Energy Trust of Oregon
New Homes Fire Resiliency

October 2022

Energy Trust of Oregon

Three types of wildfire exposure

- Firebrands or embers
- Radiant heat
- Direct flame contact

EMBERS

RADIANT HEAT

DIRECT FLAME CONTACT

Three types of wildfire exposure

- **Firebrands or embers**
  - Fire generated winds can carry burning materials for miles
  - Direct ember ignition can occur when embers enter the building through openings such as vents or an open or broken window
  - During wildfires, as many as 90% of homes and buildings damaged or destroyed were first ignited by embers or other fires set by embers, and not the main wildland fire front
- Radiant heat
- Direct flame contact

EMBERS

RADIANT HEAT

DIRECT FLAME CONTACT

Three types of wildfire exposure

- Firebrands or embers
- **Radiant heat**
  - Can ignite a combustible product (e.g., wood siding)
  - Can break the glass in windows and doors, making ember-ignition of interior materials more likely
  - Can pre-heat materials, making them easier to ignite
- Direct flame contact

EMBERS

RADIANT HEAT

DIRECT FLAME CONTACT

Three types of wildfire exposure

- Firebrands or embers
- Radiant heat
- **Direct flame contact**
  - Direct flame contact from the wildfire as it passes the property can ignite building components (e.g., combustible siding)
  - Once a building component ignites fire can enter the home through the component or through the stud cavity behind a component, such as wall siding

EMBERS

RADIANT HEAT

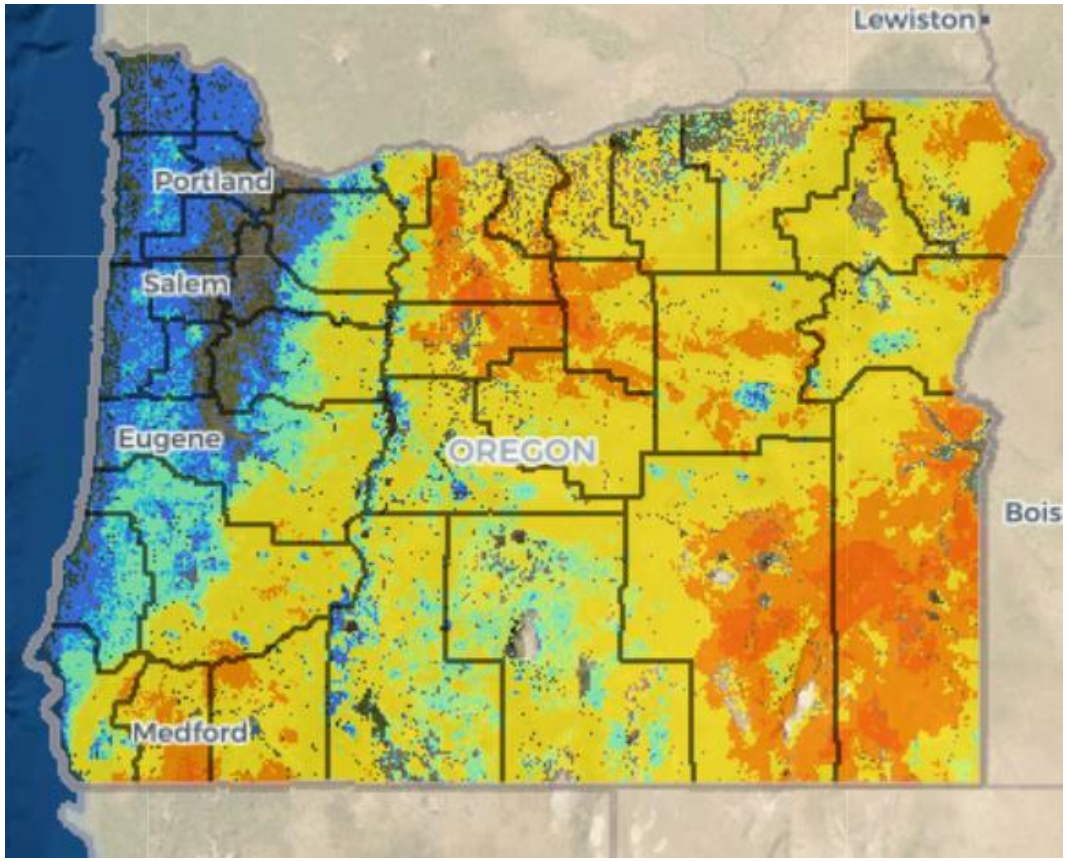
DIRECT FLAME CONTACT

Four definitions of fire resiliency

- Wildfire codes use several terms interchangeably, some of which have specific technical definitions

WILDFIRE RESISTANT	FIRE RESISTANT	IGNITION RESISTANT	NONCOMBUSTIBLE
Materials or design features that can reduce the vulnerability of a building to ignite	Material that resists the spread of fire from the fire-exposed to a nonexposed side of an assembly (e.g., wall or roof)	Materials designated ignition-resistant must pass a standard test that evaluates flame spread on the material (e.g., treated siding performs better than untreated)	Materials designated noncombustible must pass a standard test to confirm no part will burn when exposed to fire/heat (e.g., fiber cement)

Burn probability in Oregon

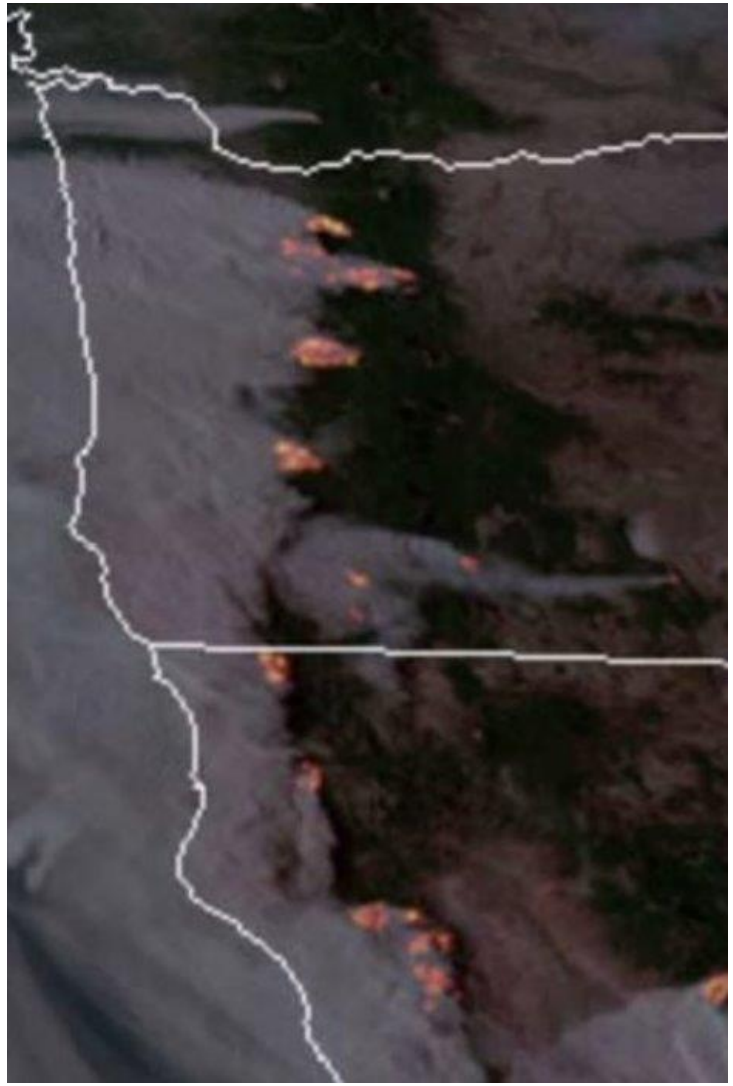


- 0
- Low (<= 1-in-10,000)
- Low - Moderate (1-in-10,000 to 1-in-5,000)
- Moderate (1-in-5,000 to 1-in-1,000)
- Moderate - High (1-in-1,000 to 1-in-500)
- High (1-in-500 to 1-in-100)
- High - Very High (1-in-100 to 1-in-50)
- Very High (1-in-50 to 1-in-25)

OREGON WILDFIRE RISK EXPLORER MAP

2020 Labor Day fires

- "Unprecedented" concurrence of conditions
  - Hot, Dry, Windy
- More than 5,100 structures affected
- Several fatalities
- >10% of Oregonians under some level of evacuation
- Hazardous air quality



2020 Labor Day fires

- More than 4,000 homes destroyed

COUNTY	HOMES DESTROYED
Clackamas	63
Douglas	133
Jackson	2,364
Klamath	11
Lane	463
Lincoln	288
Linn	71
Marion	629
TOTAL	4,022

Strategies that promote energy efficiency and wildfire resiliency

Oregon code requirements

- In 2019, the Oregon Building Codes Division produced an amendment to the 2017 Oregon Residential Specialty Code (ORSC)
- The amendment created section 327.4 to expand fire resiliency requirements for areas within wildfire hazard zones as identified using Oregon Department of Forestry criteria (OAR 629-044-0200 through OAR 629-044-0260)
- Local jurisdictions can determine whether to adopt this section of code
  - Required in City of Medford as of 9/2019
  - City of Ashland considering as of 3/2021
  - Deschutes County considering as of 9/2019

Wildfire resiliency strategies

MEASURE	SPECIFICATION
Roofs	Class A + fire-resistant sheathing; simple design with fewer valleys; metal flashing
Attics	Sealed attic; enclosed overhangs
Windows	Low E with 2-3 panes and aluminum cladding
Exterior doors	Fire-rated with non-combustible trim and fire-resistant weather stripping
Insulation	Rockwool, cellulose or insulated concrete forms
Siding	Fiber cement, metal, masonry or treated wood siding, with additional 5/8” exterior gypsum board
Ventilation	High MERV filtration; controllable openings covered with noncombustible screens

Savings potential from resiliency measures

MEASURE	EFFICIENCY IMPROVEMENT	ENERGY SAVINGS
Roof	Modeled with concrete tile roof	0.10%
Sealed attic	Move insulation to the roof line Move 50% of the ducts to sealed attic	4.25%
Exterior rigid insulation	Add R-5 continuous	3.25%
Triple pane windows	U-factor 0.20 SHGC 0.25	3.15%

Energy savings and resiliency

- ROOFING MATERIAL
- SEALED ATTICS
- EXTERIOR RIGID INSULATION
- TRIPLE PANE WINDOWS

Energy savings and resiliency

ROOFING MATERIAL

Rating	Roof Type	Resiliency Note
Class A	Asphalt fiberglass composition shingles	Most common roof type in new homes
Class A	Metal roof	
Class A	Concrete or clay times	Gaps can occur at the roof edge & ridge
Class B	Fire retardant pressure-treated shingles/shakes	Possible to achieve Class A when used in combination with an underlayment (e.g., mineral surfaced cap sheet/ panelized fiberglass gypsum board)
Class C	Recycled plastic/rubber	
Class C	Roof aluminum	
Unrated	Untreated wood shingles/shakes	Not permitted in new construction in Oregon wildfire hazard zones

SEALED ATTICS

EXTERIOR RIGID INSULATION

TRIPLE PANE WINDOWS

Energy savings and resiliency

ROOFING MATERIAL

SEALED ATTICS

- Many homes have attic vents, but these openings allow embers to enter
- Sealing the attic prevents embers from entering and offers efficiency benefits

EXTERIOR RIGID INSULATION

TRIPLE PANE WINDOWS

Energy savings and resiliency

ROOFING MATERIAL

SEALED ATTICS

EXTERIOR RIGID INSULATION

- Increases the fire rating of the wall and roof deck and offers efficiency benefits
- Two fire-resilient options:
  - Rockwool: 1” = R-3.3
  - Polyiso: 1” = R-5

TRIPLE PANE WINDOWS

Energy savings and resiliency

ROOFING MATERIAL

SEALED ATTICS

EXTERIOR RIGID INSULATION

TRIPLE PANE WINDOWS

- Low e and double pane vinyl clad windows are standard in new homes
- Triple pane aluminum clad windows offer more resiliency and efficiency
- Some builders opt for tempered glass

Incentives

Additional incentives for resilience

TRIPLE PANE WINDOWS - $750 PER HOME

EXTERIOR RIGID INSULATION - $750 PER HOME

UNVENTED ATTICS - $400 PER HOME

- Each of these design elements make homes more energy efficient and resilient to wildfires
- Incentives can be combined

Elevated incentives to rebuild homes destroyed by wildfires

- Builders or homeowners are eligible to receive 2x the standard incentive
- Incentives escalate depending on the modeled percent above code that the home achieves
- Incentives are paid to the builder
  - If the homeowner is acting as general contractor for a home they plan to occupy, Energy Trust can issue the incentive to the owner instead of the builder

Incentive type	Base incentive, at 10% above code	Max incentive, at 35% above code
Standard	$1,123 per home	$4,086 per home
Fire rebuild homes	$2,246 per home	$8,171 per home

Other considerations: solar + storage

- Considerations for ignition vulnerability
  - Studies confirmed that solar panels do not decrease the rating of the roof
  - Simple roof designs offer co-benefits between solar and fire resiliency: they accumulate less debris and are easy to maintain, and are easier for installing solar
- Considerations for resiliency for homes in proximity to burn sites
  - Solar output drops, but doesn’t typically stop, in smoky conditions
  - Pair with battery storage for increased resiliency
- Solar + storage ready is a great first step
  - Homeowners can more easily add solar and storage

Other considerations: smoke resiliency

- Follow EPS best practices for air sealing and air barriers
- Design HVAC system to offer smoke resiliency mode
  - For central systems, ensure filter cabinet is compatible with 4-5” high MERV filter and that air handler and ductwork can operate with a high MERV filter (typically MERV 11-13)
- Consider homeowners resources about:
  - Use a conventional filter for normal operating conditions, but swap out for high MERV filter
  - Disable outdoor air intake and exhaust (e.g., closing dampers, turning off HRV)
  - Minimize indoor air pollution (e.g., moisture, cooking)

Manufactured Home Replacement Program

Impacted

- 16 communities impacted by wildfires
- 4 communities rebuilding after wildfires
- Some communities rebuilding as modular, single family or not yet on radar

Challenges

- Production timelines, home and site availability, and changing landscape of communities
- New community requirements such as 55+ and/or new construction requirements like size, siting, carports

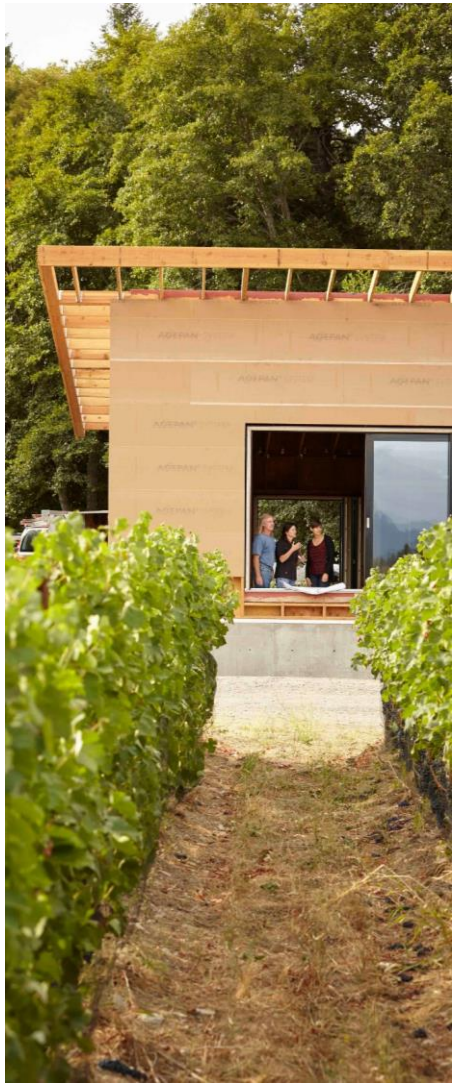
Manufactured Home Replacement Program

Projects

- One project rebuilt, 5 replacements in progress
- 20 in pipeline with active investment
- More in 2023 and beyond

HOME SIZE	INCENTIVE FOR NEW ENERGY STAR® HOME	INCENTIVE FOR NEW NEEM+ HOME
Single wide	$10,000	$11,000
Double wide	$15,000	$16,000

"How valuable those Energy Trust manufactured home incentives are. Our manufactured home parks are just beginning to rebuild. The extra support from Energy Trust goes a long way toward the purchase of new housing by a survivor who is scrapping together all the pennies possible to get back into a home." Rep. Marsh



Commercial New Buildings and Major Renovations

- Encourages building beyond code via early design assistance and technical assistance
- Works with engineers, architects and building owners/developers
- Whole Building approach, with integrated design that increases energy efficiency and resilience and lowers operating costs
- Increased installation incentives

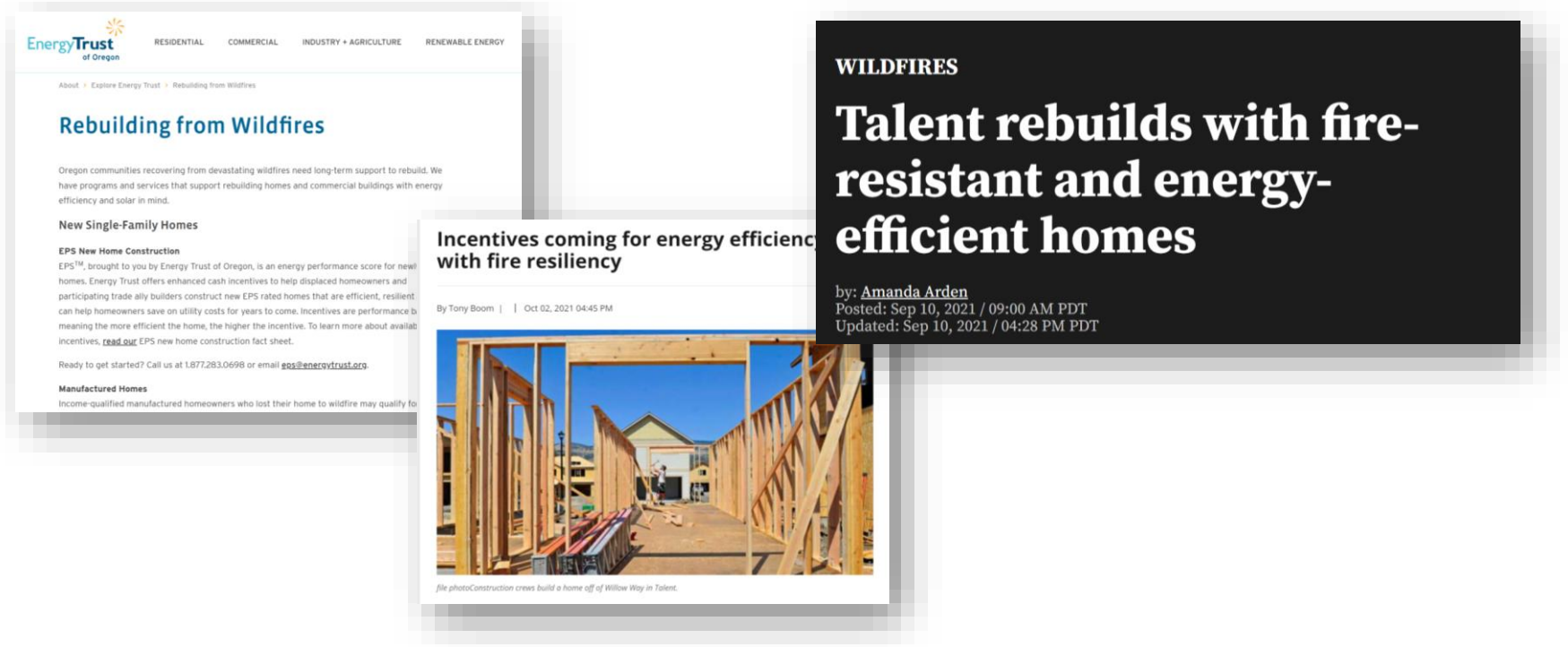
$500 Early Design Bonus	$500 Early Design Solar Bonus	Bonus Technical Assistance Funding

D&S Harley-Davidson

•Retail project in Medford
•16,117 square feet
•Mixed fuel building (electric and gas)
Incentives/Savings:
•% better than 2019 code = 24%
•% better than fire rebuild baseline = 28%
•Total additional savings claimed: 5,562 kWh, 387 therms
•Total incentive: $7,344 ($1,441 increase)

Email: newbuildings@energytrust.org | Phone: 1.877.467.0930

Energy Trust website and media coverage



- https://www.mailtribune.com/top-stories/2021/10/02/incentives-coming-for-energy-efficiency-with-fire-resiliency/
- https://www.koin.com/news/wildfires/talent-rebuilds-with-fire-resistant-and-energy-efficient-homes/
- https://energytrust.org/about/explore-energy-trust/rebuilding-from-wildfires/

State agency coordination

Energy Efficient Wildfire Rebuilding Incentive Program

INCENTIVE SUMMARY

	Building Type	Incentive
Code	Single Family Residential (SFR)	$ 3,000
	SFR- Low-Income	$ 4,500
	Multi-family/Commercial (0-25,000 SF)	$ 3,000
	Multi-family/Commercial (25,000+ SF)	$ 4,000
	Multi-Family Housing for Low Income (per unit)	$ 500
Above Code	Manufactured Homes	$ 12,500
	Manufactured Homes Heat Pump Replacement	$ 5,000
	Single Family Residential (SFR)	$ 3,000
	SFR- Low Income	$ 4,500
	Multi-family/Commercial (0-25,000 SF)	$ 5,000
	Multi-family/Commercial (25,000+ SF)	$ 6,000

Fire Hardening Incentive Grant Program

Presenter: Andy Boulton, policy analyst
Building Codes Division

BCD Building Codes Division

Department of Consumer and Business Services

Menu of Options

Element	Options	Grant
Roofing	Class B or Class A	$2,200.00
Exterior Wall Covering	Noncombustible, ignition-resistant, heavy timber assembly, log wall assembly	$1,750.00
Ventilation openings or unvented attic	Option 1: Vents designed to resist ember intrusion Option 2: Unvented attic assembly	$350.00
Overhangs, cantilevers, and projections	Underside of eaves, soffits, cantilevers, protected by: Noncombustible material, Ignition-resistant material, Exterior portion of 1 hour wall assembly, or 1 layer of 5/8” Type X gypsum sheathing or equivalent	$400.00
Walking Surfaces of porches, balconies, and decks	Noncombustible, ignition resistant, Exterior fire retardant treated wood, materials meeting ASTM E2632	$550.00
Windows	Tempered glass or 20-minute fire rated	$550.00
Skirting (Manufactured homes only)	Noncombustible, ignition resistant skirting materials.	$500.00

Lessons learned

- Small part of a solution to a big problem
- Rebuilding takes a long time
- New offer development takes long time
- Need approachable/available support and programs
- Need Spanish translated materials and interpreted events
- Energy efficiency and renewables not always considered
- **Resilience is now part of the conversation**
- Survivors benefit from central points-of-contact and coordinated programs

Thank You

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EnergyTrust of Oregon

Resources

- US EPA site for wildfire preparation and recovery
- FEMA Home Builder’s Guide to Construction in Wildfire Zones
- Oregon code wildfire hazard mitigation section
- State of Oregon Wildfire Response page
- March 2021 City of Ashland Council session resources for wildfire hazard mitigation code adoption
- University of California Cooperative Extension Wildfire Preparation site