

IMPLEMENTATION MODEL: KENTUCKY



COMBINED HEAT AND POWER (CHP)

Kentucky’s significant potential for combined heat and power (CHP) has remained untapped despite its energy-intensive manufacturing economy. Kentucky saw increased industrial energy efficiency through deployment of CHP as a way to reduce energy bills, protect jobs, and spur economic growth.

In 2014, Kentucky’s Department of Energy Development and Independence (DEDI) launched a stakeholder engagement initiative to explore policy, regulatory, and market barriers that deter industry and facility owners and operators (end-users) from achieving the economic, energy reliability and other benefits of investments in CHP. With support from a State Energy Program (SEP) competitive award from the U.S. Department of Energy (DOE), Kentucky developed an Action Plan to stimulate the market for CHP project development throughout the state.

Goal

IMPROVE
INDUSTRIAL ENERGY EFFICIENCY

Drive demand for CHP systems to improve industrial energy efficiency in public sector, industrial, and commercial facilities in Kentucky.

Barrier

LACK OF
INFORMATION

Facility owners lack information on CHP technology, the benefits it can provide, and the regional market opportunities in Kentucky.

Solution



DEDI undertook a targeted stakeholder engagement process to highlight prime locations for the deployment of CHP.

Outcome



Through the stakeholder engagement process, DEDI developed an Action Plan that provides specific recommendations for future activities and actions to promote CHP in Kentucky. DEDI’s stakeholder engagement efforts ultimately helped four industrial and public candidates take a crucial step in the complex CHP installation process. The four candidates pursued prequalification screenings, without which future CHP deployment could not occur.

POLICIES

Kentucky’s historically rich coal reserves have provided access to low-cost, baseload electricity across most of the state. Competitive energy rates have helped Kentucky establish and maintain a robust industrial sector, which employs nearly 290,000 people in over 4,800 companies.¹ Kentucky recognized that industrial energy efficiency would be critical to mitigating the impact of rising electricity prices on these companies.

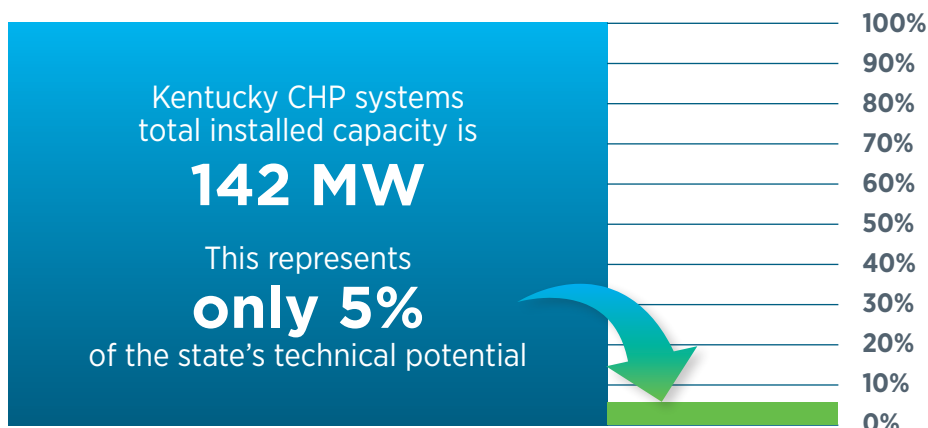
Uptake of CHP is one avenue for increasing industrial energy efficiency. It has lagged however, as low-cost electricity lengthens the payback period for a new system. The U.S. [DOE CHP Installation Database](#) lists 11 sites with CHP systems representing a total installed capacity of 142 MW in Kentucky – which is only 5% of the state’s technical potential for CHP.²



Industry clusters that operate in rural parts of the state, especially those involved with the manufacture of paper or chemicals, generate a considerable amount of waste heat. The cost-certainty and reliability afforded by CHP systems can help these industrial facilities remain competitive and support future job growth in the state.

Kentucky encourages greater CHP adoption through three policies that may benefit facilities or industries interested in deploying the technology:

- Kentucky’s [High Performance Building Standards](#) require any major construction or renovation of public buildings to optimize energy efficiency through technology and operational improvements. CHP is an eligible energy-saving technology.
- The state offers a [manufacturer’s tax credit](#) for installed energy efficiency measures, including heat recovery technology.
- Kentucky’s legislature passed [KRS 65.205 to 65.209](#) in 2015, which allows communities to establish Energy Property Assessment Districts (EPAD). Businesses in these communities can finance energy saving measures – including CHP – through a property tax lien.



¹ Kentucky’s industrial sector is a key contributor to jobs per gross domestic product (GDP). Source: https://www.bea.gov/newsreleases/regional/gdp_state/qgsp_newsrelease.html.

² Kentucky has 2,721 MW of CHP technical potential capacity identified at 4,030 sites, according to U.S. DOE. Technical potential capacity refers to ability of CHP to meeting site energy needs without regard to economic conditions. Source: <https://www.energy.gov/sites/prod/files/2016/04/f30/CHP%20Technical%20Potential%20Study%203-31-2016%20Final.pdf>

PROCESS - PROGRAM DESIGN

DEDI used a two-phase strategy to drive demand for CHP in Kentucky. Because many companies in Kentucky were unaware of CHP's long-term cost saving and reliability benefits, DEDI dedicated the first phase of the project to stakeholder education, and targeted dozens of potential end-users to educate them on the benefits of CHP. Phase one was led by [DEDI](#) with instrumental technical support from the [Kentucky Pollution Prevention Council](#) (KPPC), a state-mandated technical assistance resource center at the [J.B. Speed School of Engineering at the University of Louisville](#).

During the second phase, DEDI and partner KPPC shifted their focus to project implementation through one-on-one engagement with industry. DEDI and KPPC solicited industrial facilities to take advantage of free analyses of their CHP options.

CRITICAL TO THE SUCCESS OF KENTUCKY'S CHP PROJECT WERE THE FOLLOWING TWO ELEMENTS:

1 Diverse stakeholder group

DEDI engaged a diverse group of stakeholders to achieve the goal of increased demand for CHP. DEDI first established a CHP Steering Committee of industry, utility, and policy experts that could effectively delineate CHP's unrealized potential in Kentucky and speak to the pros and cons of various policy considerations. With guidance from the Steering Committee, DEDI assembled a CHP workgroup of end-users, industrial-sector and large commercial stakeholders, regulators, utilities, local policy decision-makers, environmental groups, equipment/plant designers, and other stakeholders with CHP expertise (e.g., equipment manufacturers and servicers, architects, engineers, financing experts, consultants, and energy service companies).

2 Dedicated workgroup members

CHP workgroup members self-selected into four sub-committees:

1. Policy and Utility Integration;
2. Education and Outreach;
3. Finance; and
4. Technical Assistance.

The sub-committees were charged with developing programs and strategies that would support the productivity and competitiveness of the state's industrial sectors by addressing specific policy, regulatory, or market barriers that deter businesses and public entities from investment in energy efficiency and CHP. Each of the four sub-committees met separately at least three times to define opportunities and challenges, and identify potential implementation strategies facing industrial and public facilities.

The sub-committees presented their findings in two six-hour stakeholder workshops hosted by DEDI. DEDI and KPPC helped facilitate meeting presentations by sub-committee members and hosted a CHP roundtable and panel discussion.



Following the two workshops, DEDI hosted an invite-only webinar for the stakeholder group. Based on feedback from the workshop evaluations, DEDI chose the following topics for the webinar: 1) navigating the air permitting process for a CHP project, and 2) initial steps to take in evaluating CHP potential. The webinar was attended by 47 stakeholders throughout the state – including representatives from 28 companies – and helped continue the growing CHP momentum in Kentucky.

A networking event for public facilities interested in CHP followed shortly thereafter. DEDI arranged site visits to two facilities using different CHP technologies, which were attended by 54 stakeholders.

PROCESS - IMPLEMENTATION

The four sub-committees were instrumental in designing implementation strategies for advancing CHP in Kentucky. Their work and the discussions at the stakeholder workshops informed the creation of the [Kentucky CHP Action Plan](#), which includes specific policy, regulatory, or market barriers that deter businesses and public entities from using CHP. The Action Plan highlights action items in the areas of education and outreach, reference and guidance documents, and technical assistance, and it served as a guide for Kentucky to effect increased demand for CHP.

The Education and Outreach sub-committee developed marketing strategies aimed squarely at manufacturing representatives and others who attended the earlier stakeholder workshops. The marketing strategies reflected input from sub-committee members that included the Kentucky Association of Manufacturers, the Kentucky Hospital Association, the Kentucky Engineering Center, and the DOE Southeast CHP Technical Assistance Partnerships (TAP) office.

The sub-committee advocated a targeted approach to augment blanket email campaigns and marketing approaches. The key was to target areas with the greatest difference between the market price of electricity and its cost of production, or spark spread, and the sectors with an energy use profile that could most benefit from CHP adoption. In response to the recommendations of the sub-committee, the project team contacted, met, and engaged the following groups through conferences and training venues:

- Industrial sectors known to be using CHP nationally, or have heavy thermal process demands, such as paper, chemical, food, or metals processing;
- Full-time manufacturing facilities in specific geographical areas;
- Companies with public-facing energy efficiency or environmental goals; and
- Decision makers at governmental or institutional sectors such as hospitals and their associations, universities, local, state, or federal agencies.

The Education and Outreach sub-committee also created a unique outreach tool – a set of CHP “heat maps,” which combined GIS data on industry and commercial facilities across the state with publicly-available utility rate information. The visualization tool helped engage interested parties and used a blue to red scale to showcase industrial density. Bright red indicates a high-density industrial cluster; shades of pink highlight energy prices – with dark pink signifying higher prices. The maps were designed to show where CHP would be especially attractive, such as high-density industrial clusters with relatively higher electricity costs.

Figure 1 below illustrates the industrial rates heat map.

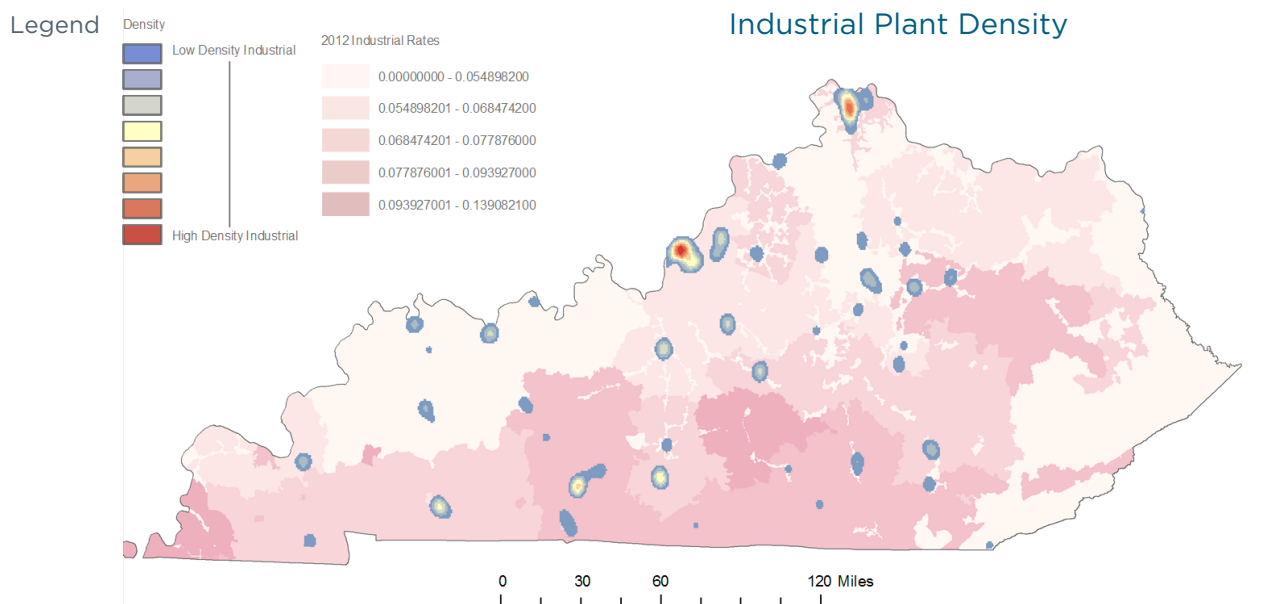


Figure 1 Heat Map of Industrial Site Density with 2012 Electric Rates (source: DEDI, KPPC)

Two maps were shown at the workshops to generate interest around CHP, and then team members provided more localized data and analyses for one-on-one meetings with industry and public facilities. Figure 2 below illustrates a screening map of potential hospital and universities sites:

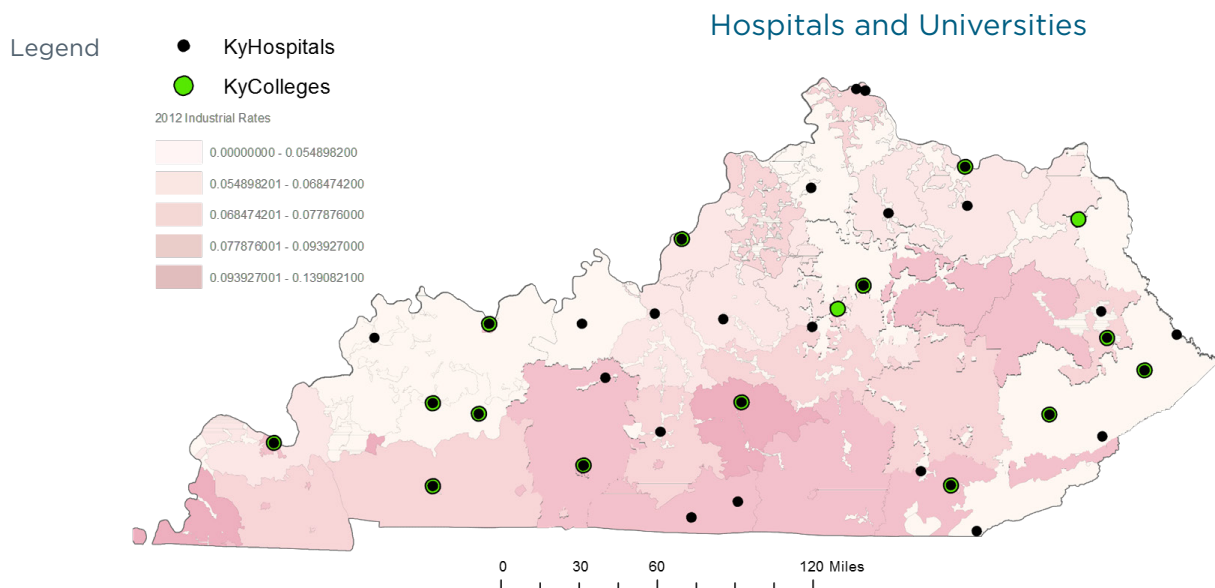


Figure 2 Example Industry-Specific Heat Map with 2012 Electric Rates (source: DEDI/KPPC)

The Technical Assistance sub-committee developed reference materials for permitting, interconnection and financing of CHP systems, which were included in the Action Plan as attachments and posted to the DEDI CHP website. DEDI expanded the [website](#) to include a clearinghouse for CHP resources, including meeting notes, presentations, [case studies](#), and [policy information](#).

The Policy and Utility Integration sub-committee identified funding and financing options that Kentucky continues to pursue, including supporting implementation of EPADS and continuing to engage and have an open dialogue with utilities.

Recommendations from the Technical Assistance sub-committee helped identify potential end users for qualification screening or other services. DEDI utilized project meetings and events it hosted to market the opportunity for facilities to receive free, unbiased assistance in the form of qualification screenings and feasibility studies. To conduct screenings, DEDI relied on the DOE’s Southeastern CHP TAP’s spreadsheet tool. Using facility-specific data on energy and heat demand, DEDI further assessed the economic viability of CHP.

If results of this screening were favorable, DEDI connected the sites with the DOE Southeastern CHP TAP for a second, more comprehensive feasibility analysis of CHP. The feasibility studies involved a more in-depth investigation of the facility and processes with a more thorough utility analysis, a site visit, return on investment and internal rate of return calculations, and “what-if” scenario analyses.



MEASURING SUCCESS

DEDI’s two-phase outreach and technical assistance campaign engaged potential CHP end users and other stakeholders. The team used the following metrics to track success in two distinct areas, interest in CHP and potential uptake.

INTEREST IN CHP

- Number of attendees at CHP events
- Contacts via e-mail, telephone, or face to face meetings
- Website hits for the state’s CHP site

POTENTIAL UPTAKE

- Number of qualification screenings
- Number of feasibility analyses

OUTCOMES

The success of the work group outreach efforts in 2013 and 2014 helped Kentucky considerably boost the profile of CHP in the state.

Through its marketing and outreach activities, DEDI engaged 75 members of the industrial, governmental, institutional, private, and utility sectors at its workshops. The follow-up webinar and networking event each reached roughly 50 participants. Hits to DEDI's CHP website steadily increased throughout the project.

Four public facilities chose to further explore their CHP options during the implementation phase of the project. DEDI helped four sites with qualification screenings for CHP in 2014. Based on the results of those desktop screenings, DEDI connected each site with the DOE Southeastern CHP TAP for a feasibility analysis. Of the four screened candidates by the CHP TAP, one candidate hired an engineering firm to analyze its energy system, a critical step towards in installation of a CHP system. If fully realized, this system could added 45,000 KW of capacity to the state – a 30% increase over existing installed CHP capacity (in KWh).

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TAP, KPPC learned how to conduct CHP screenings for commercial and industrial facilities. As a result, KPPC staff can now include CHP screenings to Kentucky companies and commercial markets in their ongoing service offerings across the state, an important step in increasing CHP uptake. A 2016 study commissioned by DOE estimated 1,598 MW of CHP technical potential in the industrial sector and another 911 MW of commercial and public sector CHP technical potential.

DEDI's ongoing implementation of the CHP Action Plan will help Kentucky maintain momentum in CHP demand to achieve greater industrial energy efficiency

³ As of late 2017, the university is still considering installing a CHP system as part of an overall operations and maintenance review.



TOOLS AND RESOURCES

[Kentucky DEDI CHP Webpage](#)

[Kentucky Energy Profile 2015](#)

[Kentucky's Action Plan for CHP](#)

[Select Kentucky](#) manufacturers database with GIS information search by NAICS code

[Kentucky Electric Service Area](#) GIS database of electric service providers

Heat Map – Data and Related Resources:

Industrial plant density data was obtained from the state's [Select Kentucky database](#) and information from the [Kentucky Cabinet for Economic Development's](#) index of manufacturers with a national presence that have CHP at other sites. DEDI and partners relied on data from members of the state's [KY EXCEL](#) environmental leadership program, a member-based program to voluntarily undertake projects that enhance Kentucky's environment.