

Technical Brief: Water Heaters for the Home - Storage Tank vs. Tankless

A plain-English guide for homeowners, developers, and real estate investors: how each system actually works, the honest advantages and disadvantages of both, what the 15-year money comparison really shows, and how to match the right system to the right house and household

Executive summary

Hot water is the quiet workhorse of a house: used every day, ignored until it fails, and one of the largest single energy loads in the home. When it is time to replace one - or to specify one for a new build - the choice usually gets framed as "tank vs. tankless" as if one is simply better. It is not. A storage-tank water heater and a tankless (on-demand) water heater solve the same problem with opposite strategies: the tank stores 40-50 gallons of heated water and accepts constant standby losses to have capacity on hand; the tankless stores nothing, heats water only while it flows, and accepts the complexity of doing so instantly, at high volume, forever. Each strategy buys advantages and pays real costs. The tank is cheaper to buy and install, simpler, and more forgiving of maintenance neglect; the tankless delivers endless hot water, a 20+ year service life, 20-30% lower energy use, and floor-space savings - at roughly double the installed price, with strict flow limits in winter, annual descaling in hard water, and an installation (gas line, venting, or electrical service) that is never a simple swap. The 15-year ownership math, run honestly, comes out close to a tie. The real decision is about the household: how many people demand hot water at the same time, how long the family plans to stay, where the unit must fit, and whether anyone is maintaining it. This brief lays out both systems without a sales pitch, then gives the decision framework Ducere uses with its own clients, because the wrong answer is not "tank" or "tankless" - it is the right system installed in the wrong house.

2 strategies, opposite trade-offs: store it (standby loss) vs. make it on demand (flow limits)	20-30% typical energy saved by a condensing gas tankless vs. a standard gas storage tank	~20 yrs tankless service life vs. 10-15 for a storage tank	~2x installed cost of a gas tankless vs. a comparable tank replacement
--	--	---	--

1. How each system actually works

1.1 The storage tank water heater. A tank - typically 40 or 50 gallons in a Georgia home - is heated by a gas burner below the tank or by electric elements inside it, and held at the setpoint (about 120°F) around the clock. Capacity is defined two ways: tank volume, and the recovery rate / first-hour rating - how much hot water the unit can deliver in the first hour of heavy use. The standing cost of this design is standby loss: heat continuously leaking from a tank of stored water, which is why efficiency ratings for gas tanks sit well below tankless units. The known failure mode is also simple and well understood: tanks rust, and when a tank lets go it releases everything it is storing into whatever room it occupies.

1.2 The tankless (on-demand) water heater. A tankless unit has no stored water. When a fixture opens, a flow sensor ignites a powerful burner (gas) or energize elements (electric) across a heat exchanger, and the water is heated as it passes through - instantly and continuously, for as long as the fixture runs. Capacity is defined not in gallons but in gallons per minute (GPM) at a stated temperature rise. Two consequences follow. First, hot water is endless in duration but not unlimited in volume: the unit can only heat so many GPM at once, so demand that exceeds its capacity comes out cooler, not slower. Second, the equipment doing that work is more sophisticated: high-output burners, condensing heat exchangers, electronic controls, and - for every gas tankless - electricity to run them, which means a tankless does not make hot water in a power outage the way an old standing-pilot gas tank did.

2. Head to head: advantages and disadvantages

FACTOR	STORAGE TANK - ADVANTAGES	STORAGE TANK - DISADVANTAGES
Installed cost	Lowest: a like-for-like replacement is typically the fastest, cheapest path (national installed ranges run roughly \$1,500-\$3,000 for gas tanks)	None - the tank wins cost of entry outright
Energy use	None - standby loss runs 24/7; efficiency (UEF) roughly 0.53-0.68 for gas tanks	n/a
Capacity / comfort	First-hour rating delivers high simultaneous draw (shower + tub + dishwasher at once)	Capacity is finite: when the tank is drained, recovery takes 30-60 minutes; the last shower of the morning pays for it
Service life / risk	Simple, forgiving technology; failures are usually slow and visible (leaks at the base, rust-colored water)	10-15 year service life; a full tank failure releases 40-50 gallons into the room - a real risk for units in attics or interior closets
Installation	Typically a same-day swap: same gas line, same vent, same location	Displacing code changes (pan + discharge piping for attic/interior installs, expansion tanks on closed systems) add modest cost; still minor vs. tankless

FACTOR	TANKLESS - ADVANTAGES	TANKLESS - DISADVANTAGES
Installed cost	None	Roughly double: \$3,000-\$5,500 installed for gas tankless, driven by upsized gas lines, Category III condensing venting, and a dedicated electrical circuit
Energy use	No standby loss; condensing gas units reach UEF 0.90-0.97, about 20-30% less energy than a standard gas tank; federal tax credits and utility rebates frequently apply	Savings are real but modest in dollars - hot water in a Georgia home is typically a few hundred dollars a year of energy
Capacity / comfort	Endless hot water in duration: back-to-back showers, never a cold tank; wall-mount frees the closet or attic and removes the 40-gallon flood risk entirely	Flow-limited in volume: size the GPM to simultaneous fixtures or winter showers cool off; a lukewarm "sandwich" when the unit cycles; a moment of lag before hot arrives at distant faucets (same as a tank)
Service life / maintenance	20+ year design life; a second unit rarely needed in a long ownership	Annual descaling required in hard water (and Georgia has hard-water areas) - neglected descaling quietly kills the heat exchanger, voiding the warranty economics
Installation	None in advantage - see cost	Electric tankless is the trap version: whole-house units demand 120-150A of dedicated 240V circuits and usually force a panel/service upgrade; electric is only sensible for point-of-use or small units

THE COMFORT TRUTH BOTH SIDES SKIP

A tankless does not make hot water arrive at the faucet faster - the distance the water travels from the unit (tank or tankless) determines that. The tankless difference is that the hot water never runs out. Conversely, the tank difference is not just stored capacity - it is forgiving simplicity: no descaling, no flow sensor, no circuit board deciding whether your family gets a hot shower. Owners who pay the tankless premium and skip the annual descaling get the worst of both systems.

3. Sizing: the math that decides everything

The most common water-heater mistake in the field is not brand selection - it is sizing. Sizing a tank means matching tank volume and first-hour rating to peak household demand. Sizing a tankless means matching GPM output at winter

temperature rise, and winter is the binding case: a unit that satisfies the house in July will disappoint it in January.

The worked example Ducere uses with clients (Georgia, family of four, two baths): peak demand = two showers (about 2.0-2.5 GPM each) plus one sink (about 1.0 GPM) = roughly 5-6 GPM simultaneously. Georgia groundwater runs roughly 55-62°F in winter, so delivering 120°F water requires a temperature rise around 60°F. A tankless delivering 5+ GPM at that rise is a full-size condensing unit - about 199,000 BTU gas input - not a compact unit. The equivalent tank answer is a 50-gallon gas tank with a first-hour rating near 80-90 gallons, which covers the same morning peak by storing most of it. Both answers are correct for the same house: they just arrive there differently - one stores yesterday's capacity, the other manufactures it live, and the gas meter and vent have to be sized for the manufacturing version.

FIGURE 1 - 15-YEAR OWNERSHIP COST (ILLUSTRATIVE, FAMILY OF FOUR, GEORGIA GAS RATES)

Thousands of dollars. Assumptions listed under the figure in the brief.

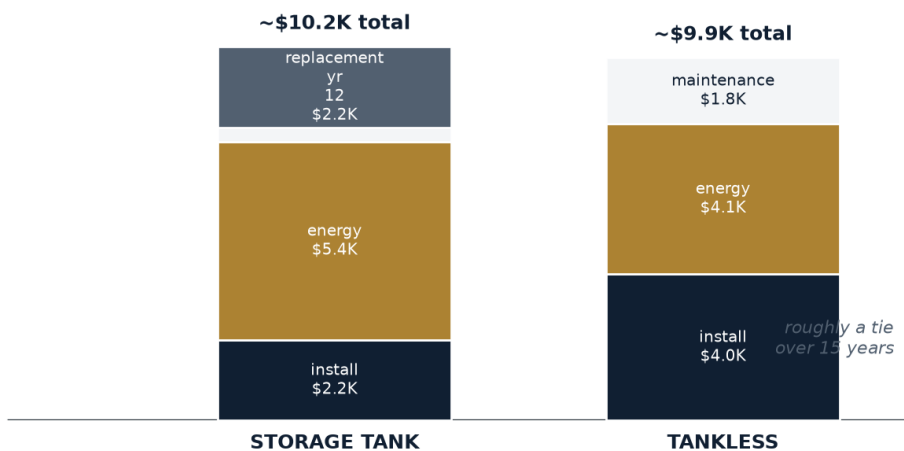


Figure 1 - Illustrative 15-year ownership cost for the worked-example household: gas tank at roughly \$10.2K (installation, energy at ~\$360/yr, maintenance, one replacement at year 12) vs. gas tankless at roughly \$9.9K (double installation, ~25% less energy, annual descaling). Assumptions: Georgia gas rates, family of four, identical 5 GPM peak demand served; energy costs dominate both totals, which is why the race is close. Illustrative only - actual costs vary with energy prices, water hardness, and usage.

4. The 15-year money race - and why it is a tie

Run the honest math and the dollars barely separate. The tankless pays roughly double up front, saves 20-30% of a few hundred dollars a year, needs paid descaling, and never needs replacement; the tank pays half as much up front, burns standby losses, and buys a second unit around year 12. Net: within a few hundred dollars of each other over 15 years in the illustrative case. The correct conclusion is not "tankless pays for itself" (it roughly does, slowly) or "the tank is cheaper" (it is, at first). It is this: over a normal ownership period the two systems cost about the same, so the decision should be made on comfort, space, risk profile, and maintenance discipline - the things the money cannot see.

5. The decision framework: matching the system to the house

5.1 Choose the tank when: the budget or the transaction is short-term (a flip or a rental turnover, where the tank's lower installed cost and universal familiarity win); maintenance is unlikely (nobody will descale annually); the household's peak demand is modest or staggered; or the electrical service and gas piping make a tankless install disproportionately expensive. The tank is also the right answer the day a failed unit must be replaced fast - parts and installers are everywhere, and a same-day swap restores service.

5.2 Choose the tankless when: the household consistently outruns a tank (large families, teen showers, guest suites); the family is staying long enough to collect the comfort and longevity benefits; the space it frees is worth real money (small urban homes, closet conversions); the owners will actually maintain it; or the home has no safe path to a bigger tank. Gas availability matters: a gas tankless is usually the sensible tankless path; whole-house electric tankless is rarely worth the electrical upgrade.

5.3 The third option neither camp mentions: the heat pump water heater. For an all-electric home with a suitable space (garage or basement with air volume and mild drain access), a heat pump unit (UEF 3.0+) beats both systems on energy by a wide margin and frequently qualifies for the strongest federal/utility incentives. It is slower to recover, slightly noisier, and cools the room around it - Georgia attics are a poor home for one. But an owner replacing a tank anyway should price the heat pump option before defaulting to the old argument. Ducere walks every client through all three paths; the answer is house-specific.

5.4 The investor / developer lens. For a rental or a resale flip, water heating is a durability-and-calls decision, not a marketing one: the tank's simplicity wins most rental math (fewer tenant maintenance calls, cheaper replacements, no descaling disputes), while the tankless is worth the premium where the buyer profile expects luxury features or the unit sits inside finished space with a tank flood risk. Appraisers do not add meaningful value for tankless; underwrite it as a comfort and durability upgrade, not a valuation play.

6. Code and installation: what Georgia requires either way

A water heater replacement is permitted plumbing work in Georgia, performed under a plumbing license (Ducere installs under GA RLQ RLQQA005251) and governed by the state-adopted code (the IRC with Georgia amendments) plus local jurisdiction rules. The non-negotiables Ducere checks on every install: a functioning temperature-and-pressure relief valve with proper discharge piping; a drain pan with discharge piping where a leak would damage construction (attic and interior closet installations); a thermal expansion tank where a check valve or pressure-reducing valve creates a closed system; correct combustion air and venting for gas units (condensing tankless units use their own venting category and terminations); correctly sized gas piping for the unit's BTU input; and a permit and inspection for the replacement. None of this is optional, and most of the horror stories traced to "handyman swaps" are missing exactly these items. Water quality is the maintenance variable: hard water shortens tank life (sediment) and tankless life (scale) alike - flush the tank every 6-12 months and descale the tankless annually, and both systems reward you with their rated lifespans.

7. Quick reference: frequently asked questions

QUESTION	ANSWER
Does a tankless give me instant hot water at the tap?	No - it gives you endless hot water. The water still travels the same distance from the heater to the faucet; a distant bathroom waits the same time either way. A recirculation loop solves the wait, and it can be added to either system.
Will a tankless run two showers at once?	A properly sized one, yes: about 5-6 GPM peak requires a full-size condensing gas unit (roughly 199,000 BTU). An undersized unit is the #1 tankless complaint - it is a sizing failure, not a technology failure.
Is a tankless worth it if I am selling soon?	Generally no. You will not recover the premium at appraisal; the value is realized by living with it - endless hot water, space, longevity - not by transferring it at closing.
Do tankless water heaters work in a power outage?	Gas tankless units need electricity for ignition and controls - no power, no hot water. An older standing-pilot gas tank is the unit that shrugs at outages; a battery-backup tankless mitigates it.

QUESTION	ANSWER
How long does each one actually last?	Storage tanks: 10-15 years (hard water shortens this). Tankless: 20+ years - but only with annual descaling; a scaled heat exchanger dies early and often out of warranty. Maintenance discipline, not the spec sheet, decides.
Which is cheaper over time?	Roughly a tie over 15 years in the illustrative Georgia case (Figure 1) - the tankless' higher install and maintenance roughly offset by energy savings and no replacement. Decide on comfort, space, and risk, not dollars.
What about heat pump water heaters?	For the right house - all-electric with a suitable garage or basement space - they beat both systems on energy (UEF 3.0+) and often carry the biggest incentives. Price one before defaulting to the tank-vs-tankless argument.
What does Ducere recommend?	Neither, as a default. We size the actual household demand, check gas service, venting, electrical capacity, and water hardness, and recommend the system the house and its owners can live with - then permit and install it to code. The wrong water heater is not a tank or a tankless; it is the one that does not fit how the house is actually used.

References: U.S. DOE Uniform Energy Factor (UEF) test procedure and water-heater efficiency ranges; ENERGY STAR water heater specifications; International Residential Code as adopted with Georgia amendments (water heater, T&P; relief, pan, combustion air, and venting provisions); Georgia licensing law for plumbing work (O.C.G.A. Ch. 43-14); typical installed-cost ranges from published national contractor cost surveys; Ducere field installation experience. All cost and energy figures are illustrative planning ranges and vary by jurisdiction, energy prices, water hardness, and household usage. Informational only - not a substitute for a site-specific evaluation, sizing calculation, and permitted installation by a licensed contractor.