

Applications of District Energy Systems in the United States

APEC Workshop on District Cooling and/or Heating Systems

EWG 08 2019S

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The U.S. has a long history of utilizing district energy systems

- ▶ There are over 660 district energy systems operating in the U.S. with installations in every state
- ▶ District energy research at US DOE is led by the Buildings Technology Office (BTO) within the Office of Energy Efficiency and Renewable Energy¹
- ▶ Private sector district energy systems are supported by the International District Energy Association

¹<https://www.energy.gov/eere/buildings/building-technologies-office>



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The International District Energy Association (IDEA) represents more than 2,200 members from the district energy industry¹

- ▶ District Energy Magazine
- ▶ Annual conferences: 34th Annual Campus Energy Conference- CampusEnergy2021
 - Virtual event 16-18 February 2021
- ▶ Wide ranges of case studies
- ▶ Virtual learning with live and streaming webinars
 - Review of Hydrogen to Reduce Carbon Emissions (17 Nov 2020)
 - 2020 HVAC Trends at Universities and Hospitals (19 Nov 2020)

¹<https://www.districtenergy.org/home>



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Congressionally directed study directed U.S. DOE to examine the energy efficiency and energy security benefits of district energy

- ▶ Congress directed the U.S. Department of Energy (DOE) *“to collaborate with industry to submit a report ... that assesses the potential energy efficiency and energy security gains to be realized with district energy systems.”*
- ▶ The report discusses¹:
 - The energy efficiency benefits of district energy
 - An overview of how district energy increases energy security
 - The current status of the district energy market, challenges to district energy implementation
 - The future research and development opportunities

¹Energy Efficiency and Energy Security Benefits of District Energy, United States Department of Energy, Washington, DC 20585, July 2019, <https://www.districtenergy.org/blogs/district-energy/2019/09/26/doe-issues>

The report provide a wide range of district energy examples in the U.S.

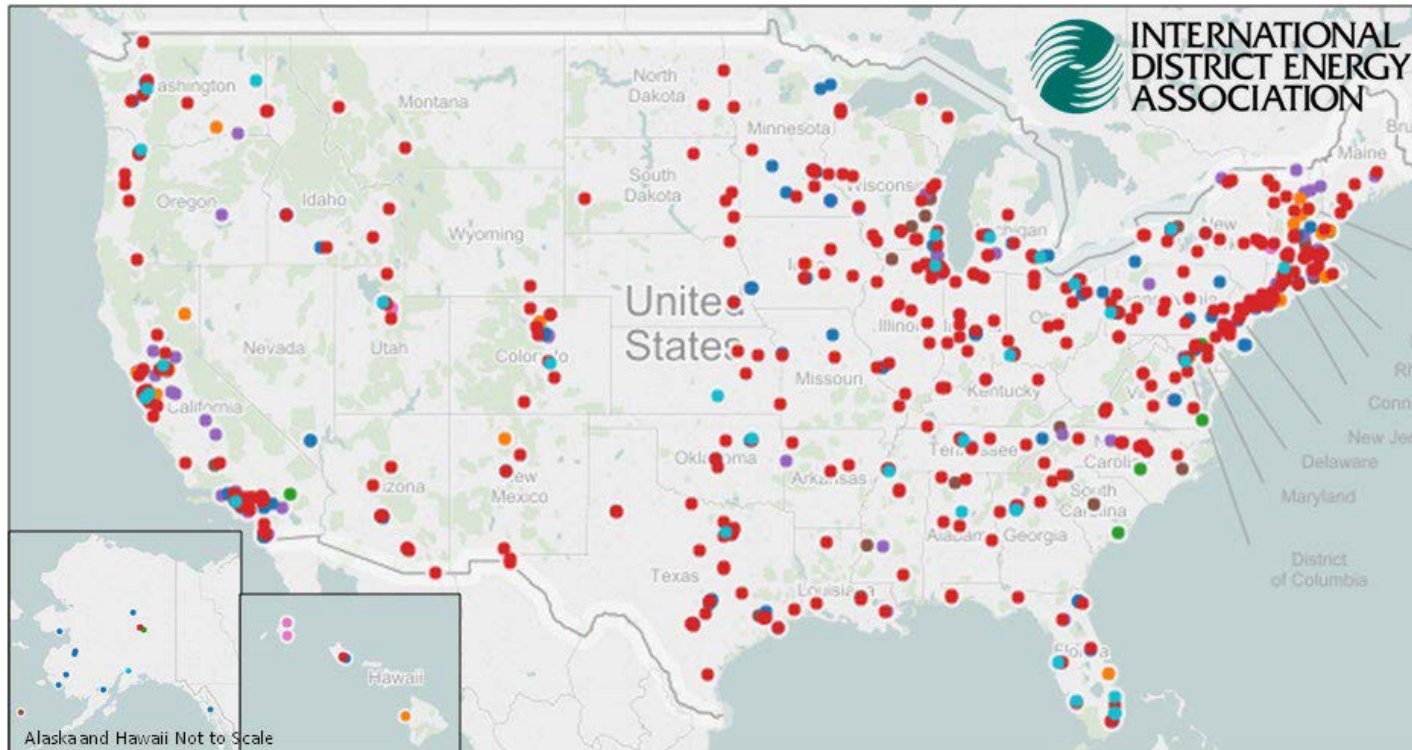
- ▶ U.S. district energy systems are typically located on university or college campuses; on hospital or research campuses; military bases and airports; and in areas of dense building settings, often in the central business districts of larger municipalities
 - Chena Alaska saw their electricity price drop from \$0.30/kWh to \$0.05/kWh when they replaced diesel with geothermal combined heat and power system
 - University of Texas Austin campus district energy/CHP/microgrid provides 100% of electricity, heat and cooling for campus since 1929. The campus has 160 buildings









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District energy systems are utilized across the United States



Sector

- | | | | |
|---|---|---|--|
|  Airport |  Commercial |  Government |  Industrial |
|  College/ University |  Downtown/ Utility |  Healthcare |  Military |



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The report provide an overview of district energy research in the U.S.

- ▶ The National Renewable Energy Laboratory's advanced analytical platform, called URBANopt¹, allows users to investigate energy efficiency and renewable energy at the district scale and identify strategies for optimizing building and energy system performance within one geographically cohesive area within a city (e.g., a city block or district)

¹National Renewable Energy Laboratory (NREL), U.S. DOE. n.d. *URBANopt Advanced Analytics Platform*. <https://www.nrel.gov/buildings/urbanopt.html>



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Future research areas

- ▶ Researching the ability of CHP and district energy to provide balancing and stability services to the electric grid to support integration of intermittent energy resources
- ▶ Research into enabling technologies, energy master planning, and quantifying non-energy benefits of district energy use could better inform how district energy operators manage load curtailment and system deployment during weather-related interruptions or conditions of grid strain



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Thank you for your attention!



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