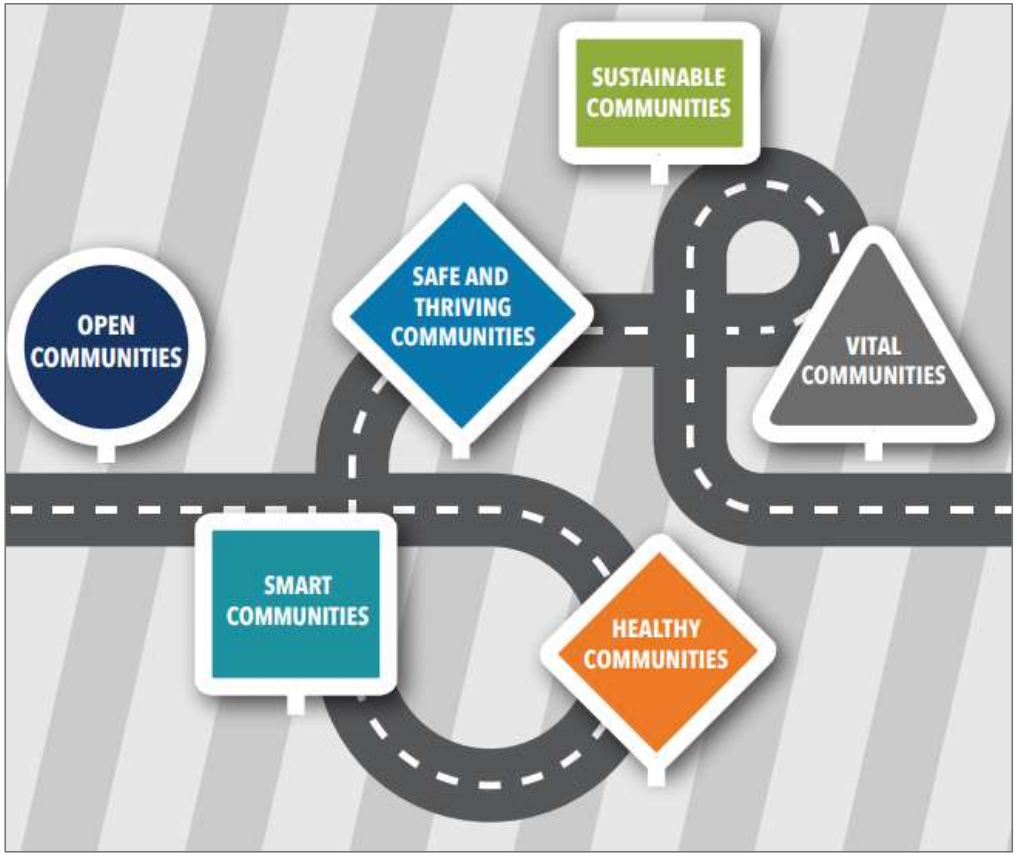
Feasible. Responsible. A model for others.

A Plan for 100% Renewable Electricity

and a Carbon Neutral Footprint for Cook County Buildings

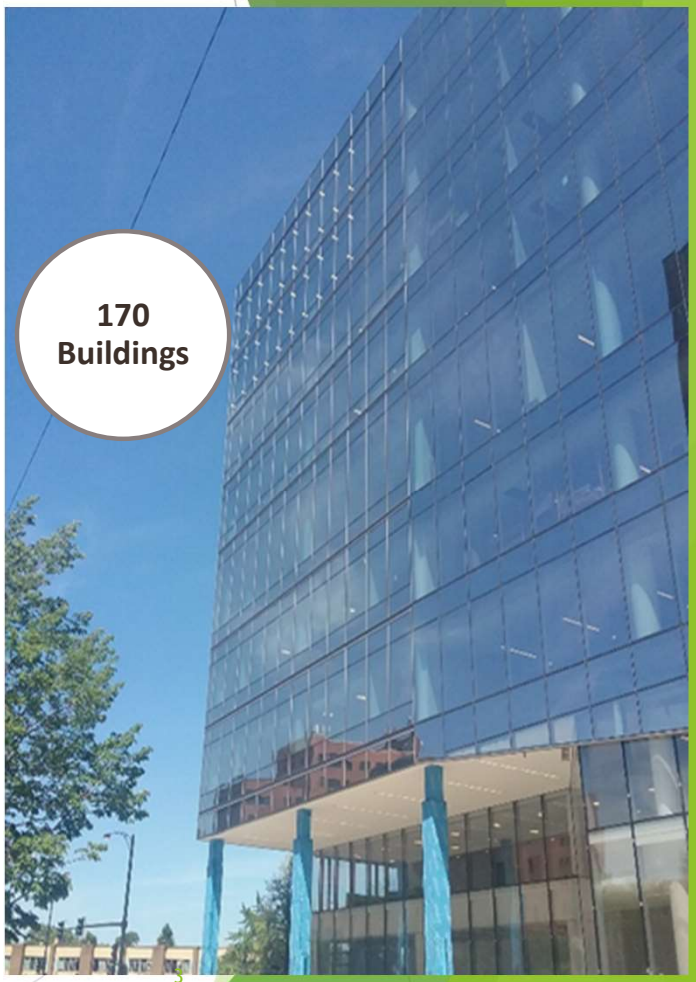
5.6.2021

Cook County Policy Roadmap



County Portfolio of Properties

89 Public Safety Buildings + **5** Corporate Facilities + **71** Health and Hospitals Buildings + **5** Parking Garages = **170 Buildings**



- 3 Portfolios – Corporate, Public Safety, and Health and Hospitals
- 19.2 million square feet
- 202020 – 216.8 million kWh, 12.6 million therms

Cook County's Goals

A reduction in carbon emissions by **45%** by **2030**

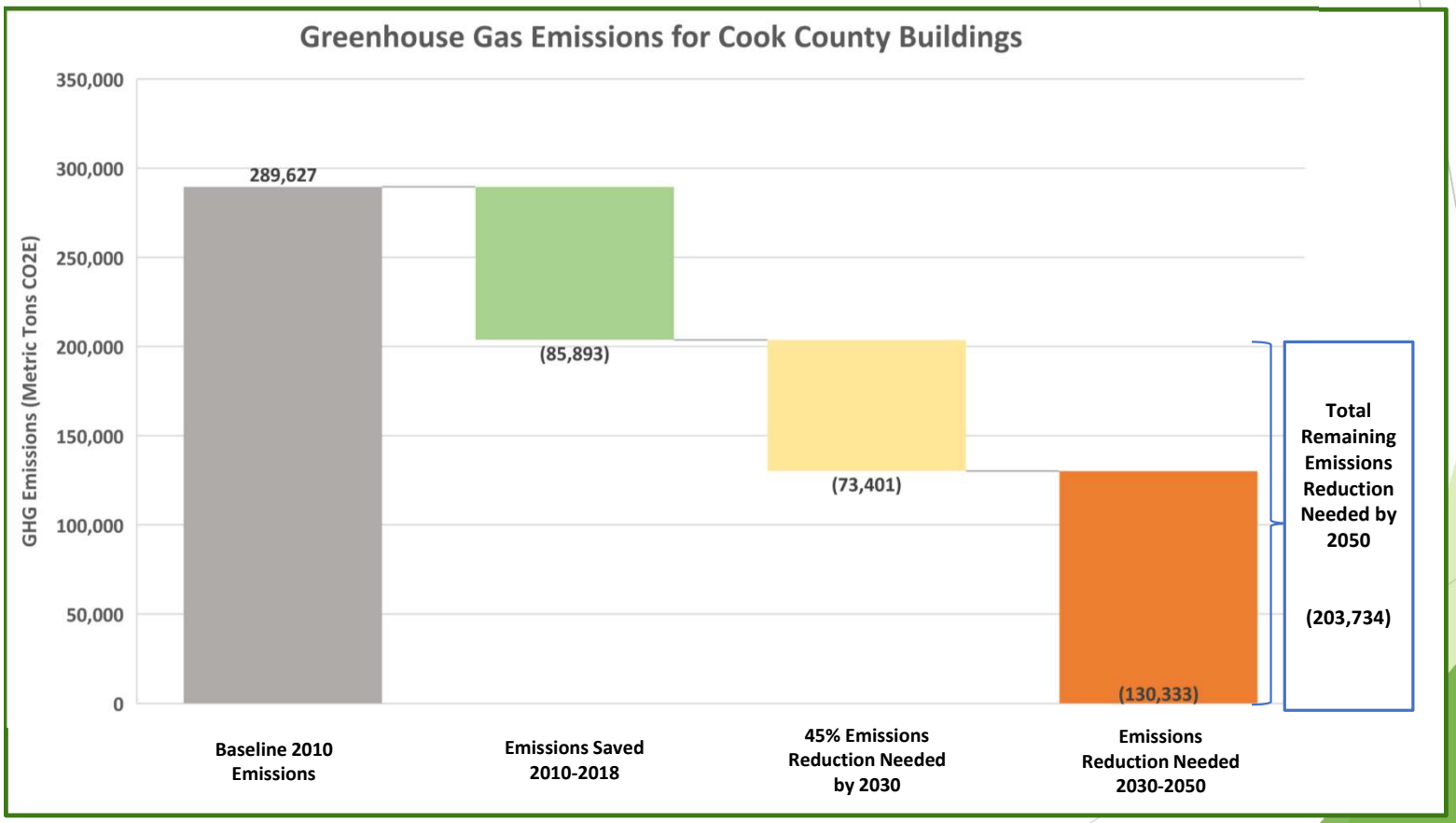
Achieving carbon neutrality by **2050**

100% renewable electricity by **2030**

- Goals are based on recommendations from Intergovernmental Panel on Climate Change to avoid the worst impacts of climate change. Baseline is 2010.
- **Carbon neutral**: The amount of human-produced carbon dioxide equivalent emissions is balanced by clean energy sources.
- **100% renewable electricity**: Using low- or no-carbon resources including wind, solar, and geothermal for all electricity used in building operations.

Equity: Climate change impacts will affect under-resourced communities and communities of color disproportionately. Solutions that prioritize the needs of under-resourced communities and communities of color are essential.

Greenhouse Gas Emissions: Progress to Date, and Future Action Needed



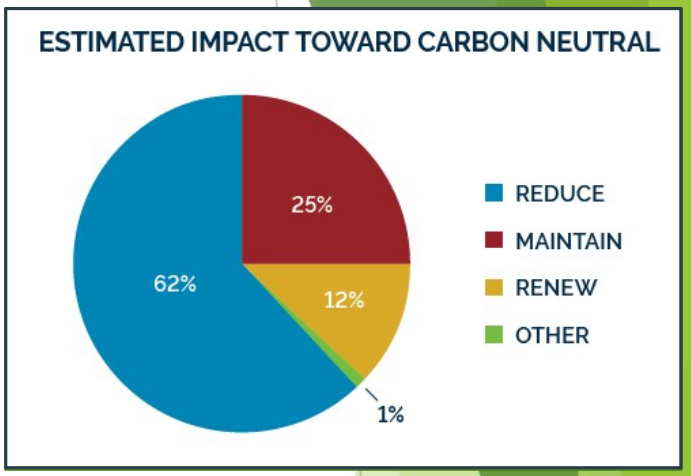
The Plan Relies Heavily on Familiar Actions

REDUCE: Energy efficient lighting, heating, cooling, plug loads, building envelope etc. The least expensive unit of energy is one you don't use.

MAINTAIN: Monitor energy use through Building Automation Systems, educate employees and building operators and ensure proper maintenance.

RENEW: Mix of on-site solar, power purchase agreements for offsite solar or wind, or if needed, Renewable Energy Credits. Priority given to local projects that create jobs or help communities.

SUPPORT: Policies and procedures to execute the other tracks, such as new building standards, thinking about solar energy potential when buildings are designed, and giving departments incentives to save energy



Reduce and Maintain Energy Use

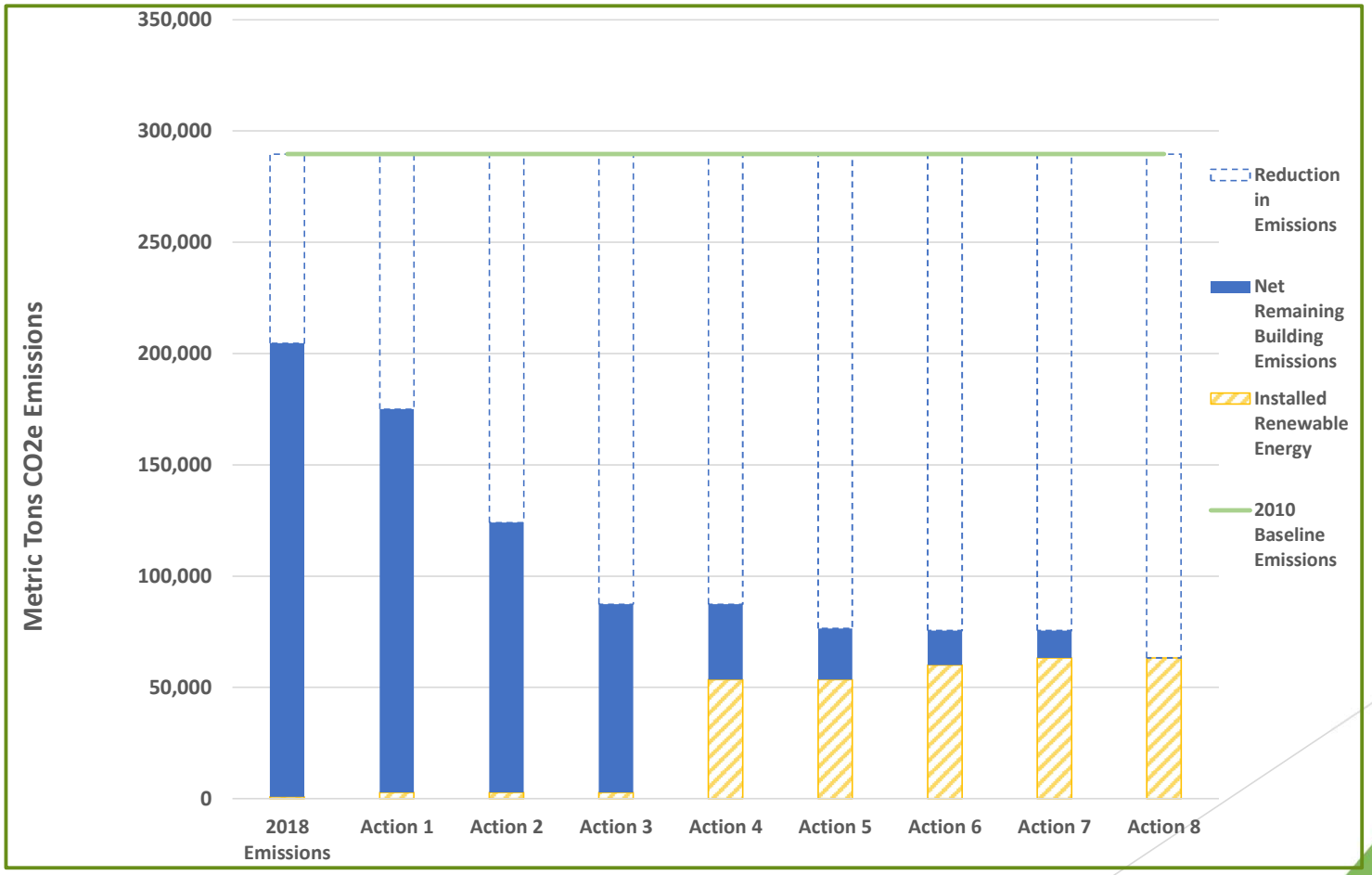
“The cheapest energy is the energy not used”

50,772 metric tons - Department of Corrections Redesign represents nearly 25% of anticipated emissions reduction and potentially 4 MW of additional renewable energy production.

61,120 metric tons - Upgrades to equipment at the end of its useful life.

50,933 metric tons - Building automation systems and fault detection and diagnostics.
Understanding how we use energy and consistent monitoring to help our buildings run efficiently as possible.

Progress Toward Carbon Neutrality



Action	Specifics
Action 1	Major Building Energy Retrofits, Skokie Solar, Cicero Records Solar
Action 2	BAS and FDD Upgrades
Action 3	Next Generation Energy Efficiency Upgrade, Rooftop Solar at Markham, Rolling Meadows, and Bridgeview Courthouses, Employee Behavior Change
Action 4	DOC Updates
Action 5	Switch mechanical equipment away from natural gas (fossil fuel) to electric when time to replace
Action 6	Portfolio On-site Solar Potential
Action 7	Microgrid
Action 8	Other factors that may reduce emissions

How Action Steps Implement the 4 Tracks

Actions	Reduce	Maintain	Renew	Support
Action 1				
Major Building Retrofits	X	X		
Skokie and Cicero Solar			X	
Action 2				
BAS Upgrades	X	X		
FDD Upgrades	X	X		
Action 3				
Next Generation Energy Efficiency	X	X		
Rolling Meadows, Bridgeview, Markham Solar			X	
Behavior Change	X	X		X
Action 4				
DOC Redesign	X	X	X	
Action 5				
Switch from Natural Gas	X			
Storage	X		X	
Action 6				
Portfolio Rooftop Solar Estimate			X	
Action 7				
Microgrid	X	X	X	
Action 8: Other				
Green Buildings Standards for Capital Projects	X	X	X	X
Performance Based Design for New Construction	X	X		X
Electricity Billed by Department through Submetering for Accountability	X	X		X
Land Acquisition Policy to encourage solar viability for new leased/purchased real estate				X
Greening the Procurement Process				X
Cleaner Grid				X
Property Disposition/Replacement	X			
Offsite Solar Partnerships			X	

Tracking Tool

203,733	2018 metric tons CO2E		
Estimated metric tons Reduction by Measure	*Timeline for Building Energy Usage*	*Est. %*	
0	Major Building Audits	0%	0%
-30,560	Major Building Retrofits	15%	15%
-987	Skokie Solar		
-30,560	BAS Upgrades	15%	15%
-20,373	Fault Detection and Diagnostics Rollout	10%	10%
-30,560	Next Generation EE Improvements	15%	15%
-1,991	Rolling Meadows, Bridgeview,Markham Solar	4% Pan	1,991
-4,075	Behavior Change Portfolio Wide	2%	2%
-50,722	DOC Redesign *	90%	90%
-746	Electricification (fuel switch away from NG)	ESCO Courts + Ma	
-10,187	Storage (V2G, Battery from excess RE Gen.)	5%	5%
-7,482	Portfolio Solar Rooftop Estimate		
-3,167	*Potential for District Energy/Microgrid Community (additional 4.16 MW RE)	4.16 M	3,167
122,240	Total Estimated CO2E Footprint 2030	45% GOAL	112,053
12,324	Total Estimated CO2E Footprint 2050	100% GOAL	0

The Components of Renewable Electricity by 2030

230,648 MWh electricity used in 2018

Energy efficiency projects through 2030 to reduce the amount of electricity consumed

Remaining electricity needed to meet Clean Energy Plan goals

Total solar installed by 2030
*(Estimated at up to 10.5 MW or **13%** of 2030 electricity estimations)*

Renewable energy procurements required to reach 100% electricity by 2030

- Decision Criteria: Favor Renewable Energy that is:
  - Urgent
  - Additional
  - Local
  - Resilient and Reliable
  - Cost-conscious
- Options:
  - Installed on County facilities/Owned by County
  - Power Purchase Agreement (PPA) onsite
  - PPA offsite

Onsite Solar and Power Purchase Agreements

- Most onsite renewable projects will be rooftop solar
- Intent is to follow the roof replacement schedule as roofs and solar have similar expected lives
- County tradesman have already gone through training on operations and maintenance of PV systems
- New builds are solar ready
- Expected installations will eventually total 15 MW
- Estimated installations by 2030 will only cover 13% of amount needed to meet 2030 goal

- In a physical power purchase agreement (PPA), a buyer purchases electricity from a large-scale, off-site renewable generator
- Cook County outsources risk, capital, and maintenance
- Due to limited land and rooftops, the County will need to pursue offsite PPAs
- Expected need output of offsite PPAs is 96,000 MWh to meet 2030 goal

Investing in the Future

The Plan will require resources to implement. However, through planning, reinvestment, and sound business cases, the added costs will be returned through operational savings that optimize taxpayer dollars.

- Actions in the REDUCE and MAINTAIN will be done as part of normal replacement when equipment is at the end of its useful life.
- Because of this, the real cost of these actions is the premium for more energy efficient equipment, which is estimated at 0-40% depending on the equipment
- Up to 40% of the RENEW portfolio could eventually be owned. Initial estimates were at $2.10/Watt installed per NREL data, although this number is expected to decline.
- The remainder of RENEW actions will be through Power Purchase Agreements that do not rely on capital from the County
- All these actions will come with operational savings.

BUILDING SYSTEM REPLACMENT CYCLE (Per ASHRAE)[3]		
	Expected Life (years)	# of Replacements by 2050
Lighting	14	2
Chiller	23	1
Boiler	25	1
AHU	20	1
RTU	15	2
Windows	25-30	1
Roof	20	1
Pumps	15	2
BAS Software/hardware upgrade	5*	6
Fans	20	1

This Plan Assumes NO…

- New technology beyond what exists today. Advances in renewable energy, energy efficiency, storage and other technologies will make the plan easier and less expensive to achieve.
- Additional renewable energy on the grid. Any increases in Illinois' Renewable Portfolio Standard, if actualized, will make the plan easier to achieve.
- Retirements of County properties. Disposal of a property could have a large impact on emissions reduction.
- Addition of County properties. Although some additions are expected, it is also assumed that these will be replacements and more efficient than the original.
- Price decreases in renewable energy, storage, etc.

Currently Happening

- Contracted with a consultant for strategic energy procurement including renewable energy
- Published Green Buildings Standards for performance-based design, solar ready buildings and sustainability measures
- Trained Cook County Department of Facilities Management employees on solar installation and upkeep
- Began in-depth building audits and energy modeling of County facilities
- Will issue an RFP for the design and procurement of photovoltaic systems for the Skokie Courthouse, Markham Courthouse and Cicero Warehouse.
- Acquired energy analysis software to better understand energy usage

Status Updates of the Clean Energy Plan

Short Term (1-5 years)	Completed	In Progress	Not Started
Develop a building-by-building energy efficiency upgrade list. Include estimated costs and upgrade schedules.			X
Update the current LEED ordinance for new construction and major renovations of Cook County owned and leased properties.		X	
Work with the ComEd energy efficiency program to select and implement a monitoring-based retro-commissioning project on a selected buildings.		X	
Roof replacements at Markham, Rolling Meadows and Bridgeview Courthouses (the Triplets)			X
Begin solar installations at Markham, Rolling Meadows and Bridgeview Courthouses			X
Begin solar installation at Cicero warehouse			X
Develop a policy and strategy for submetering by department			X
Develop a strategy to reduce transportation emissions from Cook County operations and to transition away from fossil fueled vehicles		X	
Assess opportunities for community solar either on site with the County as an anchor subscriber or through subscription only			X
Analyze and integrate battery storage to support renewable energy developments			X

Status Updates of the Clean Energy Plan

Intermediate (5-10 years)	Completed	In Progress	Not Started
Implement submetering by department			X
Complete phased roof replacement and solar installation for County facilities			X
Procure RECs to cover the remainder of the County's electricity use		X	

Long Term (10+ years)	Completed	In Progress	Not Started
Conduct a thermal decarbonization analysis to adjust how heating and cooling energy is used to effectively move away from fossil fuels by switching from remaining natural gas (fossil fuel) equipment to electric mechanical equipment.			X
Switch fuel use away from natural gas to electric equipment based on analysis of equipment as it becomes time for replacement/retrofit			X
Install portfolio solar rooftops where feasible and accessible as rooftops are replaced			X
Integrate a Microgrid on DOC Campus			X

Beyond County Facilities

- How replicable is this process for other government entities?
- Are there others who could benefit from the template?
- What is the best way to reach them?
- What else do they need?

Action Steps (Appendix)

Baseline	Savings to date have come from ESCO projects and energy efficiency measures.
Action 1	Action 1 emissions savings come from understanding the energy profile of a building to complete retrofits of equipment, buildings and operations for an initial energy reduction. These major building energy retrofits are currently scheduled to occur or will be occurring in the next 5-10 years. Action 1 also includes a solar installation at the Skokie Courthouse and garage as the roof is scheduled to be replaced in the next 3 years making the facility viable for a solar install. Action 1 also includes installing solar on half of the Cicero Records Center roof. The solar installations are difficult to see on the graph as the impact of these installations is minimal (just under 2,000 metric tons).
Action 2	Action 2 emissions savings come from updating building automation systems and fault detection and diagnostics to maintain energy savings and diagnose malfunctioning equipment. As smart building technology improves, the County expects to implement these improvements to increase savings.
Action 3	Action 3 emissions savings come from improvement of energy equipment to adopt recent technological advances as old equipment passes its useful life. Action 3 also includes solar on Markham, Rolling Meadows and Bridgeview Courthouse rooftops (i.e. The Triplets). The solar installations are difficult to see on the graph as the impact of these installations is minimal (around 2,000 metric tons). Phase 3 also integrates behavior change for electric plug load reduction.
Action 4	Action 4 emissions savings will be a result of high-performance building standards that will be implemented in the Department of Corrections Master Plan. Installed renewable energy comes from the redesign of the Department of Corrections campus to use energy as efficiently as possible with solar installations to help balance the energy needed for operations.
Action 5	Action 5 involves retiring old natural gas-powered mechanical equipment with electric-powered equipment to move away from fossil fuel dependence. Action 5 also involves incorporating battery storage with solar installations to maximize the energy available for use.
Action 6	Action 6 installed renewable energy comes from the estimated portfolio wide solar potential available on existing rooftops and land. This phase would be rolled out over several years as the rooftops are replaced.
Action 7	Action 7 represents the potential for a microgrid using excess renewable energy production potential of the DOC master plan, which frees up land for renewable energy generation. This would promote resiliency and provide power during outages to County-owned and operated buildings or even to the community.
Action 8	Action 8 addresses areas of potential reduction that may occur as a result of actions beyond our direct control. These include property disposition, a cleaner electrical grid, other renewable energy production and even the implementation of technologies not yet commercially available.