

Natural Connection Heat Pump Cycle – Executive Summary

The Natural Connection Heat Pump Cycle (NCHP) is an innovative, nature-inspired HVAC system integrating solar thermal collection, evaporative cooling, and heat pump efficiency. It demonstrates how biomimicry (learning from nature's systems) can create affordable, sustainable comfort solutions.

Core Principles

- Echoing nature's processes, solar for warmth, evaporation for cooling.
- Uses existing technologies in a unified, energy-efficient system.
- Reduces reliance on fossil fuels and grid power.

Performance Highlights

- Modeled energy savings: ~60% reduction in heating/cooling consumption.
- Typical home: 1,800 ft², annual savings ≈ \$564.
- Payback: 10–15 years, within life expectancy of components.

System Overview

The system includes solar thermal panels, a stratified water storage tank, evaporative cooling pad, and integrated heat pump. Each element operates in coordinated cycles to precondition ambient air, reduce compressor load, and reuse natural heat or coolness.

Environmental & Economic Value

By imitating natural energy flows, the NCHP reduces emissions, increases system lifespan, and provides a roadmap for future renewable HVAC development. It serves as a freely available foundation for engineers, manufacturers, and homeowners alike.

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