Energy Efficiency Stakeholder Meeting

February 15, 2024

Agenda

1. Re-cap of Last Meeting
2. New Jersey Energy Efficiency Programs
3. Energy Efficiency Updates
    - NJCEP Updates
        - New Construction Program Update
        - Community Energy Plan Grant / Community Energy Plan Implementation Grant Update
    - Regulatory Updates
        - Triennium 2 Filings Review
4. Guest Presentation – Heat Pump Technology Primer
5. General Q&A
6. Items of Interest
7. Next Meetings

Recap of Last Month

January Meeting Recap

What we covered:

- ✓ NJCEP and Utility Program Updates
  - ✓ NJCEP New Construction Program
  - ✓ Community Energy Plan Grant / Community Energy Plan Implementation Grant Update
- ✓ Regulatory Updates
  - ✓ Triennium 2 Filing Extension
- ✓ Guest Presentation: The Social Science of Climate Change in NJ
- ✓ Q&A

New Jersey Energy Efficiency Programs

New Jersey Energy Efficiency Programs

www.NJCleanEnergy.com/TRANSITION

NJBPU and NJCEP Administered Programs

New Jersey's cleanenergy program℠

- New Construction (residential, commercial, industrial, government)
- Large Energy Users
- Energy Savings Improvement Program (financing)
- State Facilities Initiative*
- Local Government Energy Audits
- Combined Heat & Power & Fuel Cells

*State facilities are also eligible for utility programs

Utility Administered Programs

atlantic city electric (An Exelon Company) · Jersey Central Power & Light (A FirstEnergy Company) · PSE&G · Rockland Electric Company · Elizabethtown Gas · South Jersey Gas · New Jersey Natural Gas

- Existing buildings (residential, commercial, industrial, government)
- Efficient Products
  - Lighting & Marketplace
  - HVAC
  - Appliance Rebates
  - Appliance Recycling

NJBPU and Utility Co-Administered Programs

New Jersey Comfort Partners

BPU | New Jersey's cleanenergy program℠

Energy Efficiency Program Information

www.NJCleanEnergy.com/TRANSITION

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NEW JERSEY'S CLEAN ENERGY PROGRAM

- ABOUT NJCEP
- BOARD OF PUBLIC UTILITIES
- POLICY UPDATES & REQUEST FOR COMMENTS
- CALENDAR
- CLEAN ENERGY STAKEHOLDER GROUPS - MEETINGS
- GRANTS & SOLICITATIONS
- TRAINING RESOURCES
- PRESS ROOM
- PUBLIC REPORTS AND LIBRARY
- CONTACT US

New Jersey's Energy Efficiency Program Transition

Transición del Programa de Eficiencia Energética de Nueva Jersey

Electric Utility Contact Information

Utility Name	Commercial & Industrial Programs	Residential Programs
Public Service Electric & Gas	Website and Email Phone: 844-300-7734	Website and Email Phone: 855-846-2895
Atlantic City Electric	Website, Email and Phone: 833-223-7297	Website, Email and Phone: 866-353-0007
Jersey Central Power & Light	Website, Email and Phone: 800-662-3115	
Rockland Electric	Website, Email and Phone: 877-434-4100	

Gas Utility Contact Information

Utility Name	Commercial & Industrial Programs	Residential Programs
Public Service Electric & Gas	Website and Email Phone: 844-300-7734	Website and Email Phone: 855-846-2895
New Jersey Natural Gas	Website and Email Phone: 877-455-6564	Website and Email Phone: 877-455-6564
South Jersey Gas	Website and Phone: 888-263-7372	Website and Phone: 833-493-0691
Elizabethtown Gas	Website and Phone: 888-263-7372	Website and Phone: 833-493-0692

Check the GIS utility finder to determine who your provider or providers are.

Clean energy is on the move in New Jersey

Program Updates

- Energy Master Plan Update
- Solar Scam Warning
- School and Small Business Energy Efficiency Stimulus Program
- Energy Efficiency Program Transition

Program Literature

Program Literature — Applications and Brochures. Download the latest program materials.

Energy Master Plan

State of New Jersey Energy Master Plan

Follow Us:

FREQUENTLY ASKED QUESTIONS

Frequently asked questions (FAQs) are grouped by the following subject areas; you can jump to any section by clicking on one of the topics below:

General FAQs
Commercial & Industrial Programs FAQs
Residential Programs FAQs
Contractor Specific FAQs
Questions

General FAQs

Why are some energy efficiency programs now managed by the utility companies? (updated August 9, 2022)

The transition of the administration of certain energy efficiency programs from NJCEP to the utilities occurred in accordance with the mandates from the Clean Energy Act of 2018. These new programs allow the utilities to work directly with customers to achieve energy savings. The Board considered the following in establishing this transition:

- Programs that rely heavily on the use of contractors will be handled at the utility level, where the utility companies can build strong relationships and lead co-branded advertising and marketing efforts.
- Utilities will handle programs that rely on customer data or advanced metering infrastructure (AMI) to streamline customer data access layers and minimize the sharing of data to protect customer privacy.
  - Utilities are well-suited to deliver certain energy efficiency programs, such as those that are based on existing customer relationships and that rely on utility data and systems.
  - Utility administration works best for programs that can leverage utilities' knowledge of energy consumption, customer demographics, workforce infrastructure, and existing customer relationships within their service territories. Utility access – and increased customer access – to energy use data enables the design of more personalized services and programs, targeted outreach, and individualized solutions for customers.
- Utilities can offer flexible financing options, such as on-bill repayment.
- Customers may have more "brand awareness" and direct communication with their utility, which facilitates the broader adoption of energy efficiency measures.

New Jersey's cleanenergy program

Energy Efficiency Updates:

New Jersey's Clean Energy Program

More NJCEP Information

Quarterly Newsletter:

www.NJCleanEnergy.com/NEWSLETTER

Clean Energy Program Filings:

www.NJCleanEnergy.com/FILINGS

Clean Energy Program Monthly Progress to Goal Report

www.NJCleanEnergy.com/EE - Meeting Materials Archive

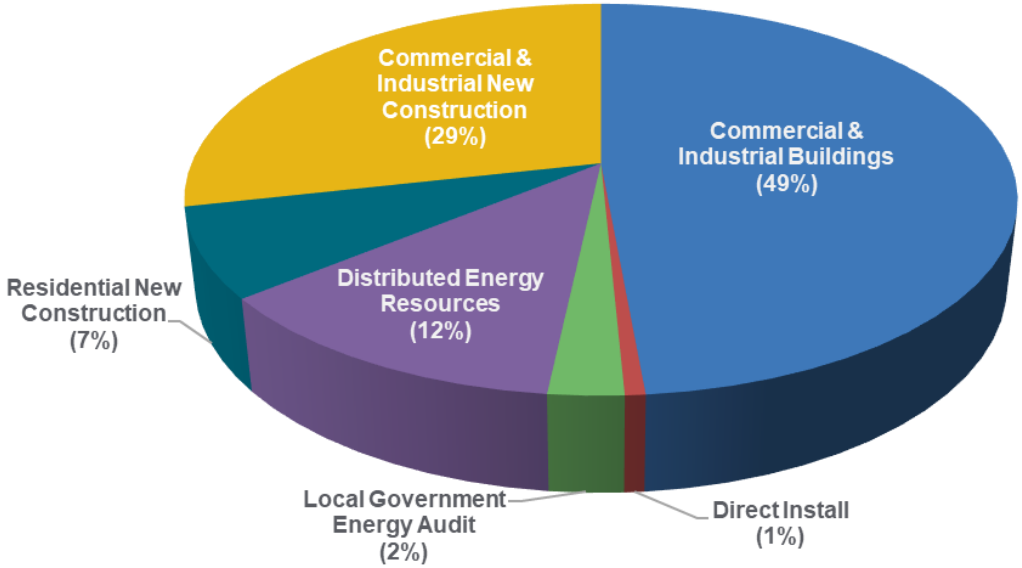
New in FY24:

Progress to Goals Report is posted with post-EE Stakeholder Meeting resources after this meeting

Budget Break-down by Program

FY24 TRC Managed Programs

Incentive Budget: $148,502,129



Energy Efficiency Programs FY24

NJCEP/TRC Managed

Closed

- Residential Products & HVAC
- Residential Existing Homes
- Direct Install

Closing Out

- C&I Buildings (existing buildings)
- SmartStart Retrofit
- Pay for Performance Existing Buildings
- School & Small Business Stimulus Program (federally funded)

NJCEP/TRC Managed

Open

- New Construction

  Was: Residential New Construction, SmartStart New Construction, Pay for Performance New Construction, Customer Tailored Energy Efficiency Pilot New Construction

- Large Energy Users
- Local Government Energy Audit
- Distributed Energy Resources

BPU/Utility Managed

Comfort Partners

New Construction Program & Garden State Challenge Pilot Update

Next Steps

- Finalize program design with Board Staff
- Release for public comment as Compliance Filing update

Community Energy Plan Grant & Community Energy Plan Implementation Grant Update

These two grant programs support municipalities with community-level clean energy initiatives.

Community Energy Plan Grant (CEPG) Program
- Grants for municipalities to develop community energy plan grants
- Two grant award levels
  - $10,000
  - $25,000 – overburdened municipalities

Community Energy Plan Implementation (CEPI) Grants
- Grants for municipalities to implement community energy projects
- Applicants eligible for $250,000 with possibility of additional awards if funds remain after all priority projects are funded.

Sustainable Jersey will provide Technical Assistance for applicants, with a focus on assistance for overburdened municipalities

Community Energy Plan Grant & Community Energy Plan Implementation Grant Update

New Application Deadline!

Friday, May 24

Applications must be submitted before 5 pm Eastern time

- Applications for both programs available on the NJCEP website at https://www.njcleanenergy.com/commercial-industrial/programs/community-energy-plans
- Questions can be submitted to: community.energy@bpu.nj.gov

Energy Efficiency Updates:

Regulatory – State & Federal

Triennium 2 Filings Review (Docket No. QO23030150)

- Triennium 2 energy efficiency proposals from utilities under review by Staff and Rate Counsel.
  - Joint utility motion to participate in other utility filings
  - Motions to intervene from EEA-NJ (7), NJLEUC (6), CPower (4), Convergent (3), NJPEEC (2), NRDC (2), Sierra Club (2), Google (1), Uplight (1)*
  - Motions to participate from Uplight (5), Google (2)
- January 10: Board re-designated presiding commissioners and re-opened the filings for new motions to intervene and participate tied to administrative completeness. No new motions received January 19–26.
  - ACE, JCP&L, RECO: Commissioner Christodoulou
  - ETG, NJNG, SJG: Commissioner Abdou
  - PSE&G: President Guhl-Sadovy

*Advanced Energy United (United), Convergent Energy and Power Inc. (Convergent), Energy Efficiency Alliance of NJ (EEA-NJ), Natural Resources Defense Council (NRDC), NJ Large Energy Users Coalition (NJLEUC), NJ Progressive Equitable Energy Coalition (NJPEEC)

Triennium 2 Filings Review (Docket No. QO23030150)

- Next steps:
  - Decisions on intervention and participation by presiding commissioners (February)
  - Interveners/parties discuss procedural schedules (February)
  - Ongoing discovery
  - Public hearings on each filing (April–May 2024)
  - Board action (Summer – early Fall 2024)
  - Triennium 2 starts January 1, 2025

Heat Pump Technology and Market Primer

February 15, 2024

Matt Christie
Director
Advanced Residential Building, Decarbonization

SUPPORTING [DOING] LEADING

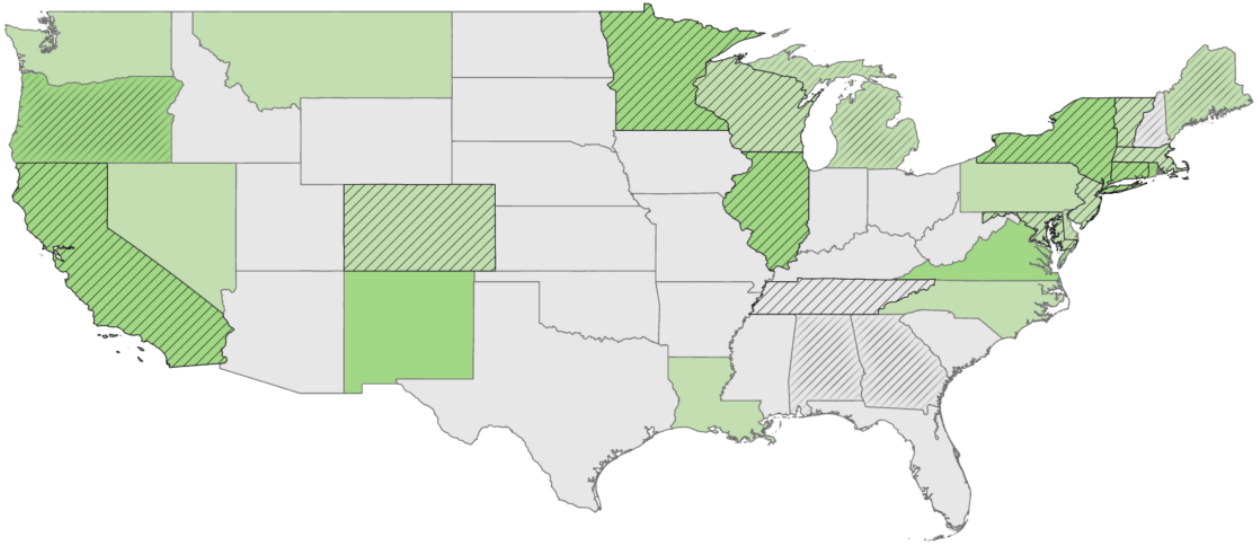
TRCcompanies.com

Matt Christie

Director, Advanced Residential Building - Decarbonization

- Located in Vermont
- 14 years of industry experience and an engineering background
- Started a small residential auditing company
- TRC-career start; advanced-market residential new construction programs
- TRC-career pivot; heat pump advancement
  - ccASHP Sizing and Design training
  - Clean Heat Connect
  - Experience Clean Heat
  - New York State Clean Heat Quality Control
- Research in emerging technologies
  - Variable capacity heat pumps, HPWH, load-management/controls, AWHP, Codes & Standards (CA Title 24)

Clean Energy & Fuel Switching Policies



100% renewable or clean energy target

Other Clean Energy Goal

Fuel Switching Supported

Limited/Highly Conditional Support for Fuel Switching

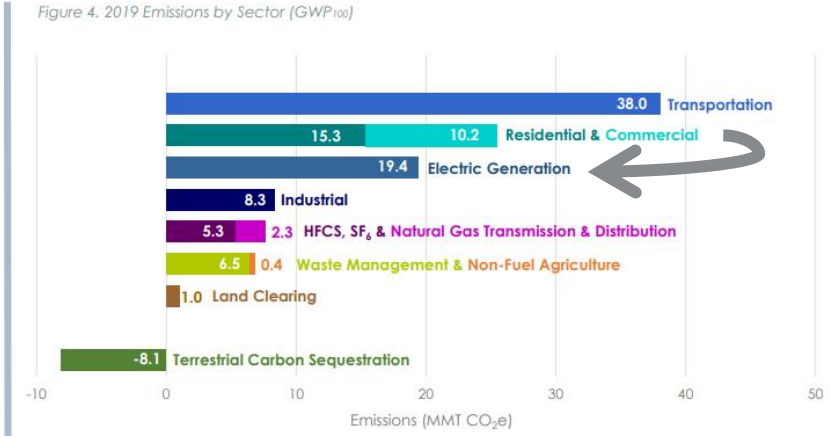
Prohibition or No Support of Fuel Switching

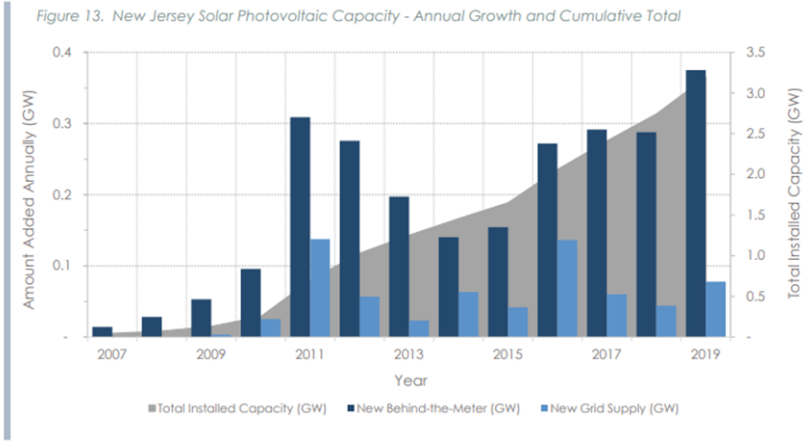
Sources: *Smart Electric Power Alliance, Clean Energy States Alliance, ACEEE*

GHG Reduction Potential

Electrification of **low-rise buildings** is the highest potential decarbonization strategy available and viable in a 5 to 10-year timeframe

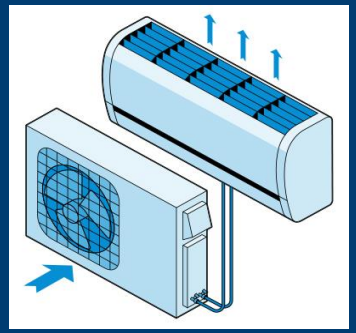
Building electrification will provide **cost savings**. First costs and ongoing, especially in new construction



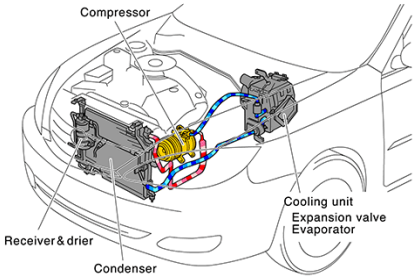


Source: 2022 NJ Greenhouse Gas Emissions Inventory Report – NJ DEP

Basics of Heat Pump Operations



Heat Pumps are All Around Us!



Heat Pumps Don’t Generate Heat, They MOVE It

Because heat pumps move heat, they are approximately 200 - 400% *efficient*

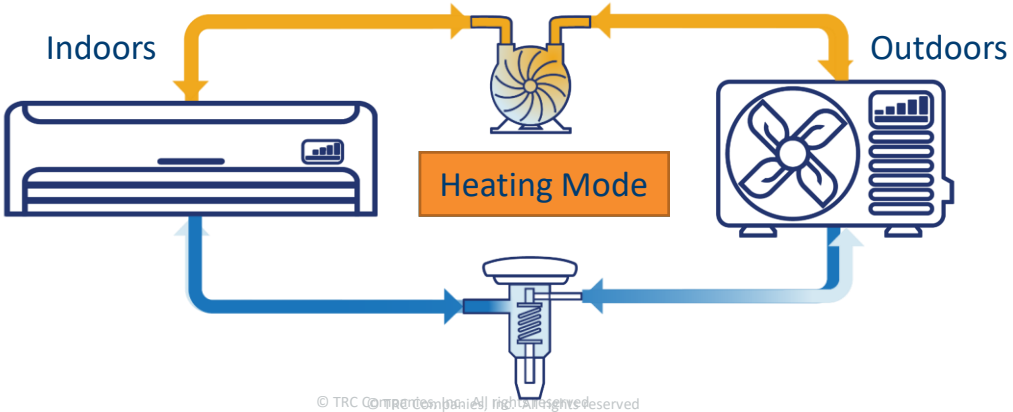
One unit of energy can pump 2 - 4 units of heat

Fossil systems are at most 98% *efficient*

How Do Heat Pumps Work?

Vapor Compression Cycle

- Pumped refrigerant
- Depressurized (gas) **collects** heat
- Pressurized (liquid) **delivers** heat



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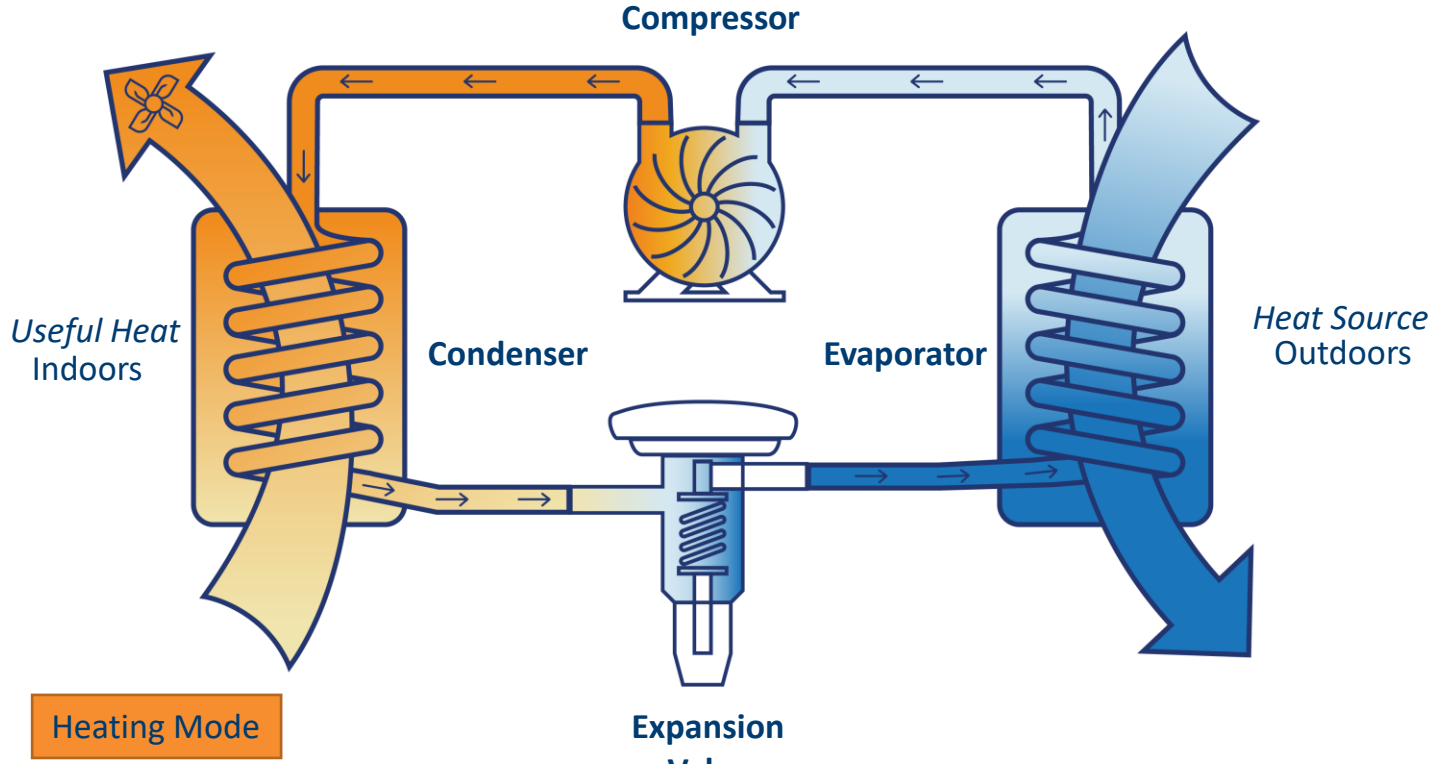
Heat Pump Components



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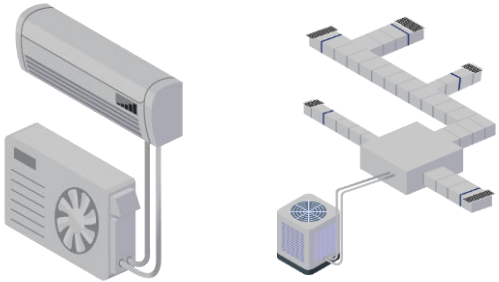
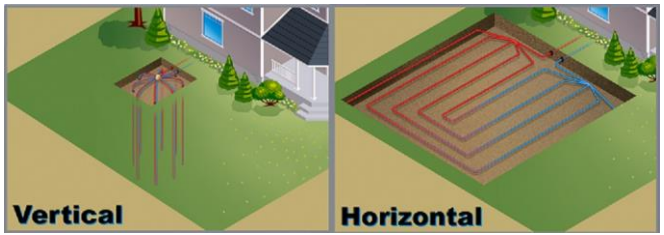
Primary Heat Pump Types

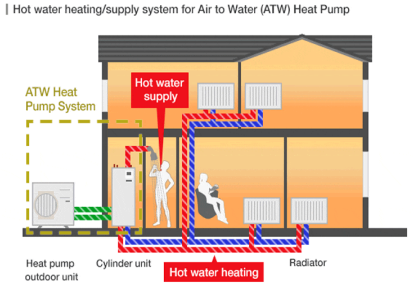


Air Source Heat Pump (ASHP)

Heat Pump Water Heater (HPWH)

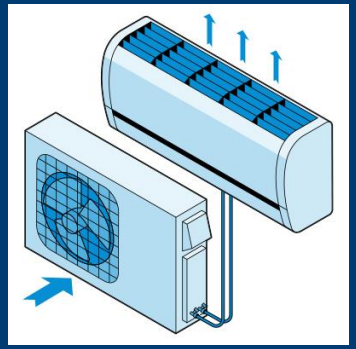


Ground Source Heat Pump (GSHP)
(Geothermal)



Air to Water Heat Pump, AWHP

Air Source Heat Pumps (ASHP)



Where Does the Heat Come From

Heating mode: From the outside air. Heated by the sun, even when it is cold outside

Cooling mode: From the inside air. It's not bringing in cold, it's removing (pumping) heat

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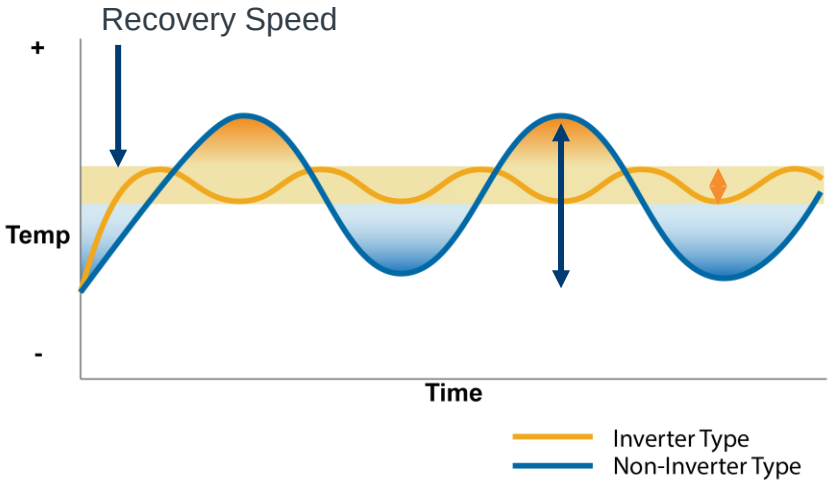
Variable Capacity = Modulation

Uses an ***inverter***-driven compressor.
Allows it to ramp up, and ramp down.



- Cold-climate capable
- More control
- More efficient
- Improved comfort

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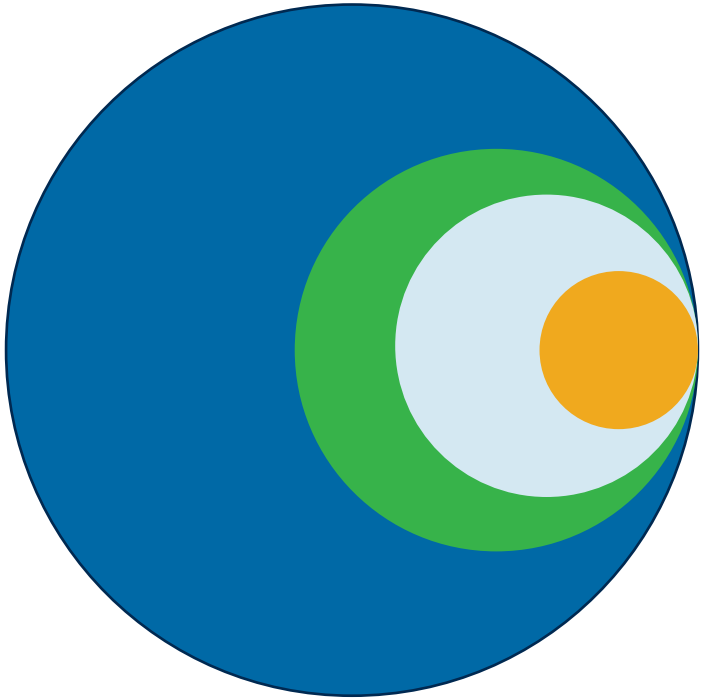
The Many Names of Air Source Heat Pumps



Air Source Heat Pump (ASHP)

Variable Capacity Heat Pump (VCHP)

Also Known As:

- ✓ Inverter driven
- ✓ Extended capacity
- ✓ Extra performance
- ✓ Extreme climate
- ✓ Various branded trade names:
  Hyper heat®, Aurora ®, Halcyon XLTH ®, Max-Heat ®

Cold Climate Air Source Heat Pump (ccASHP)

Cold Climate Ductless Heat Pump (ccDHP)

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ASHP Design Considerations

- Proper sizing matters more than for fossil heat
- Ducted vs. ductless vs. hybrid
- Central plant thinking vs. multiple HP systems
- Controlled for heat pump primacy
- Zonal controls
- Snow protection
  - Off the ground on risers or wall-mounted
  - Best on gable ends of the home
- Unit clearances – sufficient room for air to flow through and then away
- Condensate drain planning
- Defrost drip planning
- Noise/vibration concerns

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Heat Pump Water Heater (HPWH)

Heat Pump Water Heater Types

Integrated, Unitary, Tank

Split-System

For multifamily or larger C&I:

- Central HPWH
- Ganged HPWH
- Clustered HPWH

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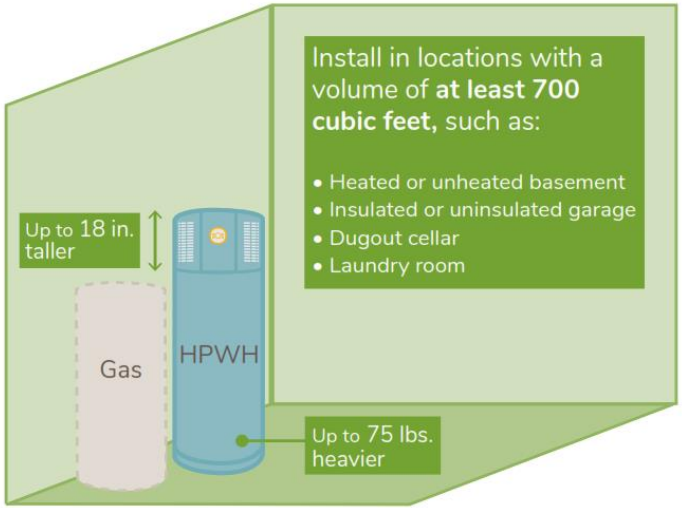
Integrated HPWH Design



- Locate where there is ample heated air to harvest heat
  - Basement
  - Garage (warm climate)
  - Closet with high-low openings
  - Closet with active venting
- Size larger for catchup-speed
- Never use recirc-pumps (SF-Res)

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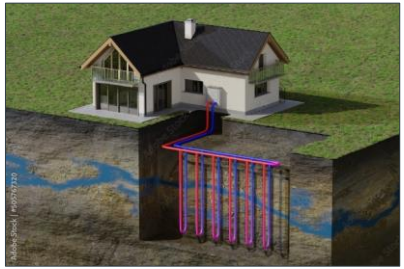
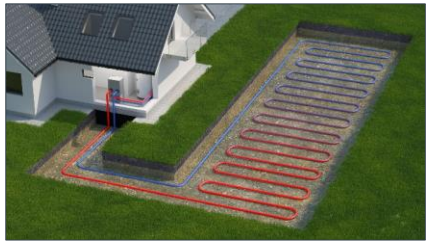
Ground Source Heat Pump (GSHP - Geothermal)

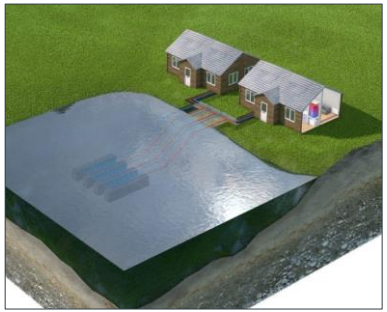
GSHP Well Types



Vertical
(Closed-loop)



Horizontal
(Closed-loop)



Open-loop, Pond,
“Pump and Dump”

Direct Exchange
(Waterless)

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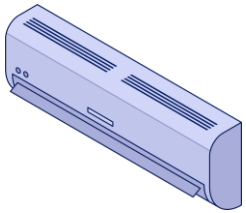
GSHP Distribution Types

Ducted

Hydronic (baseboard, radiators in-floor)



Ductless (hydronic)
Ductless (refrigerant)

Domestic Hot Water Support:

- Desuperheater
- Dedicated WWHP

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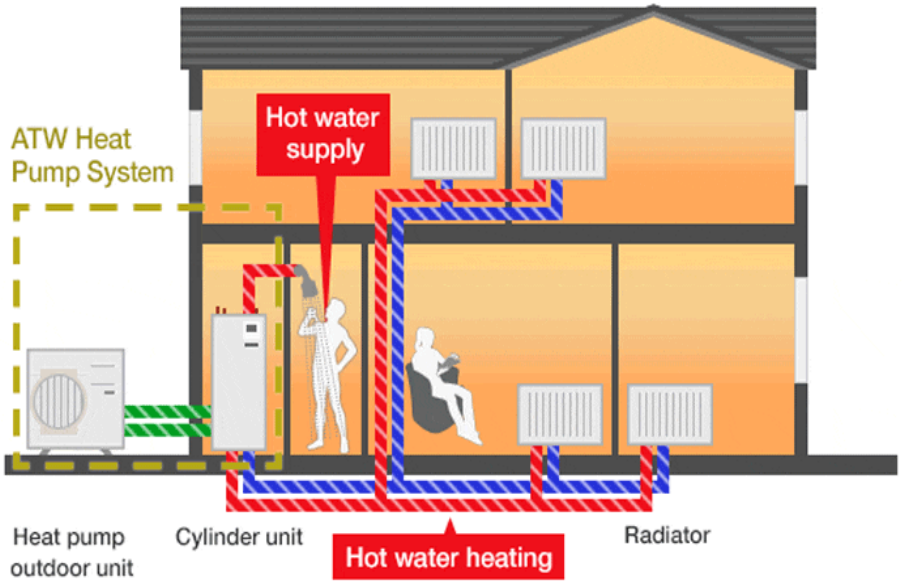
Air to Water Heat Pump (AWHP)

Air to Water Heat Pumps (AWHP)

Hot water heating/supply system for Air to Water (ATW) Heat Pump



- Quickly expanding market - new products
- Market-change driven in part by upcoming changes to refrigeration regulation
- Viable for “combi” systems – both DHW *and* space conditioning
- Viable for multifamily and commercial
- Distribution –
  - Hydronic baseboard
  - Hydronic radiators
  - Hydronic in-floor
  - Forced air
  - Ductless hydronic fan-coil units

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Not a Drop-in Boiler

Supply temperature

- Most on the market max out at 140F (but with a substantial efficiency penalty, best at ~110ºF)
- Most existing hydronic baseboards are sized to use 180ºF or 190ºF
- To drop-in requires either:
  - Additional radiating surfaces (often cost-prohibitive in retrofit)
  - Deep envelope retrofit to reduce load (also cost prohibitive, but desirable for general efficiency reasons)
  - Full-distribution replacement
- Radiant floor uses 80ºF-90ºF – perfect
- New construction – perfect

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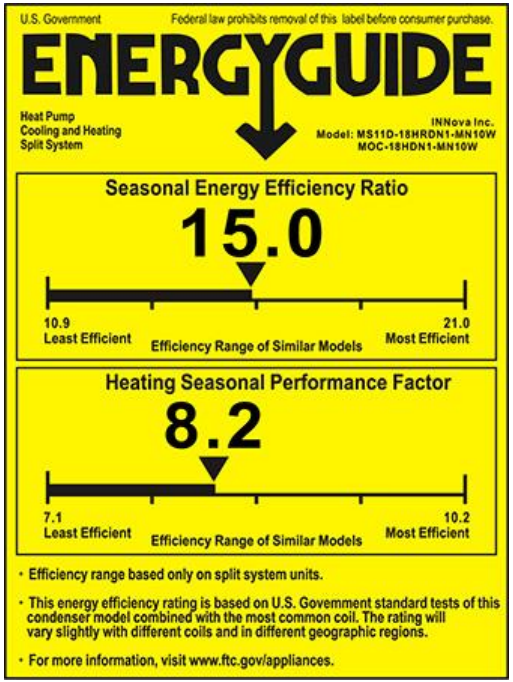
Product Challenges – Lack of Standards

- No industry or federal standard to measure efficiency
  - HSPF or SEER equivalents
    - Not in the IRA for tax incentives
    - New AHRI committee formed in 2024
- Made more difficult with the variability of **capacity and efficiency** with both heating-water supply temp and outdoor air-temp
- Utilities will be dubious of manufacturer-reported data until field-verified



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Key Heat Pump Market Realities

Key Market Realities

- **Hearts and minds** – Neither contractors nor customers are totally comfortable/sold on heat pumps as a *sole* heating option
  - Dual-fuel, hybrid systems are commonly specified but do not solve the decarbonization problem
  - Integrated systems revert to the fossil option too much
- **Demand** – Heat pump demand is increasing ~10-15% year on year. IRA and delivered-fuel energy costs are big drivers
- **Market capacity** – We have too few qualified, confident, contractors to fulfill *current* demand. Demand is increasing
- **Design challenges** – Design for heat pumps is harder. Modular thinking, bigger oversizing penalties Contractors need support to learn or transition
- **Refrigerant regulation** – Driving innovation and anxiety in the industry. R-290 (propane) safety approval is a critical next step

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Questions?

Thank you

Email:

MChristie@TRCcompanies.com

Visit:

TRCcompanies.com

General Q&A

To submit questions in advance for next month:
EnergyEfficiency@bpu.nj.gov

Items of Interest

Next Meetings

Guest Presenter Survey Responses

Ranked guest speaker topics

Air Source Heat Pumps (ASHP)

Heat Pump Water Heaters (HPWH)

Demand Response (Programs & Technologies)

Storage Technologies

Air to Water Heat Pump (AWHP)

HVAC Heat Recovery

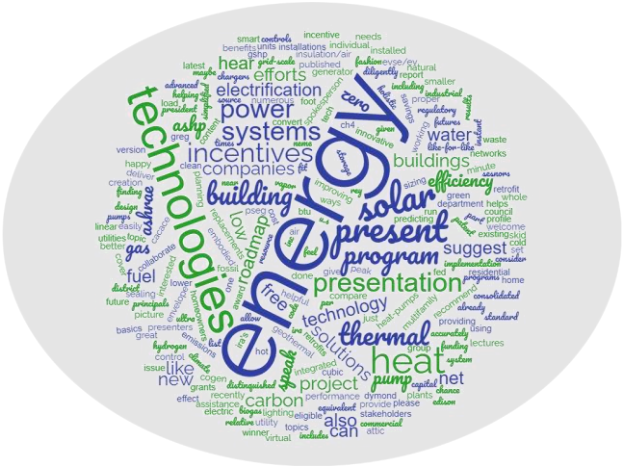
Ground Source Heat Pumps (GSHP) / Geothermal)

Battery Storage

Hydrogen Technologies

Weatherization Technologies

New guest speaker topics



Energy Efficiency Stakeholder Meetings

NJCleanEnergy.com/EE

3rd Thursday of the Month, 1-2:30pm

Next Series of Guest Presenter Topics:

Air Source Heat Pumps (ASHP)
Ground Source Heat Pumps (GSHP)
Air to Water heat Pumps (AWHP)
Heat Pump Water heaters (HPWH)
Demand Response
Storage Technologies
HVAC Heat Recovery
Hydrogen Technologies
Weatherization Technologies

March 21, 2024
April 18, 2024
May 16, 2024
June 20, 2024
July 18, 2024
August 15, 2024
September 19, 2024
October 17, 2024
(no November meeting)
December 19, 2024

More Information

VISIT

NJCleanEnergy.com

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CONTACT

EnergyEfficiency@bpu.nj.gov

866.NJ.SMART (657.6278)

EE LISTSERV

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THANK YOU