The HVAC, WH, & Appliances Sub-Program develops & accelerates energy-efficient technologies at a reduced cost in the near term & also develops & introduces next-generation technologies, both of which advance cost-effective technologies to improve system energy consumption.

External Influences: DOE budget, Spin-off products, Energy prices, Private sector R&D, Market incentives, Legislation / Regulation

Dec. 2015

30% by 2030

Objectives	Activities / Partners	Outputs	Short Term Outcome	Mid Term Outcome	Long Term Outcome
Support R&D of next-generation components & technologies (e.g., non-vapor compression heat pumps)	Competitive & shared R&D funding focused on tech. performance by researchers in lab / field facilities Competitive & shared support to field test, & validate tech. & integrate with building control	Technology pathway & research reports Prototypes with greatest system technical benefit (e.g., advanced materials, compressors; fluids)	Researchers equipped with validated solutions to develop or improve components & optimize tech. systems at reduced cost	Researchers develop higher performing, efficient, cost effective systems with less environmental impact Manufacturers produce	High-efficiency HVAC, water heating & appliance technologies & products are regularly developed & produced by
Improve performance &	systems with industry Collaboration with international orgs. on tech development	Prototypes that reduce cost or optimize systems & compatibility with existing technologies	new or improved components & tech. & equipped with reduced	optimized products at a reduced cost & bring them to market in large volumes	
pump & water heating technologies	Shared R&D funding of manufacturing R&D & cost reduction with industry	Share best practices with national & international community	Manufacturers have access to data to	Manufacturers & retailers support & push high efficiency products in the	industry; installed by building professionals; &
Accelerate market entry & acceptance of technologies & products	Shared funding to benchmark performance	Manufacturing production advanced solutions	& retailers to understand	markethaBuilding professionals easily install & maintain, & integrate products into building systemsco	have similar or better installed
	Shared funding of field demo of installation, system configuration & performance with manufacturers	Performance assessment reports & best practices Improvements to tech. for ease of installation & maintenance	Building professionals are aware of high efficiency products & can easily install equipment Industry orgs. & building professionals have test & modeling approaches to codify ratings & standards & differentiate products.		cost & comfort value, but higher efficiency with less environmental impact relative to conventional products.
Improve testing & modeling tools to enable market	Competitive & shared funding to develop protocols to support industry standards & ratings			Government, standards & industry orgs. use testing & modeling approaches to use product performance as a basis for market incentives, standards & energy codes	
		Standardized simulation & field test protocols			
	Shared funding of modeling tool & control algorithm development & testing	Modeling tools & approaches that accurately analyze technologies			
Meet cost & performance targets by 2020 to enable technologies that will be capable of reducing HVAC EUI 60%, water heating EUI 25%, & appliances EUI					

bldg. EUI 30% by 2020

15%, respectively, (primary EUI).

## K HVAC, Water Heating, and Appliances Research and Development Logic Model

