Community Bill Reducer: $10M for the homes nearest the Wythe County campus, and what it costs Fluidstack under each credit rule

A case study and program proposal. Omer Bese, November 2026.

It uses public information only. Fluidstack and Appalachian Power have not seen or agreed to it. Every number comes from a model published at wattshed.co/case-study/wythe-county, with every input on its assumptions page. My earlier case study, a $10M program in Mitchell County, Texas, is at wattshed.co/case-study/mitchell-county.

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The brief

Recommendation

- Fluidstack should create the Community Bill Reducer: free upgrades and a battery in the homes nearest its Progress Park campus, paid for by Fluidstack, counted as capacity reduction credits under Va. Code 56-596.7. Commit $10M, as it did for Colorado City's water.
- Open it to every home within 5 miles. Pay for an upgrade when it costs less than $3,000 per verified kW in that home, and put a 13.5 kWh battery in every program home.
- Fund Phase 1 now: the 367 homes within 3 miles, $5.7M installed ($4.4M after the battery tax credit), so there is a measured winter before the Commission's final order in November 2027.
- Ask Appalachian Power, by 1 December 2026, for three terms in its 15 January filing: battery exports count over the 3-hour window (with the exported kWh credited to the household at the on-peak rate), every verified kW counts, and the credit applies below the 80% billing floor.
- Hold Phase 2 until the final order sets the credit, and size its batteries to the export rule it sets.

With the battery measured to zero the $10M costs Fluidstack $5.6M; if battery exports count, $5.1M; if no credit is ever granted, $8.5M. Spent on bigger batteries in fewer homes instead (40.5 kWh in 362 homes, exports counted), it costs $3.7M.

Wythe County is split over data centers (section 1). Fluidstack is building a campus of about 210 MW on Lot 35 of Progress Park. On 27 October 2026 it told the board it "is interested in discussing opportunities to support the broader community as the project develops." A 2026 Virginia law lets a customer its size fund measured, verified peak cuts in its neighbors' homes and count them. Appalachian Power files its program by 15 January 2027.

The 2027 rules are not set, so I make three assumptions. First, credits are one for one: a verified kW off a home's winter peak counts as one kW off the campus's demand charge, $120 per kW-year, with the campus running at full capacity. Second, the battery is credited two ways. "Measured to zero", the base case, credits it only for the home's own load, averaged over the 3-hour peak window. "Exports count" also credits what it sends to the grid over the same window; the filing should ask for this. Third, upkeep, $150 a home a year, is part of the cost.

	Phase 1: 367 homes within 3 mi	**$10M, battery measured to zero: 642 homes**	**$10M, 40.5 kWh batteries exporting: 362 homes**
Installed cost	$5.7M	$10M	$10M
Battery tax credit, if it applies	$1.3M	$2.3M	$2.6M
Winter peak cut	1.58 MW	2.76 MW	4.59 MW
Credits a year at $120 per kW	$189K	$331K	$550K
Net cost to Fluidstack over 14 years, with upkeep	$3.2M	$5.6M	$3.7M
Households' bills lowered a year	$218K	$382K	$240K

For this paper I built the model behind every number, the homeowner app and the sponsor console (section 5). I also read the county minutes, the tariff and the statute that the paper rests on.

1. Why

The opposition in Wythe is organized. At the Board of Supervisors meeting on 9 June 2026, six residents spoke against data centers during citizens' time. One asked, "what about the massive electric demand?" She reported a petition with more than 1,300 verified signatures in five days and a local Facebook group of more than 800 members. The county's draft zoning confines data centers to Progress Park; the board votes on 8 December 2026.

On 27 October Fluidstack told the board that it "will pay for all its electricity, energy infrastructure, and necessary upgrades to the nearby substation," and that it "is interested in discussing opportunities to support the broader community as the project develops."

A rebate program does not answer the question about electric demand. A visible program in the nearest homes can. Fluidstack pays for a heat pump and insulation that the household keeps,

and a battery that gives it backup power. The answer then shows on the household's own bill, and every kW is metered.

Polling supports this. In September 2026, 76% of Virginia voters supported a requirement that data center developers pay for improvements that lower nearby residents' bills. A GoodPower survey for Rewiring America found that an offer of a community benefit agreement with home upgrades raised support among data center opponents by as much as 14 points.

Two state actions make this the right time. Va. Code 56-596.7, passed in 2026, lets a customer of this size meet its share of a new demand flexibility standard by funding "capacity reduction credits from other retail electric service customers," including "conversions from electric resistance heat to electric heat pumps," weatherization and customer-sited storage, "provided that such efforts produce measured and verifiable results." Appalachian Power files its program by 15 January 2027, and the Commission rules by 30 November 2027 (Appendix E). Governor Spanberger's Executive Order 22 (September 2026) creates the VA-LEAD program, which will weigh local community benefits when it evaluates new data centers.

Fluidstack has made this kind of commitment before. With Cipher and Anthropic, it committed $10M to the water system of Colorado City, next to the Barber Lake campus in Mitchell County, Texas. My earlier case study asked what the same $10M would do as home upgrades. In Wythe, the program can be the commitment, and it can also earn credits under state law.

2. What: the Community Bill Reducer

A program company Fluidstack owns (Appendix I) pays for upgrades and a battery in the homes nearest the campus. Installers from Appalachian Power's participating contractor list put them in at fixed prices. Households pay nothing.

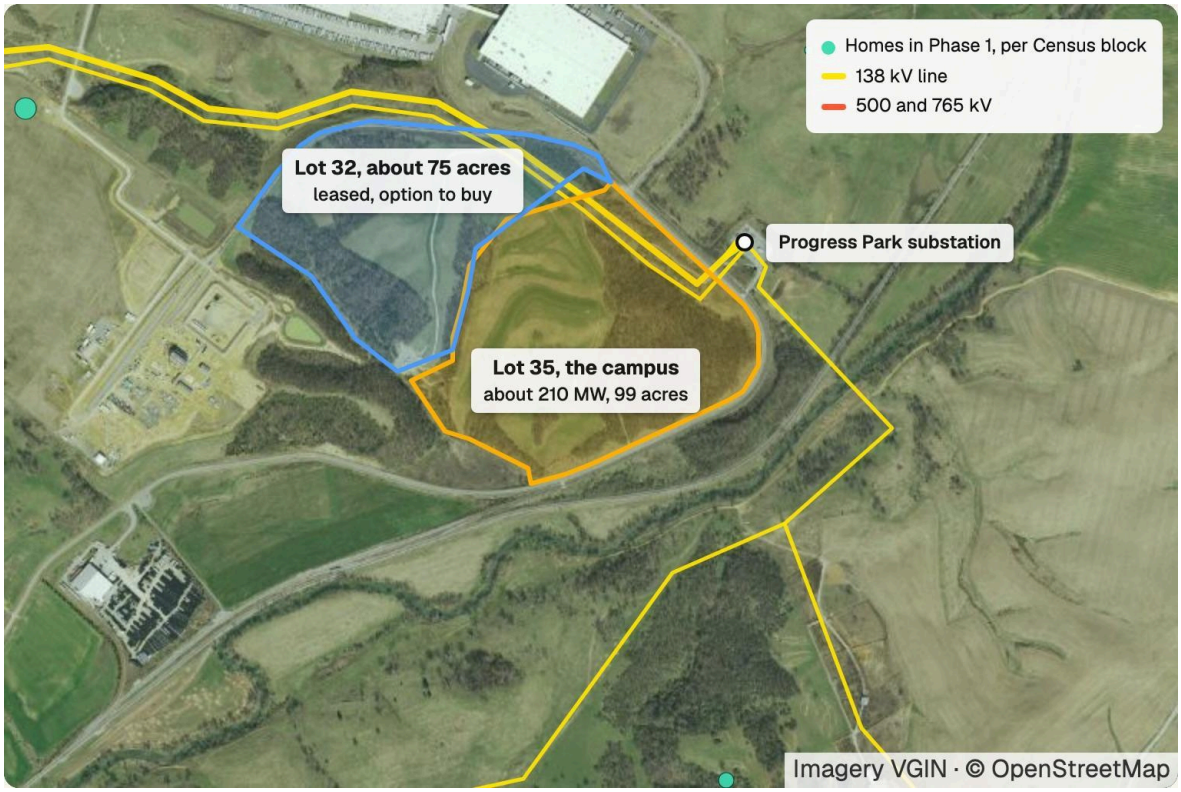


Figure 1. Progress Park on state imagery (VGIN). Lot 35 (orange, 98.8 acres, parcel 42-41D) is the campus. Lot 32 (blue, about 75 acres, the main body of parcel 42-41) adjoins it to the north-west. Appalachian Power's Progress Park 138 kV substation sits east across Kents Lane, and 138 kV lines (yellow) run along both lots.

Who is eligible, and what each home gets

The program is open to every home within 5 miles of the campus, closest first. What a home gets is decided on its own numbers, by one rule the sponsor sets: pay for an upgrade when it costs less than $3,000 per verified kW off that home's winter peak. The upgrades are tested in the order attic insulation, heat pump, smart thermostat, each counted on top of the ones already in.

- A home on electric resistance heat gets a cold-climate heat pump ($2,892 per kW in a 1970s ranch), attic insulation where it has a reachable attic, and a smart thermostat.
- A home with a working heat pump keeps it. Replacing a 20-year-old unit costs about $7,000 per kW at the peak, a newer one about $12,300. It gets the thermostat, and the attic where that passes.
- A home heated by gas, oil, propane or wood draws no electric heat at the peak, so its upgrades cut no kW. It gets none.

The battery is decided apart: every program home gets 13.5 kWh, for backup, the bill and dispatch. Measured to zero it costs about $5,000 per kW before the tax credit, more than the

cap, and it stays in because the program can call on it and it keeps the household's lights on in an outage.

One average program home

	The average program home (battery measured to zero)
Gets	A 13.5 kWh battery; a smart thermostat in 73% of homes (every home heated with electricity), attic insulation in 37%, a cold-climate heat pump in 24% (the homes on resistance heat)
Takes off the winter peak	4.3 kW: 1.9 from the upgrades, 2.4 from the battery
Saves its household	$595 a year, its bill from $2,270 to $1,675
Costs Fluidstack	$15,557 installed, $11,957 after the battery tax credit, plus $150 a year of upkeep

The homes

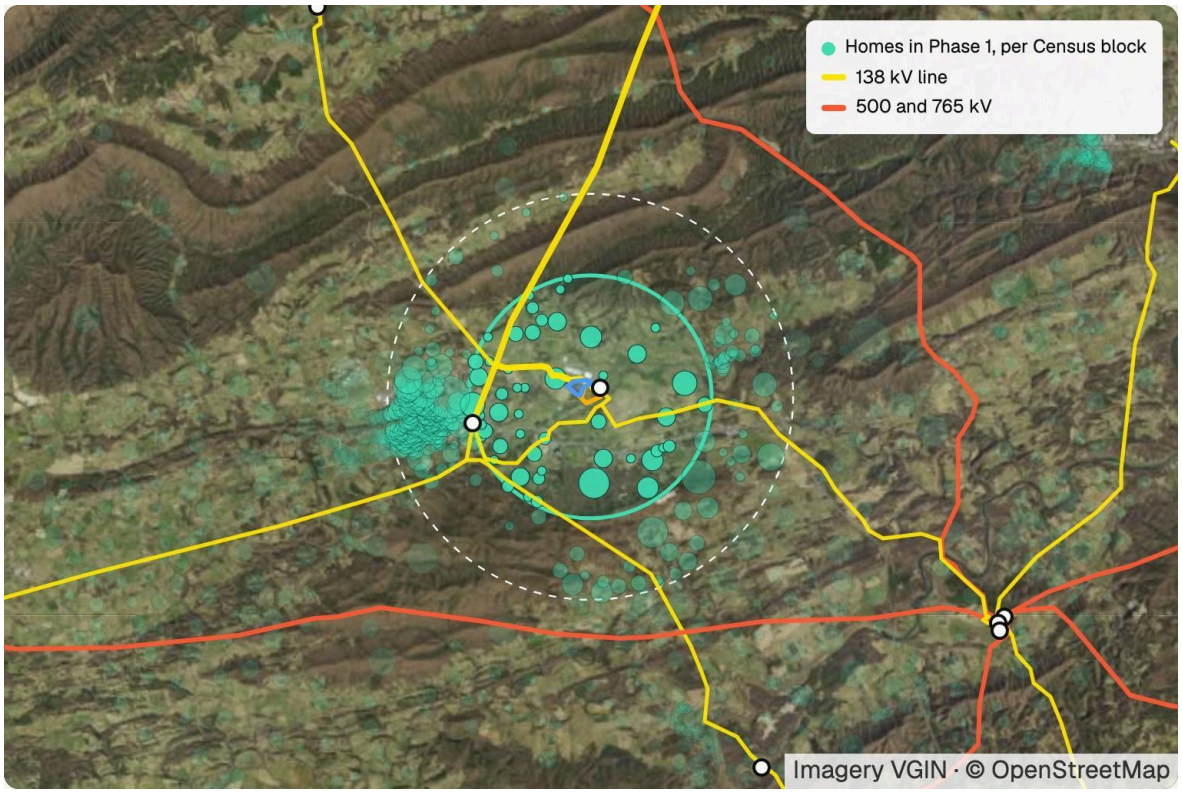


Figure 2. The two phases. Each dot is a 2020 Census block sized by its housing units. Phase 1 is the solid 3-mile circle around the campus; Phase 2 is the ring out to the dashed 5-mile circle. The dense cluster at the west edge is the town of Wytheville. White markers are substations; yellow lines are 138 kV, red 500 and 765 kV (Jacksons Ferry, south-east).

Radius from the campus	**Housing units (2020 Census blocks)**
1 mile	56
3 miles	734
5 miles	4,744
10 miles	10,268
Wythe County	13,990

With half of the homes signing up, Phase 1 has 734 × 50% = 367 homes and Phase 2 has (4,744 − 734) × 50% = 2,005. The budget reaches the closest first.

I checked who lives within 3 miles in three ways:

- Census ACS 2020 to 2024, the four block groups that touch the circle: about 20% manufactured homes, about half built before 1980, mostly three bedrooms, about 28% rented, about 73% heated by electricity, median household income about $60,000 in the core and $36,000 in the most rented area.
- Virginia's statewide building footprints: 886 addressed buildings, a median roof area of 1,567 square feet, 11% with the long, narrow shape of a single-wide.
- A Street View sample of ten random addresses: one-storey ranches, a single-wide, a double-wide style home, and two businesses that slipped into the footprint set.

The model uses three kinds of home and four kinds of heating:

Kind	**Share**	**Size**	**Envelope today**	**Heat loss (kW per °F)**
1970s ranch	50%	1,500 sq ft	R-11 attic, R-7 walls	0.157
1990s home	32%	1,500 sq ft	R-19 attic, R-11 walls	0.127
Manufactured home	18%	1,000 sq ft	R-11 roof cavity, 2x4 walls, leaky	0.120

Heating today	**Share of homes**	**Basis**
Electric resistance (baseboard or electric furnace)	24.3%	Electricity heats 73% of homes near the site (ACS); about a third of those have no heat pump (RECS 2020)
Heat pump older than 15 years	24.3%	Half the heat pumps assumed older than 15 years; HSPF2 6.5 when new

Heating today	Share of homes	Basis
Heat pump 15 years old or newer	24.3%	HSPF2 7.5, the 2023 federal minimum
Gas, oil, propane or wood	27.0%	The rest (county-wide: fuel oil 10.1%, gas 8.4%, wood 7.6%, propane 4.9%)

The manufactured home gets no attic job, and its heat pump uses the ducts under the floor. The engine has no manufactured-home type, so I assumed that envelope.

3. What it costs under each way to spend it

In September Fluidstack, Cipher and Anthropic committed $10M to Colorado City's water system. Upgrades in the homes near a campus can be the next step after a commitment like that. Here $10M buys capacity credits off the demand charge for 14 years. The table shows the net cost of the $10M under each way to spend it: the installed cost, less the 30% battery tax credit, plus upkeep at $150 a home a year and the make-whole payment, less the credits, all over 14 years at 7% in today's dollars.

What Fluidstack spends $10M on	Credit rule	Homes	MW credited	Off the demand charge a year	Over 14 years, today's $	Battery tax credit	Net cost	Each household a year (upgrades, battery)	All households a year
Upgrades plus a 13.5 kWh battery	No credit	642	0.00	$0	$0	$2.3M	$8.5M	$595 ($562, $33)	$382K
Upgrades only	Every verified kW	1,732	4.44	$532K	$4.7M	none	$6.1M	$769 ($769, $0)	$1.3M
Upgrades plus a 13.5 kWh battery	Battery measured to zero	642	2.76	$331K	$2.9M	$2.3M	$5.6M	$595 ($562, $33)	$382K
Upgrades plus a 13.5 kWh battery	Exports count	642	3.51	$421K	$3.7M	$2.3M	$5.1M	$595 ($562, $33: a $103 export credit and a $49 make-whole from the	$382K

What Fluidstack spends $10M on	Credit rule	Homes	MW credited	Off the demand charge a year	Over 14 years, today's $	Battery tax credit	Net cost	Each household a year (upgrades, battery)	All households a year
								program, less $120 of recharging on peak)	
Upgrades plus 27 kWh	Exports count	463	4.20	$504K	$4.4M	$2.5M	$4.2M	$661 ($562, $100: a $297 export credit and a $138 make-whole, less $335 of recharging on peak)	$306K
Upgrades plus 40.5 kWh	Exports count	362	4.59	$550K	$4.8M	$2.6M	$3.7M	$664 ($562, $103: a $492 export credit and a $206 make-whole, less $595 of recharging on peak)	$240K
27 kWh batteries only	Exports count	555	4.00	$480K	$4.2M	$3M	$4.0M	$90 ($0, $90: a $227 export credit and a $104 make-whole, less $241 of recharging on peak)	$50K

The no-credit row returns community support, and whatever the Commission attaches to the standard, which the law says may include faster interconnection. Upgrades alone run out of homes before money: the electric-heated homes that sign up within 5 miles cost $8.4M, so that row spends $8.4M, not $10M. In the export rows the program pays each household the make-whole (in the household column), so its battery is worth at least what it would be measured to zero: no household does worse by letting the program export.

Two breakeven lines follow from the model, and both are asks for the filing comments:

- At $212 per kW-year, the "Upgrades plus 40.5 kWh" row pays for itself. The demand charge is $120.

- Batteries alone pay for themselves at about $7,600 installed for 27 kWh, against $18,000 at the bulk price assumed here.

What the table shows. Bigger batteries buy more credited kW per dollar once exports count: the 40.5 kWh row cuts the most peak (4.59 MW) for the lowest net cost ($3.7M), in fewer homes. Measured to zero, a battery can only cover the home's own load, so a bigger one adds little. The upgrades are what lower bills: the upgrades-only row puts $1.3M a year in households' pockets, against $240K to $382K for the battery rows, which reach fewer homes. The battery itself moves a household's bill very little (section 6, Appendix F).

The credit's value. A credit at the demand charge is worth $9.96 × 12 = $119.52 per kW-year. This is close to PJM's 2027/28 capacity price of $333.44 per MW-day (set at the cap in December 2025), which is about $122 per kW-year. The credit is paid for all 12 months although the kW exists only in the December to February windows. That is how capacity is priced: PJM's obligation is annual, and PJM puts about 85% of its loss-of-load risk in winter from 2027, so a kW off the winter peak is worth about the annual price. Over 14 years at 7%, $1 a year is worth $8.75 today, so each credited kW returns about $1,049.

Why homes, and not one battery at the substation

An energy team will first ask whether Fluidstack can buy the same kW for less. It can. NREL puts a utility-scale four-hour battery at about $330 per kWh in 2024 dollars, or about $1,320 per kW, and about $924 after the same 30% credit the program's batteries take.

Option	**Cost per kW of winter peak, net of the battery tax credit**	**What else it delivers**
Utility-scale four-hour battery at the substation (NREL, 2025)	about $924	Nothing on household bills; a new fenced site in the county
This program, 13.5 kWh measured to zero	$2,786 ($3,092 with 14 years of upkeep)	$382K a year off 642 households' bills
This program, 40.5 kWh exporting	$1,607 ($1,852 with upkeep and make-whole)	$240K a year off 362 households' bills
Curtailing the campus on winter mornings	The value of the compute lost	Nothing for the community

Homes cost about two to three times as much per kW. Three reasons still make them the right choice. First, the statute's route is funding reductions from "other retail electric service customers." A battery that Fluidstack owns at the substation would count, if at all, as the campus's own resource. Second, the households keep lower bills, which a substation battery does not give them. Third, the question in Wythe is whether the county will support the next development, and a fenced battery yard does not answer it.

4. What it unlocks

Three terms in Appalachian Power's filing move the net cost most. Fluidstack can ask for them in comments on the filing (Appendix B):

1. Exports count. A battery is credited for what it sends to the grid over the 3-hour window, and the household is credited for those kWh at the on-peak rate (14.306 cents). That is the difference between the measured-to-zero row and the export rows: $5.6M against $5.1M for the same homes.
2. Every verified kW counts. Insulation and heat pumps lower the peak every winter day but cannot be called. Dominion's working group has proposed counting only dispatchable capacity; then the measured-to-zero row costs $6.5M. The statute lists weatherization, efficiency and heat pump conversions by name, and PJM no longer accepts energy efficiency as a capacity resource from 2026/27, so a 56-596.7 credit for efficiency does not sell again something already sold into PJM.
3. The credit applies below the floor. The table assumes the campus runs at full capacity. Appalachian Power bills new large loads on at least 80% of contract capacity, used or not (Appendix D); below that, a kW saved next door counts only if the filing makes it a bill credit.

Beyond the bill:

- Lot 32. Fluidstack's development company leased Lot 32 and the inland port, with a six-month option to buy that closes around February to March 2027. A measured record of verified kW from the homes nearest the campus is the community case for whatever comes next on it.
- The standard. The Commission will set a demand flexibility standard that Appalachian Power meets "working with its high energy demand customers." A campus that buys credits contributes without changing its own load. If the standard later binds loads that began service after 1 July 2026, credits already on the registry protect the campus from a request to curtail.
- Appalachian Power's virtual power plant pilot. Va. Code 56-585.1:17 requires Appalachian Power to petition by 1 July 2027 for a pilot of up to 150 MW of distributed resources, at least 5 MW of it residential batteries. The program claims its batteries under 56-596.7 and joins the pilot only if the registry shows which kW count where.
- The same program in New York. The program design, contracts and verification method carry over; there, the obligation to fund it would fall on the site owner. New York's

legislature passed S10642 in June 2026, which would require large data centers to fund host community programs, including heat pumps and batteries in homes; Executive Order 62 (14 July) paused approvals while Empire State Development writes a Community Investment Framework. New Jersey's Data Center Fair Share Act (7 July 2026) creates a voluntary demand-reduction trade program on the same model.

5. The software

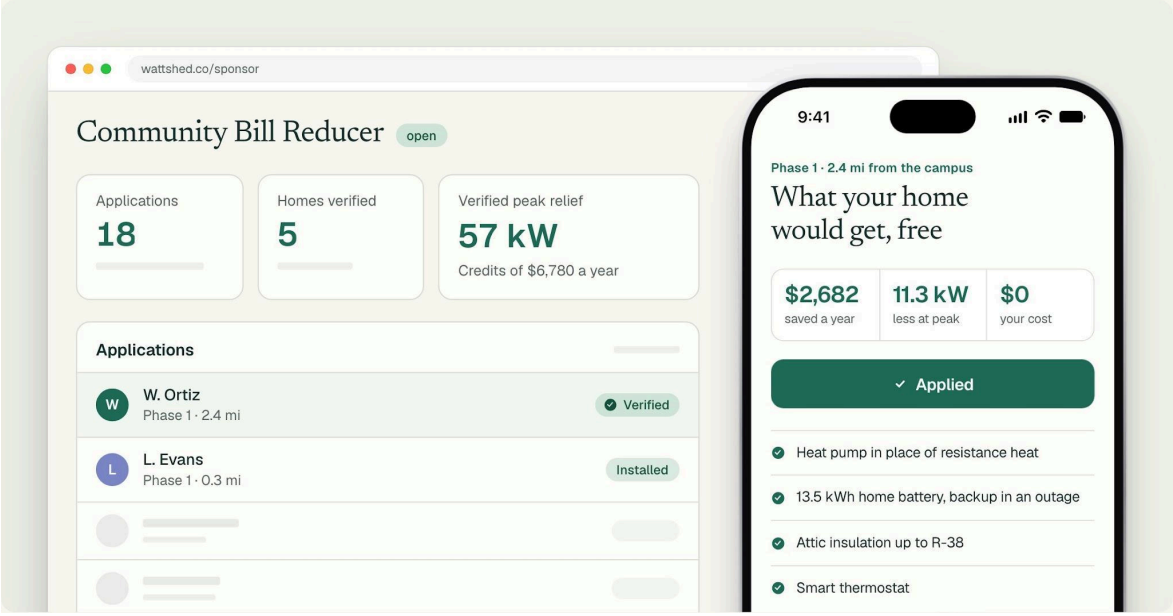


Figure 5. The sponsor console and the homeowner app, as built.

I built the two apps the program runs on, so Fluidstack's energy team can run the program in-house without a vendor.

Create your own program (wattshed.co/wythe-county/program/new) sets the area, the cap per kW, the upgrades and their prices, the battery and the credit terms, each with my suggestion beside it, and gives the money table for those choices. Create turns the program into a signed link: nothing is stored, and the link opens the program in the sponsor console with sample households.

The homeowner app (wattshed.co/wythe-county/enroll) takes an address and places the home in its phase. It asks the home's size, the year it was built and the year the attic was last insulated, from which it assumes the attic's R-value by the codes homes here were built to; the contractor checks it on site. A vision model reads the heating equipment's nameplate from a photo (fuel, equipment, age, rated efficiency); when the photo cannot be read, the app asks three plain questions. The home's upgrades are the program's cap applied to that home, on the same winter peak model as this paper, and its saving is its bill on the cheapest residential schedule. Nothing is stored, and the photo is dropped once read.

The sponsor console (demo at wattshed.co/wythe-county/sponsor-demo) is the program company's side. It shows phases, budget, the package and the fixed-price contractors. It tracks every home from review through install, verification and payout, and adds up verified kW and credits as homes finish.

6. Design decisions

- The credit is an ask, not a claimed saving. The law never mentions the campus's demand charge, so counting a verified kW against it is the first term to request in the filing.
- Every home near the campus is eligible, and each home gets the upgrades that cost less than $3,000 per kW in it. A heat pump replaces resistance heat; a working heat pump, even an old one, stays, because replacing it costs $7,000 to $12,300 per kW.
- Batteries are sized by capacity (13.5, 27 or 40.5 kWh) and credited over the 3-hour window. Measured at the meter, a battery covers only the home's own load, so the base case credits that; exports are the filing's ask.
- The bill is computed hour by hour on all four of Appalachian Power's residential schedules, and the cheapest is chosen. Most homes are already cheapest on the smart demand schedule, so the battery saves $33 a year.
- Exported kWh belong to the household, credited at the on-peak rate if the filing grants it. In any year the battery would cost a household money, the program pays the difference.
- The engine runs on the Marion-Wytheville airport's weather, hour by hour through the typical year.
- The footprints and the Census put the typical home near the campus at 1,500 square feet, and one in five is a manufactured home, so the program averages three kinds of home and four kinds of heating.
- The engine keeps the thermostat's energy saving separate from the heat pump's peak credit, counts it on its own, and takes the heat pump's winter peak hour by hour on the coldest days.
- Upkeep, at $150 a home a year, is part of the cost.

Appendix A. Calculation sheet

A1. The campus bill at 210 MW

- Demand: 210,000 kW × $9.96 × 12 = $25,099,200 a year.
- Floor: 80% × $25,099,200 = $20,079,360 a year.
- Energy: 210 MW × 8,760 h × 0.85 = 1,563,660 MWh; × (0.386 + 3.133) cents = $35.19 per MWh; = $55.0M a year.
- Total: about $80.1M before riders and taxes.

A2. The pool

- Phase 1: 734 units × 50% sign-up = 367. Phase 2: (4,744 − 734) × 50% = 2,005.

- With a battery in every program home, every home is served. Without one, gas, oil, propane and wood homes (27%) get nothing: 4,744 × 50% × 73% = 1,732 homes.

A3. One home at the window's average, 15.35°F (1970s ranch on resistance heat)

- Load today: 0.15708 × (70 − 15.35) − 0.8176 = 7.77 kW.
- Attic: after it, 0.1281 × 54.65 − 0.8176 = 6.18 kW. Attic: 1.58 kW, $2,475, $1,563 per kW (under the cap).
- Heat pump COP: 2.0 + (15.35 − 5) ÷ 12 × 0.6 = 2.52. Draw: 6.18 ÷ 2.52 = 2.45 kW. Heat pump: 3.73 kW at the mean, 3.63 kW averaged hour by hour; $10,500, $2,892 per kW (under the cap).
- Thermostat: 25% × 2.45 = 0.61 kW at the mean, 0.64 hour by hour; $225, $353 per kW.
- Battery: 13.5 kWh × 0.8 = 10.8 kWh a window, at most 3.6 kW over three hours and no more than the home draws. Hour by hour, 2.70 kW measured to zero. With exports: 10.8 ÷ 3 = 3.6 kW; 27 kWh gives 7.2 kW and 40.5 kWh 10.8 kW, under the 11.5 kW inverter.
- Home: 1.58 + 3.63 + 0.64 + 2.70 = 8.55 kW measured to zero.

A4. Cost of one home

- Attic: 1,500 sq ft × $1.65 = $2,475. Heat pump: half ducted, half ductless for baseboard homes: (9,000 + 12,000) ÷ 2 = $10,500. Thermostat: $225.
- Battery: $12,000 for the first 13.5 kWh, $6,000 for each further 13.5 kWh: $12,000, $18,000 or $24,000; less 30% for the tax credit.
- 1970s ranch on resistance heat: $25,200 installed, $21,600 after the credit. The average program home: $3,557 of upgrades plus $12,000 of battery = $15,557 installed, $11,957 after the credit.

A5. The budget, battery measured to zero

- $10M ÷ $15,557 = 642 homes: all 367 in Phase 1 ($5.7M) and 275 of 2,005 in Phase 2 ($4.3M).

A6. Credits and the net cost, battery measured to zero

- Credit value: $9.96 × 12 = $119.52 per kW-year; the model uses $120. PJM check: $333.44 per MW-day × 365 ÷ 1,000 = $121.70 per kW-year.
- Program: 642 homes × 4.29 kW = 2,755 kW. Credits: 2,755 kW × $120 = $331,000 a year. 14 years at 7%: (1 − 1.07^−14) ÷ 0.07 = 8.745; × $330,655 = $2.89M.
- Cost: $9.99M installed − $2.31M tax credit + $0.84M upkeep (A9) = $8.52M. Net cost: $8.52M − $2.89M = $5.63M.
- With exports over the window: 3,512 kW, $421,000 a year, $3.69M over the term; net cost $5.11M with the make-whole (A9). With 40.5 kWh exporting: 362 homes, 4,587 kW, $550,000 a year, $4.81M; net cost $3.68M.

A7. Route B, credit purchase (battery measured to zero)

- $7.68M ÷ 8.745 = $878,000 a year, plus $96,300 of upkeep = $974,000; ÷ 2,755 kW = $354 per kW-year ($286 with exports over the window, $212 with 40.5 kWh exporting, make-whole included).
- Less the $120 bill credit: $234 per kW-year net, $643,000 a year ($166 and $584,000 with exports; $92 and $421,000 with 40.5 kWh).

A8. The household's bill (1970s ranch on resistance heat)

- The home's year is built hour by hour on the typical year and priced on all four residential schedules, with the same 8.517 cents of fuel factor and riders on every kWh (Appendix F).
- Today, cheapest on R.S.-S.D. (smart demand): $3,948 a year.
- With the upgrades: $2,161 less. With the battery, cheapest on R.S.-T.O.D. (time of day): $1,755, $32 less again. Total: $2,193 a year.
- The average program home: $2,270 today, $1,675 after, $595 a year. With 13.5 kWh exporting, the battery's bill effect (−$119.79) and the export credit ($103.15) leave that household $16.64 a year short of zero. Its floor is what the same battery saves it measured to zero, $32.84, so the program pays the make-whole, about $49 a year (A9), and the household keeps $595, as it would measured to zero.

A9. Upkeep and make-whole

- Upkeep: 642 homes × $150 = $96,300 a year; × 8.745 = $842,000 in today's money.
- Make-whole: the household's floor is what the same battery would save it measured to zero, so no household does worse by letting the program export. Measured to zero nothing is owed. With 13.5 kWh exporting, $49 a home a year: 642 × $49.47 = $31,800 a year ($278,000 over the term); with 40.5 kWh, $206 a home, $74,500 a year ($652,000).

Appendix B. Illustrative asks for Appalachian Power's 15 January 2027 filing

There is no form for this step. The statute puts the filing on the utility. So the way in before 15 January is a written submission that asks Appalachian Power to include these provisions in its petition, and comments on the filing once the Commission opens the case. The list below shows what Fluidstack could ask for. It is not a draft in Fluidstack's name.

Subdivision B 2 of 56-596.7 asks the petition to analyze methods by which high energy demand customers may take part "without directly curtailing their own electricity use, such as by funding, supporting, or purchasing capacity reduction credits from other retail electric service customers." The asks:

1. A third-party pathway. High energy demand customers may fund or buy capacity reduction credits from a third-party provider that delivers weatherization, efficiency

upgrades, conversions from resistance heat to heat pumps, smart thermostats and customer-sited storage in other customers' homes, as the statute lists.

2. A bill credit that applies below the minimum billing demand. Each verified kW-year is credited against the customer's bill at the Schedule L.P.S. demand rate ($9.96 per kW-month today), including when billing demand is set by the 80% minimum in the large-load terms of case PUR-2025-00057. Without this, a credit earned off the customer's meter has no value to it.
3. Every measured kW counts. Efficiency and heat pump conversions count alongside dispatchable resources, each on its measured reduction in the peak periods the Commission identifies.
4. A winter peak definition. Peak periods that include winter mornings and evenings on the coldest days, with battery credit averaged over the peak period.
5. Battery exports count. A battery gets credit for its measured output in the peak period, including what it sends to the grid beyond the home's own load, and the household is credited for the exported kWh at the on-peak rate (14.306 cents on R.S.-T.O.D.). Export terms cover batteries not paired with solar.
6. Measurement and verification. Hourly meter data against a weather-normalized baseline for efficiency and heat pumps; device telemetry checked against the meter, exports included, for batteries.
7. One registry. A registry shared with your energy efficiency programs and your virtual power plant pilot under 56-585.1:17, so that no kW is claimed twice. A home that took a rebate for a measure is not credited for that measure.
8. The separate standard. For customers beginning service after 1 July 2026, credits bought this way count toward the demand flexibility standard the Commission sets.
9. A localized pilot. Approval of a pilot in about 367 homes within 3 miles of Progress Park in winter 2027-28, as a localized solution under subdivision B 2 (iv).

Two prices also matter, and the model computes both: the credit at which the program pays for itself ($212 per kW-year for 40.5 kWh exporting), and the installed battery price at which batteries alone do (about $7,600 for 27 kWh).

What Fluidstack could offer: the model behind this paper, with every input open; the program design, contracts and verification method in Appendices I and K; and a meeting with Appalachian Power's regulatory team before it files.

Appendix C. Credit rules and sensitivity

The first table changes the credit rule on the base case (642 homes, 13.5 kWh measured to zero). These rules are not investment choices, so they stay off the main table.

Credit rule	MW credited	Credit a year	Net cost
Every verified kW, one for one (the base case)	2.76	$331K	$5.6M
Only dispatchable kW (battery and preheat)	1.93	$231K	$6.5M
Credit for the winter months only ($29.88 a kW-year)	2.76	$82K	$7.8M
Half price ($60 a kW-year)	2.76	$165K	$7.1M
No credit	0.00	$0	$8.5M

The second table changes one input at a time on the base case and keeps the $10M budget. Cost per kW includes 14 years of upkeep.

Change	Homes	MW	Net cost	Cost per kW, with upkeep	Each household a year
Default	642	2.76	$5.6M	$3,092	$595
Exports count, not credited to the household (program makes it whole)	642	3.51	$5.7M	$2,670	$595

Change	Homes	MW	Net cost	Cost per kW, with upkeep	Each household a year
Battery at Wythe retail, $17,550	473	2.03	$6.0M	$3,997	$595
Heat pumps 30% dearer	765	2.96	$5.1M	$2,789	$263
Every baseboard home needs ductless	742	2.92	$5.2M	$2,843	$322
Heat pump only meets the NEEP floor (COP 1.75 at 5°F)	742	2.92	$5.2M	$2,844	$319
No preheat	649	2.59	$5.8M	$3,290	$529
Cap $2,000 per kW	802	3.02	$5.0M	$2,706	$198
Cap $5,000 per kW	634	2.72	$5.7M	$3,136	$601
Cap $8,000 per kW (old heat pumps replaced)	545	2.38	$6.2M	$3,672	$697
Electric heat at the county-wide 66.4%	656	2.61	$5.8M	$3,257	$544

Change	Homes	MW	Net cost	Cost per kW, with upkeep	Each household a year
Discount rate 5%	642	2.76	$5.4M	$3,132	$595
Sign-up 30% instead of 50%	642	2.76	$5.6M	$3,092	$595
90% of housing units occupied	642	2.76	$5.6M	$3,092	$595
Upkeep $300 a home a year	642	2.76	$6.5M	$3,397	$595
No battery tax credit	642	2.76	$7.9M	$3,930	$595

What the tables show:

The cap and the heat pump price trade homes against bills. The resistance-heat heat pump sits just under the $3,000 cap ($2,892 per kW in the ranch). If heat pumps cost 30% more, or perform only at the NEEP floor, or the cap is $2,000, the heat pump falls out: the money reaches more homes and cheaper kW, and each household saves a third as much. Raising the cap to $8,000 replaces old heat pumps: fewer homes, more saving each, a higher cost per kW. $3,000 is the cap at which every resistance home gets its heat pump.

The credit rule moves the net cost more than any engineering input. Only dispatchable kW costs $0.9M more over the term; winter-months-only credit costs $2.2M more.

Sign-up and occupancy change who is reached, not the cost per kW: the budget runs out before the pool does.

Appendix D. The bill the campus owes anyway

The campus takes power at transmission voltage under Appalachian Power's Schedule L.P.S. (Tariff 28, November 2026 update):

- Demand charge: $9.96 per kW-month.
- Energy charge: 0.386 cents per kWh, plus the fuel factor of 3.133 cents (Rider F.F.R.).

The Commission set the terms for new large loads in case PUR-2025-00057 on 1 June 2026. The terms apply to new load or expansions of 100 MW or more after 1 July 2025:

- A 14-year contract, including a ramp of up to four years.
- Billing demand never falls below 80% of the greater of contract capacity or the prior 11 months' high.
- A minimum charge that also includes 60% of contract capacity times hours times the base energy rate.
- 42 months' notice and an exit fee to reduce capacity.

At 210 MW	**A year**
Demand charge at full contract capacity	$25.1M
Of which owed at the 80% floor whatever the campus draws	$20.1M
Energy at an assumed 85% load factor (1,563,660 MWh)	$55.0M
Total before riders and taxes	about $80M

The money table assumes the campus runs at full capacity, so each credited kW comes off the demand charge one for one. Below 80% the bill does not change with what the campus draws, and a credit earned in another customer's home has no physical path to this meter. Its value is what the Commission says it is: ask 2 in Appendix B.

Appendix E. The law, and the part of it this program uses

Va. Code 56-596.7 came from HB 284 and SB 371 (2026 Acts chapters 377 and 378). The parts that matter here:

- Who. A "high energy demand customer" has 25 MW or more of contracted or measured demand and an average annual load factor of 75% or more. The campus qualifies on both.
- The filing. By 15 January 2027, each Phase I and Phase II utility, Appalachian Power among them, files a petition for a voluntary demand flexibility program. The Commission issues a final order by 30 November 2027. It sets a demand flexibility standard that each

utility, "working with its high energy demand customers," makes best efforts to meet. The Commission can set separate standards for customers that begin service before and after 1 July 2026. Wythe is after.

- The route that does not touch the campus's own load. The petition must analyze methods by which these customers "may be eligible to participate without directly curtailing their own electricity use, such as by funding, supporting, or purchasing capacity reduction credits from other retail electric service customers."
- What can earn a credit. Weatherization, energy efficiency, "conversions from electric resistance heat to electric heat pumps," demand response, customer-sited storage and virtual power plants, through "third-party providers" among others, "provided that such efforts produce measured and verifiable results."
- What the Commission must also do. Identify the periods of peak demand, set the measurement and verification method, and "consider the extent to which localized solutions may help." Carbon-emitting resources cannot take part.

The statute defines a capacity reduction credit as "a measured and verified standard unit of demand flexibility as approved by the Commission." It does not mention a demand charge or a bill credit, so the Commission will decide what the credit is worth. This paper uses one for one at the demand rate. Appendix C shows the other cases.

This route suits an AI campus. A training cluster does not want to be curtailed on a cold January morning. The statute's fourth method lets Fluidstack meet its share of the standard with kW taken out of homes instead of out of its racks. The program is also a localized solution: every home is within 5 miles of the load.

Governor Spanberger's Executive Order 22 (September 2026) sets up a Virginia Data Center Accountability Framework. It directs the Office of the Chief Energy Officer to "identify and pursue strategies that direct data center investments into local energy projects that improve the affordability of energy for Virginia communities and strengthen Virginia's grid." It creates the VA-LEAD program, which will evaluate data center developments partly on their local community benefits. It also calls for a toolkit for community benefit agreements within 120 days.

Appendix F. Method: one home on the coldest mornings, and its bill

The window

Utilities in PJM peak on cold winter mornings and evenings, when a home's heating draw is also highest. So I credit each home's average draw over a peak window: 6 to 9 am and 5 to 8 pm on the ten coldest December to February days of the local typical weather year. That is 60 hours at an average of 15.4°F. Appalachian Power has historically peaked in winter. PJM puts about 85% of its loss-of-load risk in winter from 2027, and nearly 99% by 2031. The statute asks the

Commission to identify peak periods. If it picks different hours, the window changes and the model runs again.

The weather is the typical year (TMY3) of the Marion-Wytheville Mountain Empire airport, 15 miles away at the same elevation. It has 5,167 heating degree days, against 5,118 for Wytheville in the NOAA 1991 to 2020 normals.

The arithmetic for one hour

For each hour in the window, at outdoor temperature T:

- Heating load (kW) = heat loss per °F × (70 − T) − internal gains (0.82 kW).
- Draw on resistance heat = load. Draw with the new heat pump = load ÷ COP(T).
- Draw with an existing heat pump = load ÷ its COP(T). A 10-year-old standard unit (HSPF2 7.5) with strip heat runs at about 3.0 at 47°F, 2.0 at 17°F and 1.4 at 5°F. Its gain over strip heat scales with its rating and fades 1.5% a year past 10 years (an assumption; field studies report 1 to 2%). At the window's average, the 20-year-old unit runs at 1.68 and the newer one at 1.99.
- A home heated by gas, oil, propane or wood draws no electric heat.
- The thermostat preheats in the two hours before each window. This moves 25% of the heating draw out of the window. The model treats preheat as moving energy, not saving it.
- The battery keeps 20% for the household's backup. Over each 3-hour window it delivers at most its usable energy ÷ 3: 3.6 kW for 13.5 kWh, 7.2 for 27, 10.8 for 40.5, never above the 11.5 kW inverter. Measured to zero, it gets credit only for the load it covers, which includes 0.82 kW of lights, cooking and hot water. With exports counted, it gets the full rate.

The new heat pump's efficiency changes with temperature, because a seasonal average overstates what it does at 15°F. The model uses a cold-climate unit with a COP of 2.0 at 5°F, above the 1.75 floor in the NEEP cold-climate specification. Between 5 and 17°F, its COP is 2.0 + (T − 5) ÷ 12 × 0.6. Below 5°F, it is no lower than 1.5. At the window's 15.4°F, the COP is 2.52.

Backup heat. Many heat pumps have electric strip heat. On a 3°F morning, a unit that runs on its strips can draw more than the baseboards did. The program sizes each heat pump to the full heating load at Wytheville's design temperature, locks the strips out above 0°F, and checks each install. The model's COP floor of 1.5 below 5°F includes defrost.

The worked example

1970s ranch, 1,500 sq ft, on baseboards	Peak kW, battery measured to zero	Cost	Cost per kW
Attic insulation, R-11 to R-38	1.58	$2,475	$1,563
Cold-climate heat pump	3.63	$10,500	$2,892
Smart thermostat with preheat	0.64	$225	$353
Home battery, 13.5 kWh, after the 30% tax credit	2.70	$8,400	$3,109
The home	8.55	$21,600	$2,526

The model runs this hour by hour over all 60 hours, and the colder hours weigh more. Measured to zero, the battery averages 2.70 kW, because in the coldest hours the home draws more than the battery can supply for three hours.

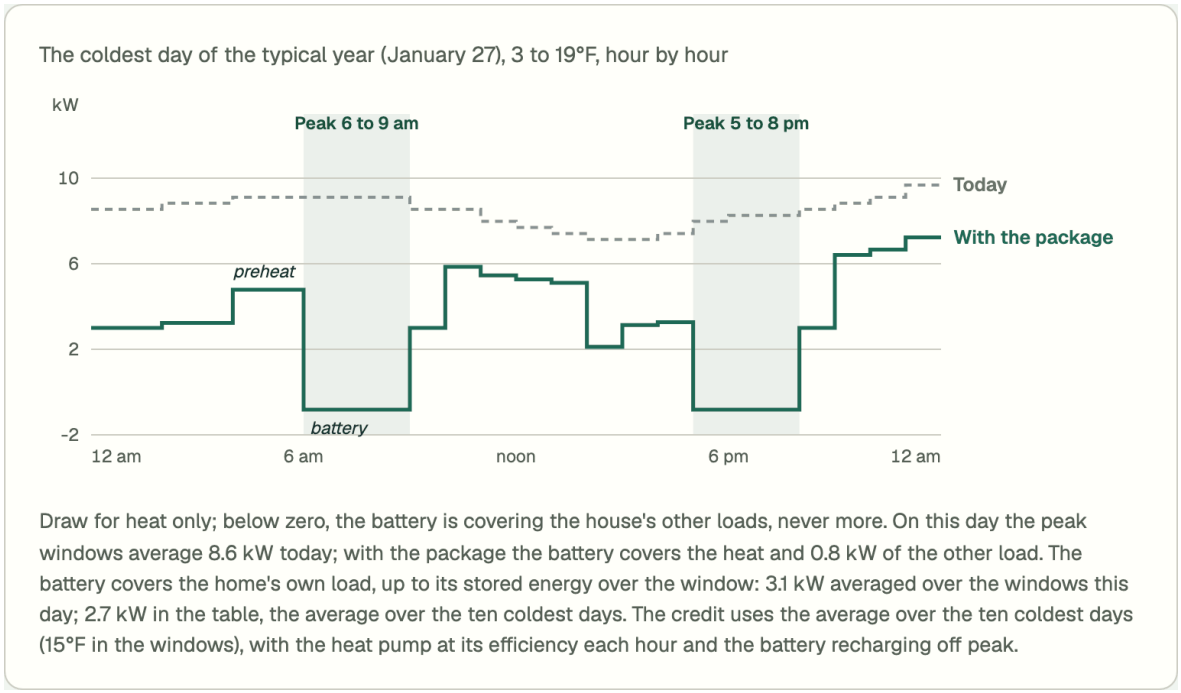


Figure 3. The same home on 27 January, the coldest day of the typical year (3 to 19°F). The dashed line is its heating draw today; the solid line is with the package. Preheat raises the draw before each window. The battery is measured to zero, the base case: it covers the home's heat and the 0.8 kW of other household load through each window, so the solid line sits just below zero and nothing is exported.

The household's bill

Each home's year is built hour by hour on the typical year: heating from its envelope and equipment, other household use flat at its internal gains (0.82 kW in a site-built home), cooling from the engine's yearly cooling kWh spread over the hours above 65°F. The thermostat's setback trims heating 8% and cooling 10% (ENERGY STAR connected thermostat metrics). The battery covers the home's load in the evening window and, with what is left, the on-peak hours before it, every weekday; on winter weekdays it also covers the morning window and recharges 10 am to 2 pm. It charges overnight at 90% round trip.

The year is priced on all four residential schedules (Appalachian Power Tariff 28, base rates before fuel and riders), each kWh carrying the same 8.517 cents of fuel factor and riders (the 16.139 cent all-in price on R.S.: $169.35 for 1,000 kWh from 1 November 2026, less the $7.96 customer charge, less R.S.'s 7.622 cents):

Schedule	Customer charge	Energy, base rate
R.S. (standard)	$7.96 a month	7.622 cents every kWh
R.S.-T.O.D. (time of day)	$9.82 a month	14.306 cents 7 am to 8 pm weekdays, 3.358 cents otherwise
R.S.-S.T.O.U. (smart time of use)	$7.96 a month	17.5 cents 7 to 10 am weekdays December to February and 4 to 7 pm June to September; 10.672 cents other weekday hours 7 am to 8 pm; 5.083 cents otherwise
R.S.-S.D. (smart demand)	$7.96 a month	$7.96 per kW of the highest weekday hour 7 am to 8 pm (December to February, June to September); 7.028 cents on peak, 3.358 cents off peak

The saving counts the cheapest schedule today against the cheapest after, so switching schedules alone is not counted. Most homes are already cheapest on the smart demand schedule, whose off-peak rate leaves a battery little to shift: the battery saves the average home $33 a year. The winter morning window forces a midday recharge on peak, so when the battery exports, its own effect on the bill is negative.

Exports and making the household whole. The kW credit belongs to the program; exported kWh belong to the household, credited at the on-peak rate (14.306 cents) if the filing grants it. The household's floor is what the same battery would save it measured to zero: in any year the battery and its export credit come to less (exports not credited, or the winter morning window forcing an on-peak recharge), the program pays the difference, the make-whole. That payment is a program cost in the model: with 13.5 kWh exporting and the exports credited, $31,800 a year; if the exports are not credited, $98,000 a year.

Appendix G. Prices, and the money I chose not to use

Every price assumes bulk purchase and fixed-price installs. I checked each price in November 2026. I kept the heat pump and battery prices low on purpose, because the program buys hundreds of units at a time.

Item	Program price	What retail looks like
Attic insulation	$1.65 per sq ft	Blown-in $1.50 to $2.45 (Home Depot, 2026)
Smart thermostat, installed	$225	Hardware $79 to $280
Heat pump, ducted	$9,000	TECH Clean California draft cost study: all-electric projects at a median of $18,500; NYSERDA's 386 whole-home installs averaged $16,300; group buys save 10 to 20%
Heat pump, ductless (half of site-built baseboard homes)	$12,000	South Atlantic remodeling data: about $19,200 for five heads
Battery, first 13.5 kWh, Powerwall 3 class	$12,000	EnergySage Wythe County: $1,350 per kWh, about $17,550 installed. Most quoted there: Enphase IQ 10C, Tesla Powerwall 3, Enphase IQ 5P
Battery, each further 13.5 kWh	$6,000	Powerwall 3 expansion: about $5,900 list before install, about $6,200 installed; FranklinWH aPower about $11,000 plus $800 to $1,000 to install; HomeGrid modules about $760 per kWh retail

Expansion packs share the inverter, the gateway, the wiring and the crew's trip, which is why the second 13.5 kWh costs half the first. A written bulk quote from a Southwest Virginia installer would change this case more than any other input (Appendix C).

The battery tax credit. The program company (Appendix I) owns the batteries, so each battery can earn the 30% credit for energy storage under section 48E. A tax review must check two points. First, storage that begins construction after 2025 loses the credit if it takes material assistance from a prohibited foreign entity. That depends on the battery's supply chain. Second, hundreds of batteries under one owner and one contract will probably count as one project of more than 1 MW. The 30% rate then needs prevailing wages and registered apprentices on the installs; without them, the rate is 6%. The upgrades belong to the homeowners and earn no business credit, and the homeowner credits (25C, 25D) ended with 2025.

Money I left out on purpose. Appalachian Power already pays rebates in these homes through its Home Performance Program: $1,500 per 1,000 sq ft of attic insulation in a resistance-heated home, $90 for a smart thermostat and $300 for a ductless heat pump. But Appalachian Power counts the savings from rebated measures toward its own targets, so a capacity credit for the same kW would count it twice. The program pays for its own work in full and claims the credit. It gives no credit for a measure that a home already took a rebate for.

Virginia's federal HOMES and HEAR rebates have not started. The Weatherization Assistance Program (Mountain Community Action Program here) is a referral partner for the lowest-income homes, not a source of funds.

Appendix H. Assumptions register

Every value is an input in the model.

Input	**Value**	**Source or basis**
Phases	3 and 5 miles	Distance from Lot 35
Budget	$10M, installed cost	Same basis as the Mitchell County study
Eligibility	Every home; an upgrade when it costs under $3,000 per verified kW in that home	Sponsor's cap
Heating today	24.3% resistance, 24.3% heat pumps over 15 years, 24.3% newer heat pumps, 27% gas, oil, propane or wood	ACS 2020 to 2024 near the site (73% electric); RECS 2020; assumption on heat pump age

Input	Value	Source or basis
Sign-up	50%	Assumption
Occupied homes	100% of housing units	2020 Census housing units; roughly 10% vacant (Appendix C)
Mix of homes	18% manufactured; 61% of site-built before 1980	ACS 2020 to 2024, VGIN footprints, Street View sample
Peak window	60 hours, 15.4°F	Mountain Empire AP TMY3; 6 to 9 am, 5 to 8 pm, ten coldest days
New heat pump COP at 5°F	2.0	NEEP specification floor 1.75; listed units 1.9 to 2.4
Existing heat pump	Standard curve scaled by rating, fading 1.5% a year past 10 years	Assumption; field studies report 1 to 2%
Preheat share	25%, moved to the two hours before the window (energy moved, not saved)	Conservative against a UK field trial (56 to 90% over three hours at 41°F)
Battery	13.5 kWh a home (27 and 40.5 in the table), 20% reserve, 11.5 kW inverter; measured to zero in the base case	Powerwall 3 class; warranty 70% of capacity at 10 years
Other household load	0.82 kW	The same internal gains the heat loss uses
Prices	Appendix G	Checked November 2026

Input	Value	Source or basis
Ductless share	50% of site-built baseboard homes	Assumption
Battery tax credit	30%, on	Section 48E, subject to tax review
Credit value	$120 per kW-year, one for one, campus at full capacity	L.P.S. demand charge; PJM 2027/28 capacity
Term, discount rate	14 years, 7%	Large-load contract term; assumption
Household bill	Hourly, cheapest of four residential schedules, 8.517 cents of fuel and riders on every kWh	Appalachian Power Tariff 28; $169.35 for 1,000 kWh from 1 November 2026
Exported kWh	Credited to the household at 14.306 cents; the program tops the household up to what the battery would save it measured to zero	The ask; host agreement
Upkeep	$150 a home a year, in the cost over the term	Battery monitoring, warranty service, verification; assumption in a $100 to $200 range

Appendix I. Structure: a program company Fluidstack owns

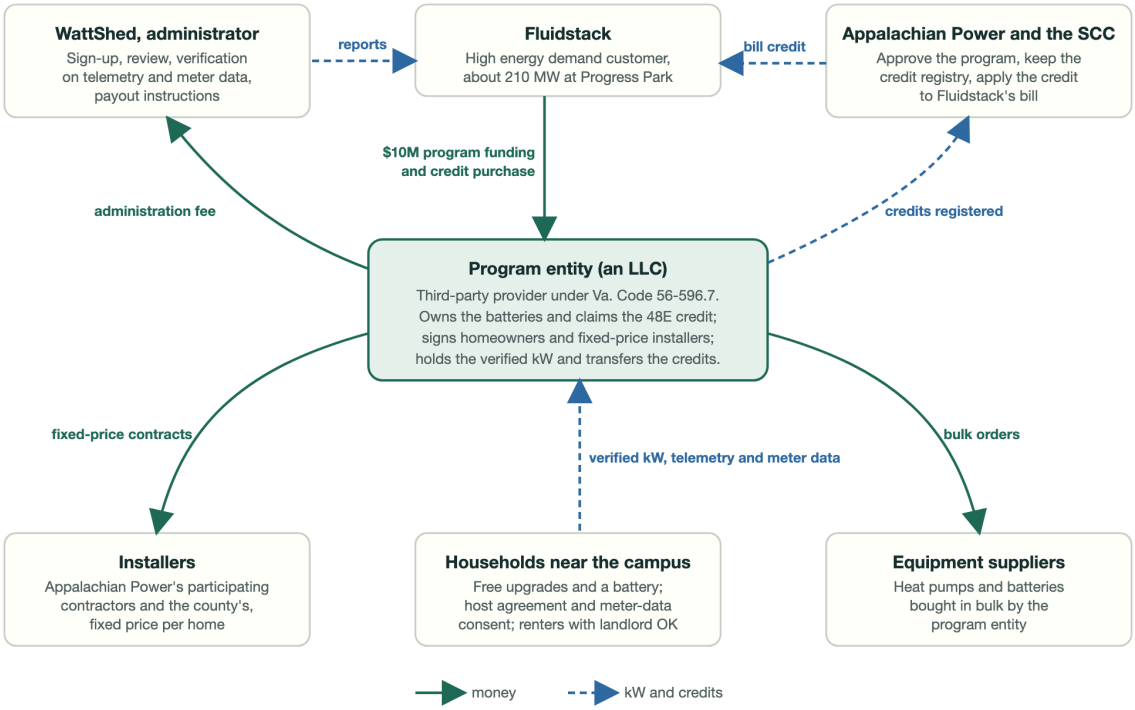


Figure 4. Who pays whom, and where the kW and credits go.

Why a separate company

The program sits in a special-purpose company, the Community Bill Reducer LLC (Virginia). Fluidstack owns it and its energy team runs it, but it is separate from the entity that holds the campus's power contract. There are four reasons:

1. It owns the batteries. Ownership makes the battery tax credit available. Under section 6418, the LLC can sell the credit for cash if it cannot use it.
2. It keeps the liability for equipment in hundreds of homes away from the campus.
3. It holds the credits. With one owner for every verified kW, the registry is simple and the LLC can transfer the credits to Fluidstack.
4. Other money can join. The county, a green bank or another large load can pay for homes through the same company, without new contracts with each household.

The contracts

Contract	Between	What it does
Credit purchase agreement	Fluidstack and the LLC	Fluidstack funds the program, or pays per verified kW-year, for 14 years to match its Appalachian Power contract; the LLC transfers the credits
Services agreement	The LLC and Fluidstack	Fluidstack's energy team runs enrollment, review, verification on telemetry and meter data, payouts and reporting, at cost
Host agreement	The LLC and each household	Free upgrades and a battery the LLC owns; 20% of the battery kept for the household's backup; consent to share meter data; landlord consent for renters; removal or transfer at the end. The kW credit belongs to the program; the exported kWh belong to the household. In any year the battery and its export credit would cost the household money, the LLC pays the difference
Installer master agreement	The LLC and each installer	A fixed price per home and measure; Appalachian Power's participating contractors as the starting list; any licensed contractor may join on the same terms; prevailing wages and registered apprentices, for the 48E credit

Contract	Between	What it does
Equipment supply agreement	The LLC and suppliers	Bulk heat pumps and batteries; battery supply chain documented for the 48E foreign-entity test
Registry and verification	The LLC, Appalachian Power, the Commission's method	One record per verified kW, checked against Appalachian Power's own programs

Two ways to fund it

A. Upfront funding (the case the model shows). Fluidstack pays $10M and the LLC installs. The credits reduce Fluidstack's bill, and the battery tax credit returns $2.3M to the LLC's owner. Upkeep, $96,300 a year, is $842,000 in today's money, so the program costs $8.52M in all with the battery measured to zero. The credits are worth $2.89M in today's money, so the net cost is $5.63M.

B. Credit purchase. The LLC borrows the $7.68M net installed cost from a low-cost lender and Fluidstack pays per verified kW-year for 14 years:

- Annual payment: $7.68M ÷ 8.745 = $878,000, plus $96,300 of upkeep, $974,000 a year: $354 per kW-year on 2,755 kW measured to zero ($286 with exports, $212 with 40.5 kWh exporting, make-whole included).
- Fluidstack's bill credit at the demand rate: $120 per kW-year.
- Fluidstack's net cost: about $234 per kW-year, $643,000 a year ($166 and $584,000 with exports; $92 and $421,000 with 40.5 kWh exporting).

Route B spreads the cost over the 14 years and ties every payment to a verified kW. It adds the lender's margin, and it raises a bankability question: the loan depends on Fluidstack's contract, not on batteries in hundreds of homes.

Governance

A county representative gets a seat on a community advisory board. The LLC publishes an annual report of homes, verified kW and bills saved, and it opens its installer prices to review.

Appendix J. Delivery plan

When	What
By 1 December 2026	Share the asks in Appendix B with Appalachian Power, with the model, six weeks before its filing
8 December 2026	County board votes on the zoning that confines data centers to Progress Park
15 January 2027	Appalachian Power files its 56-596.7 petition. The Commission's order in its biennial review (PUR-2026-00044) is also due
Once the Commission opens the case	File a notice of participation through counsel (5VAC5-20-80), and comments; push for battery exports to count and to be credited to the household
Winter 2026-27	The baseline winter: homes that enroll in spring share this winter's interval meter data at sign-up
February to March 2027	Lot 32 purchase option window closes
Spring 2027	Form the LLC; installer request for proposals with fixed prices; tax review of the battery supply chain; open Phase 1 enrollment
1 July 2027	Appalachian Power's virtual power plant pilot petition is due
Summer to autumn 2027	Install Phase 1, 367 homes, $5.7M
30 November 2027	Commission's final order on the credit

When	What
Winter 2027-28	First measured winter for Phase 1; campus certificate of occupancy early 2028
2028	Phase 2 on the final rules, its batteries sized to the export rule

Appendix K. Risks, and how the design handles them

Risk	What could happen	How the design handles it
The credit is not a bill credit	No money comes back: $8.5M net on the base case	Phase 1 only before the final order; Phase 2 waits for it; the submission asks for it directly
Only dispatchable kW counts	$6.5M net instead of $5.6M	Phase 2 waits for the final order; the filing asks that efficiency count, as the statute lists it
Battery exports not counted	2.76 MW measured to zero instead of 3.51 MW	The base case already measures to zero; Phase 2 sizes its batteries to the rule
Exports counted but not credited to the household	The program makes households whole: $98,000 a year on 642 homes	Ask for the on-peak export credit; the cost is in the model
Double counting with Appalachian Power's programs	Credits disallowed	No Appalachian Power rebates used; check prior participation at enrollment; one shared registry; batteries not also sold into the virtual power plant pilot

Risk	What could happen	How the design handles it
48E credit fails the foreign-entity or wage test	$7.9M net instead of $5.6M	Document the supply chain; prevailing wages and registered apprentices on installs; every result shown without the credit
Upkeep	$300 a home a year instead of $150: $6.5M net	Fixed-price service terms in the installer and supply contracts; telemetry and warranty claims tracked in the console
Heat pump prices above the plan	Resistance homes fall out of the cap; more homes, smaller bill savings	Fixed-price installer contracts; a written bulk quote before launch
Low sign-up	A smaller program	Same cost per kW; widen the radius
Renters	Owners decline work on homes they rent out	Landlord consent in the host agreement; the upgrades raise the home's value at no cost
Battery backup	Households fear losing backup in an outage	20% kept for the household; events limited in number and length
Summer peak	Heat pumps bring air conditioning to homes that had none, adding summer load	Appalachian Power has historically peaked in winter, and PJM puts about 85% of its risk in winter from 2027; the heat pump replaces window units at higher efficiency, and the battery can cover summer evenings

Risk	What could happen	How the design handles it
Battery wear	The warranty guarantees 70% of capacity at 10 years; credits run 14	Measured to zero, the home's draw limits the battery more than its capacity; with exports, plan a replacement or a shorter term
Backup heat strips	On the coldest mornings strips can draw more than the baseboards did	Size to the full load at design temperature, lock strips out above 0°F, check each install
Measurement	Efficiency savings disputed	Deemed peak values from a technical reference manual, checked against interval meter data on a sample of homes; battery telemetry checked against the meter. A heat pump's saving is a modeled counterfactual, and the filing should say so

Sources

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