Products needed for Making Electrification Easier

Tom Kabat

tomgkabat@gmail.com

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It can all fit

- We need to help people right size several things:
  - EV charger circuit
  - Heat pump (inverter driven variable speed)
  - Water heater tank and circuit
  - Cooking (design, type, size and circuit)
  - Drying (separate machine or combined, moisture removal method)

Products needed

- Better water heaters
- Better cooking solutions
- Better drying
- Better heat pumps
- Better EVSE
- Better easier circuiting

Better Heat Pump Water Heater

- Water heater
  - High stratification
    - To deliver hot water and defer reheat
    - To excel on First Hour Rating test (gallons delivered)
    - Upper elevation delivery of useful heat
  - Techniques
    - Low velocity dip tube
    - High elevation useful heat injection
    - Small diameter condenser tube wrapped higher and lower
    - Or controls like intermediate semi expansion valve.

Cooking Solutions

- Same pot wattage cooktop
  - using high efficiency lower electric watt hobs
- 36” cooktop under 7200 W
- Better power sharing among elements
- Variable power oven that goes to equilibrium
- Better insulated oven with less thermal mass that swings (heats up faster)

Better Drying

- Better lint management (lint clogs thermal systems) better filters or easier access cleaning
- Better condensing dryer heat rejection
  - (would speed drying and save water)
  - Explore use of solid state heat pumps in dryers
    - Peltier chips or Seebeck chips

Better heat pumps

- Even Higher COPs
- Even Quieter outdoor units (compressors and fans)
- Low GWP refrigerants
- Central air handler learns from duct pressure and then looks at weather forecast, grid forecast and it plans its approach to comfort

Drop-in Replacements

- Replacement for Wall Furnace
  - Indoor unit fits in the wall furnace hole and line-set goes up vent stack to outdoor unit on roof.
- Replacement for floor furnace
  - Low pressure air handler replaces furnace and line-set goes up vent stack to outdoor unit on roof or on ground
- Replacement for fire place (fireplace lookalike)
  - Line-set goes up chimney to outdoor unit on roof.

Better EVSE

- Chargers with built in circuit that pauses charging if panel load exceeds 80%
- Chargers with solar PV self consumption logic built in.
- Chargers that look at the grid forecast (e.g. wind forecast) and they flex accordingly to fill higher before doldrums.

Easier circuiting

- Factory made electrification retrofit module.
  - Energy locker or retro circuiter
- Connects via meter collar
- Has built in main panel (old main panel is easily connected as a sub via 100A feeder)
- New main has four flexible outdoor rated conduit circuits for: cooking, heat pump, heat pump water heater and EVSE with pauser.

Retro circuiter continued

- Meant to make one-day electrification happen
- It can contain a battery and management software to use the battery and EV pauser together to meet more electrification without service upsize or old panel upsize.
- It could have right angle bends moldable into the conduit for neat wall penetrations.
- All circuits easily extended to devices with wires already in conduits.

Utilities might own the retro circuiter

- Utility could offer free electrification
- Utility could offer control packages to customer.
  - Eco gentle
  - Bill gentle
  - High power livin’ large

Energy Locker components