



Alaska Affordable Energy Strategy

Rural Energy Conference

Neil McMahon
April 26, 2016

Presentation Goals

- What is the Alaska Affordable Energy Strategy?
- What drives the costs for consumer energy?
- What are potential strategies for reducing costs?
- How can you stay informed or involved as we develop policy?

What is the Alaska Affordable Energy Strategy (AkAES)?

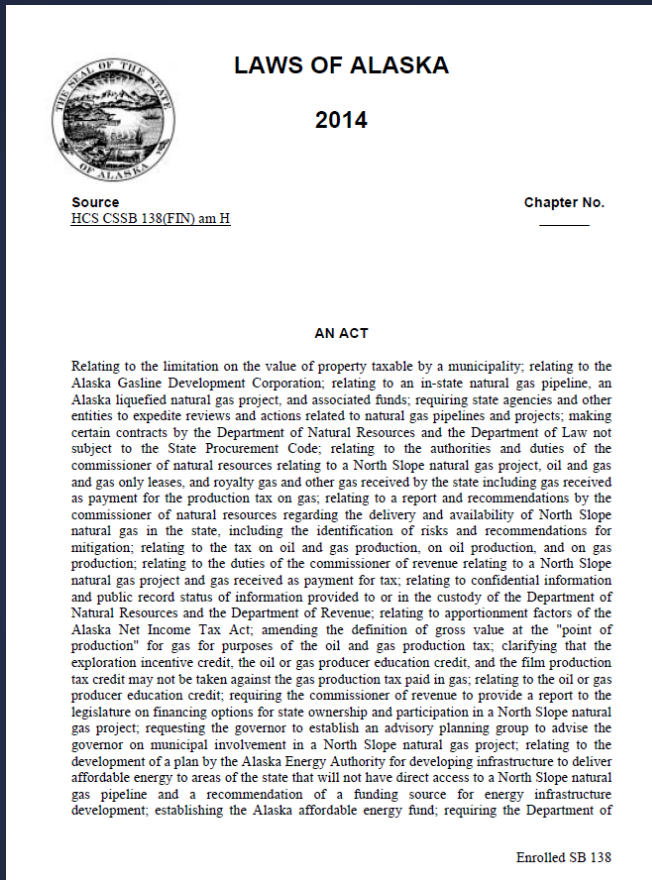
Senate Bill 138

Alaska Affordable Energy Strategy

Plan and recommendations to the Legislature on infrastructure needed to deliver affordable energy to areas in the state that do not have direct access to a North Slope natural gas pipeline.

Started: May 2014

Report and Proposed Legislation Due:
January 1, 2017



AkAES Planning Horizons

Short-term:

1. With the current budget climate, what can the state do to maximize the reduction in community energy costs?
 - a. For example, how to spend a hypothetical \$1M to best benefit a community?
 - b. Where will the hypothetical \$1M come from?
2. Test options prepare the state for the long-term plans

Long-term: (2024 at the earliest for AKLNG)

1. How should the state invest money available through the Affordable Energy Fund to provide the maximum benefit to communities?

Sectors Addressed

- Residential: Electricity & Heating Costs
- Public Facilities (including water/sewer): Electricity & Heating Costs
- Private Commercial Facilities: Electricity & Heating Costs

Not Addressing:

- Industrial
- Transportation (within and between communities, except for delivery of fuel or energy-related infrastructure)

Expected Outcomes of the AkAES

- Status quo will remain unless there is a compelling reason to change

What AkAES is expected to develop:

- Prioritized list of program-level recommendations for the Legislature
 - Improvements to current programs
 - New programs (loans, incentives, assistance) to fill identified gaps
 - Regulations, codes, or other requirements that will lead to cost effective energy cost reductions
- Useful tools and data for communities and regions to help prioritize projects

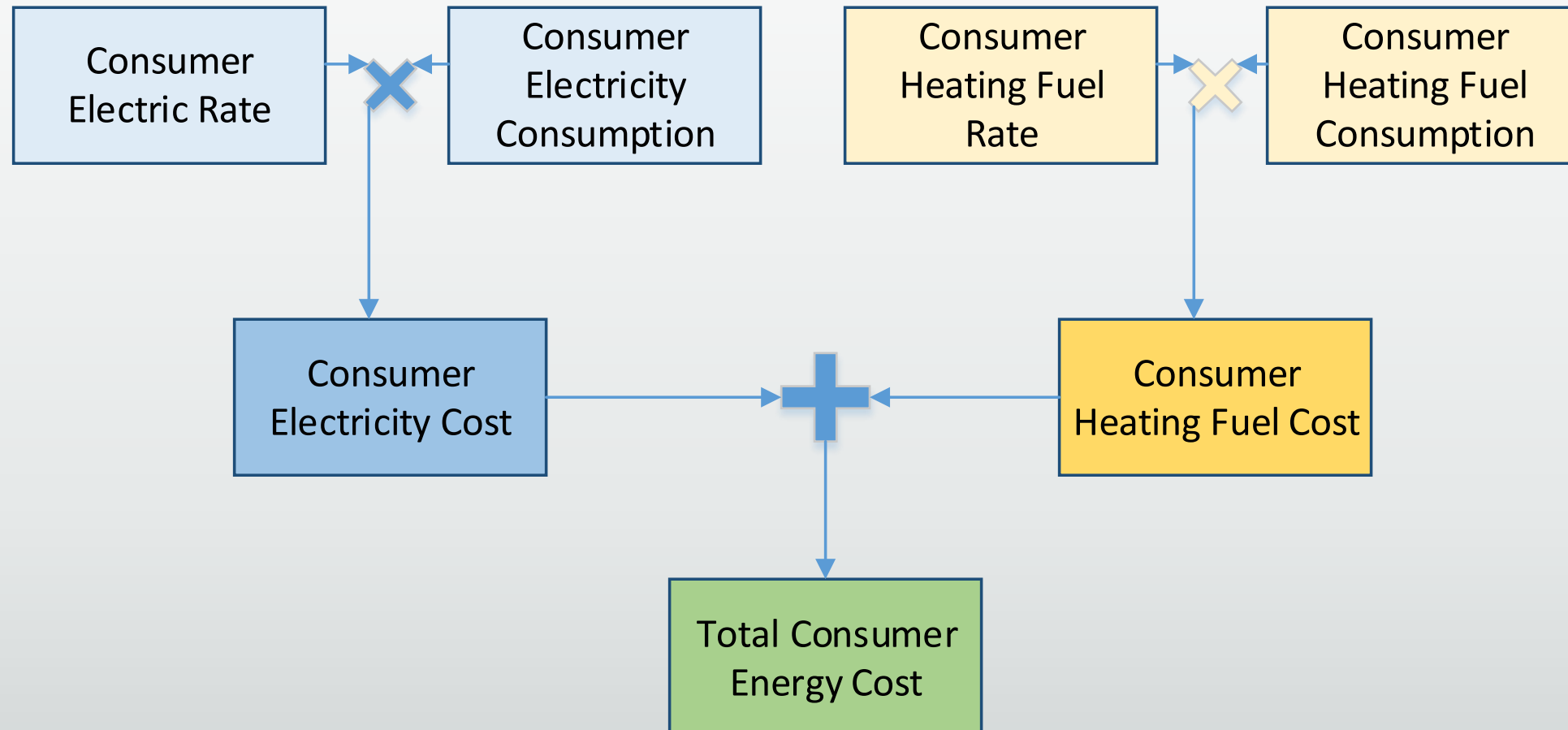
Stakeholder Engagement

- Capitalize on Previous Efforts
 - Pathways, regional energy planning, many previous studies
- Alignment with Administrative Order 272 (consumer energy group)
- Advisory Group
- Technical Advisory Group

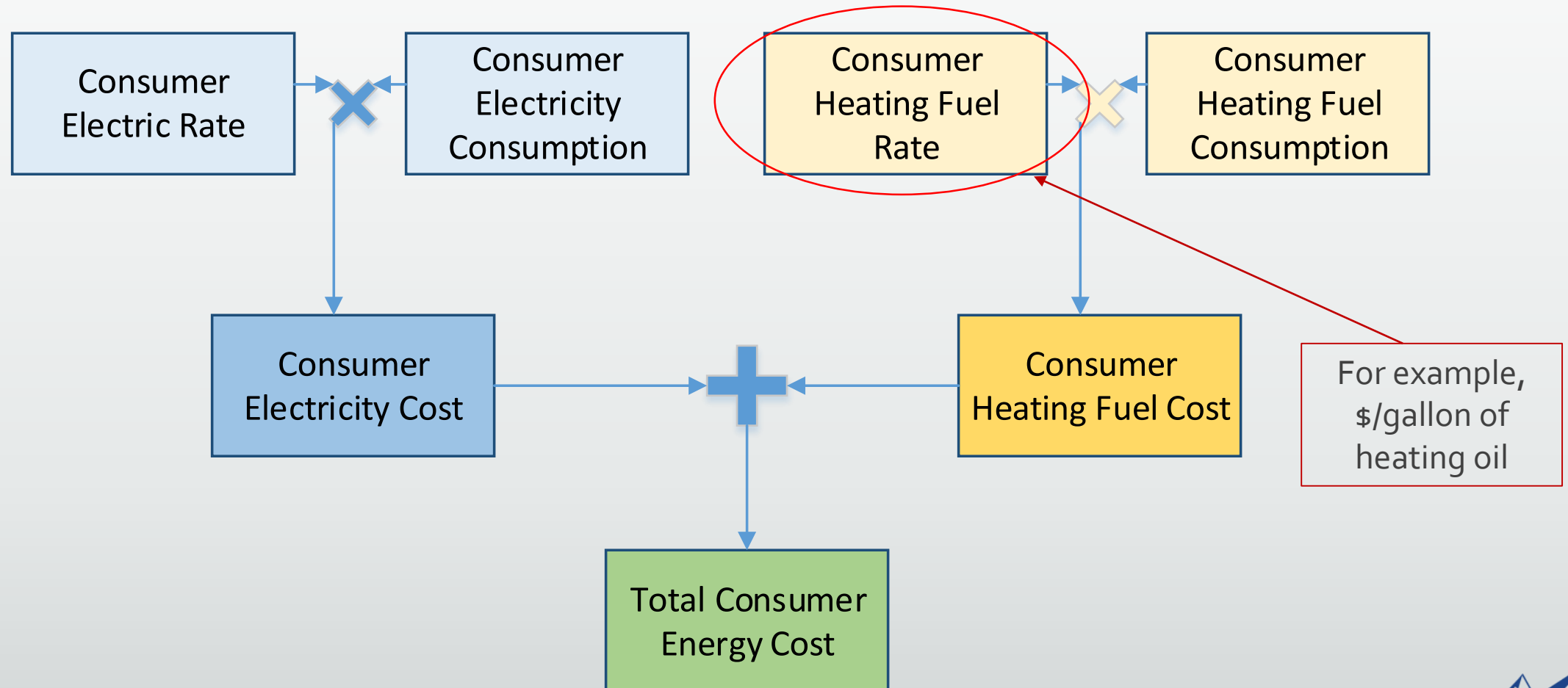
- Regional Organizations:
 - TCC, Nuvista, SEC, NWAB, SWAMC
- Government Agencies & Entities
 - RCA, ISER, ACEP, DOT&PF, AGDC, AHFC, GINA, US DOE, USACE
- Utilities
 - IPEC, AVEC, AP&T, Avista
- NGOs
 - AFN, ANTHC, CCHRC
- Private
 - Crowley, VEIC, Northern Economics, others

Rural Energy Cost Drivers

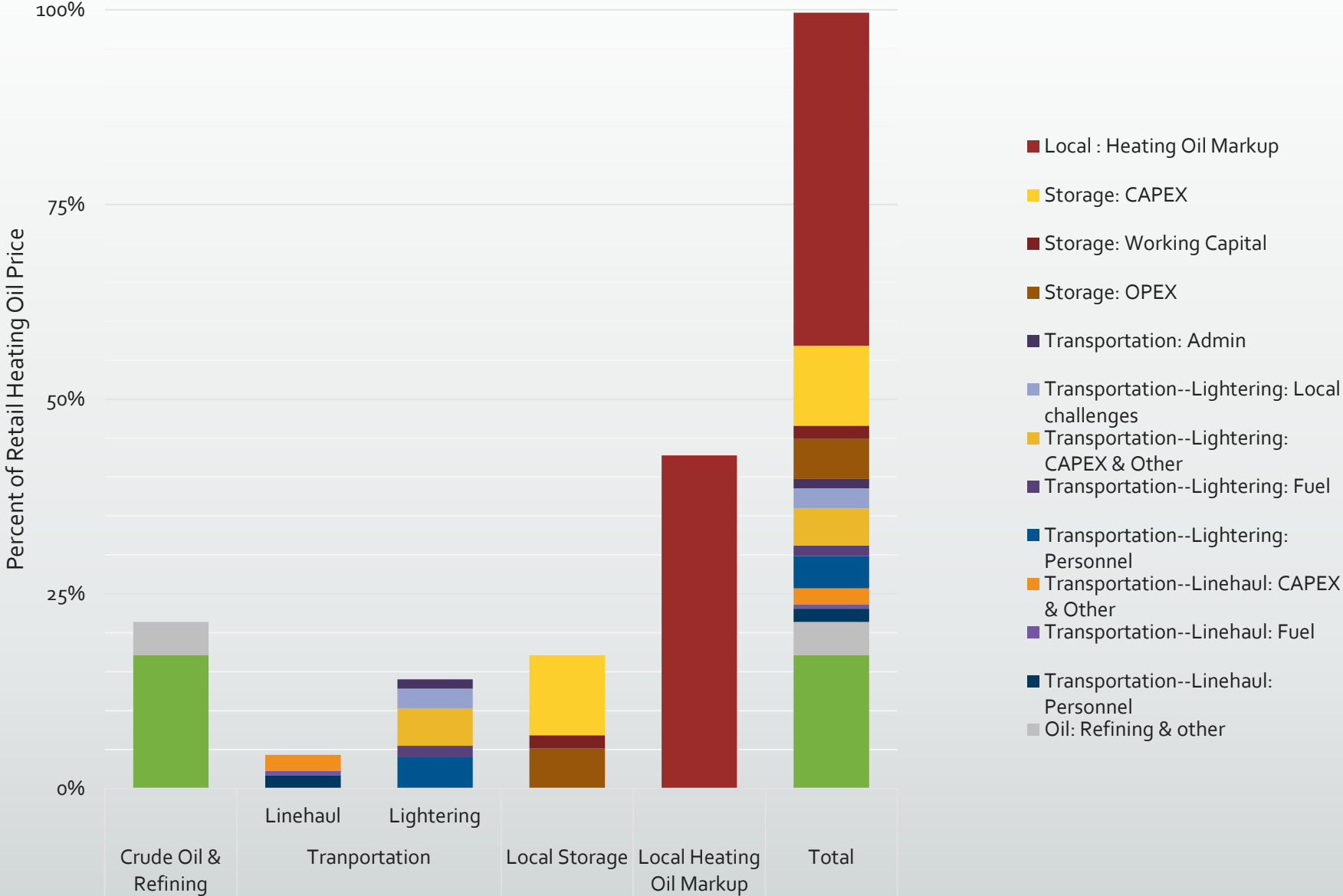
Factors That Lead to Consumer Energy Costs



Factors That Lead to Consumer Energy Costs

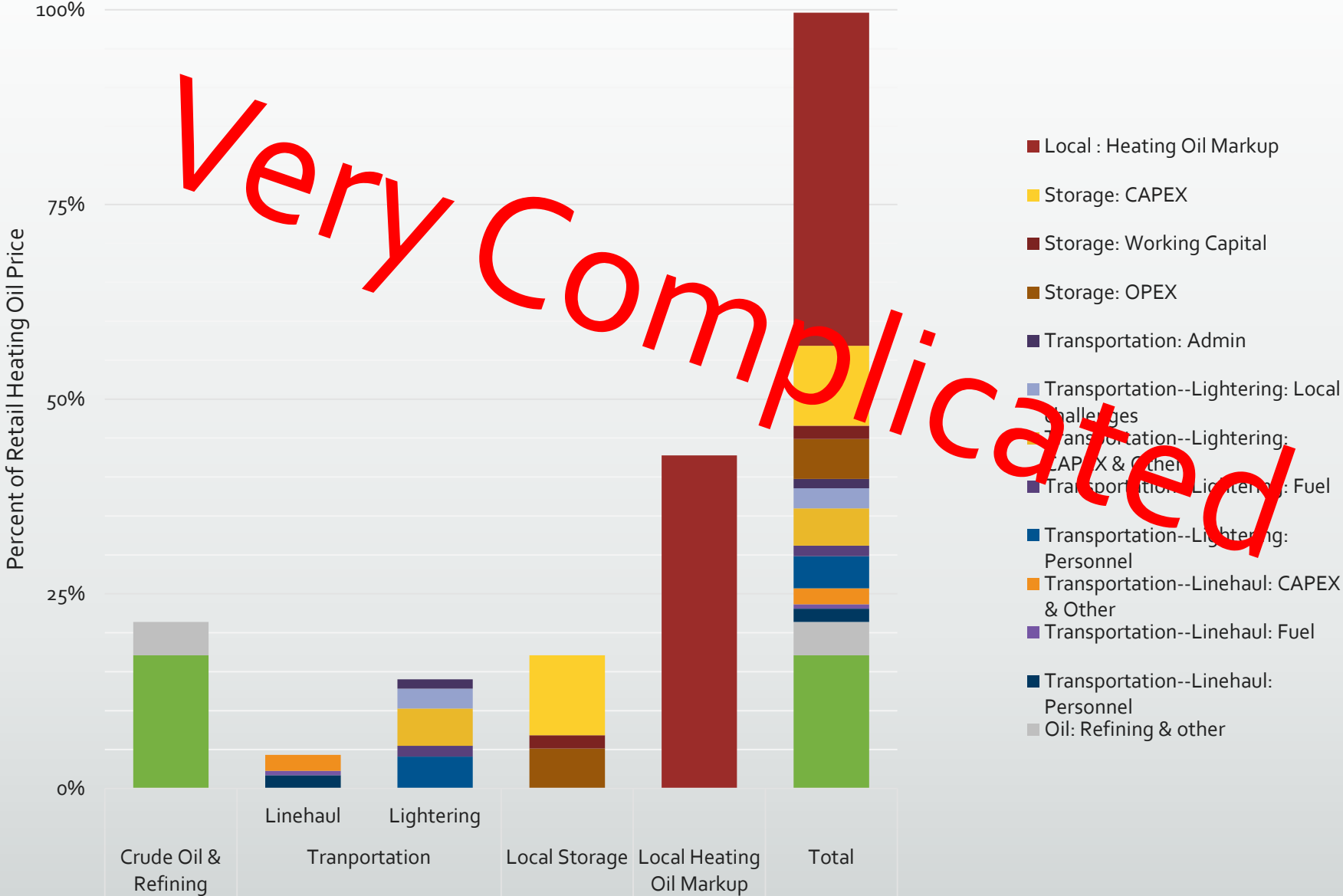


Components of the Delivered Price of Diesel (Assume \$40/barrel for Crude oil)



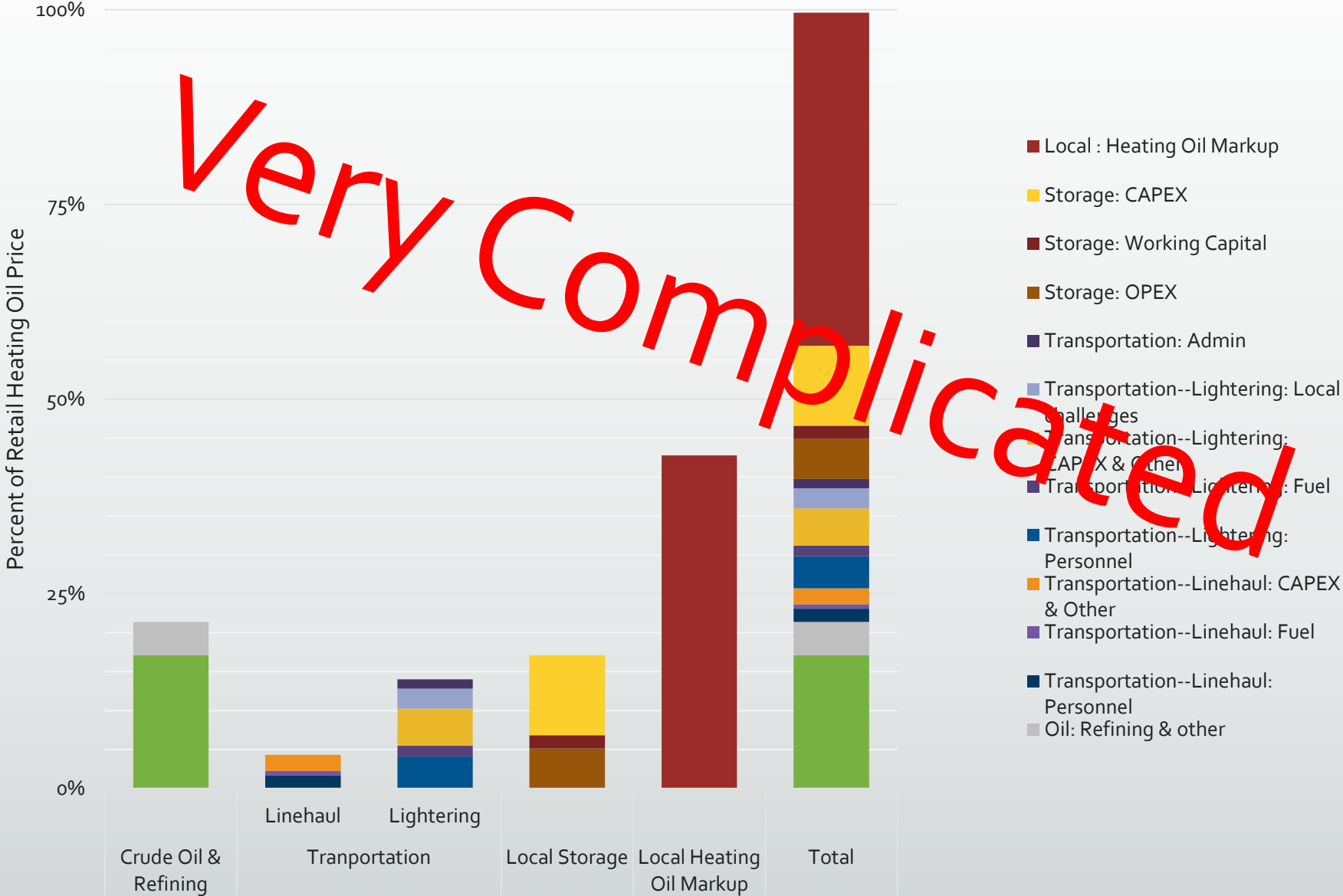
Adapted from ISER 2010.

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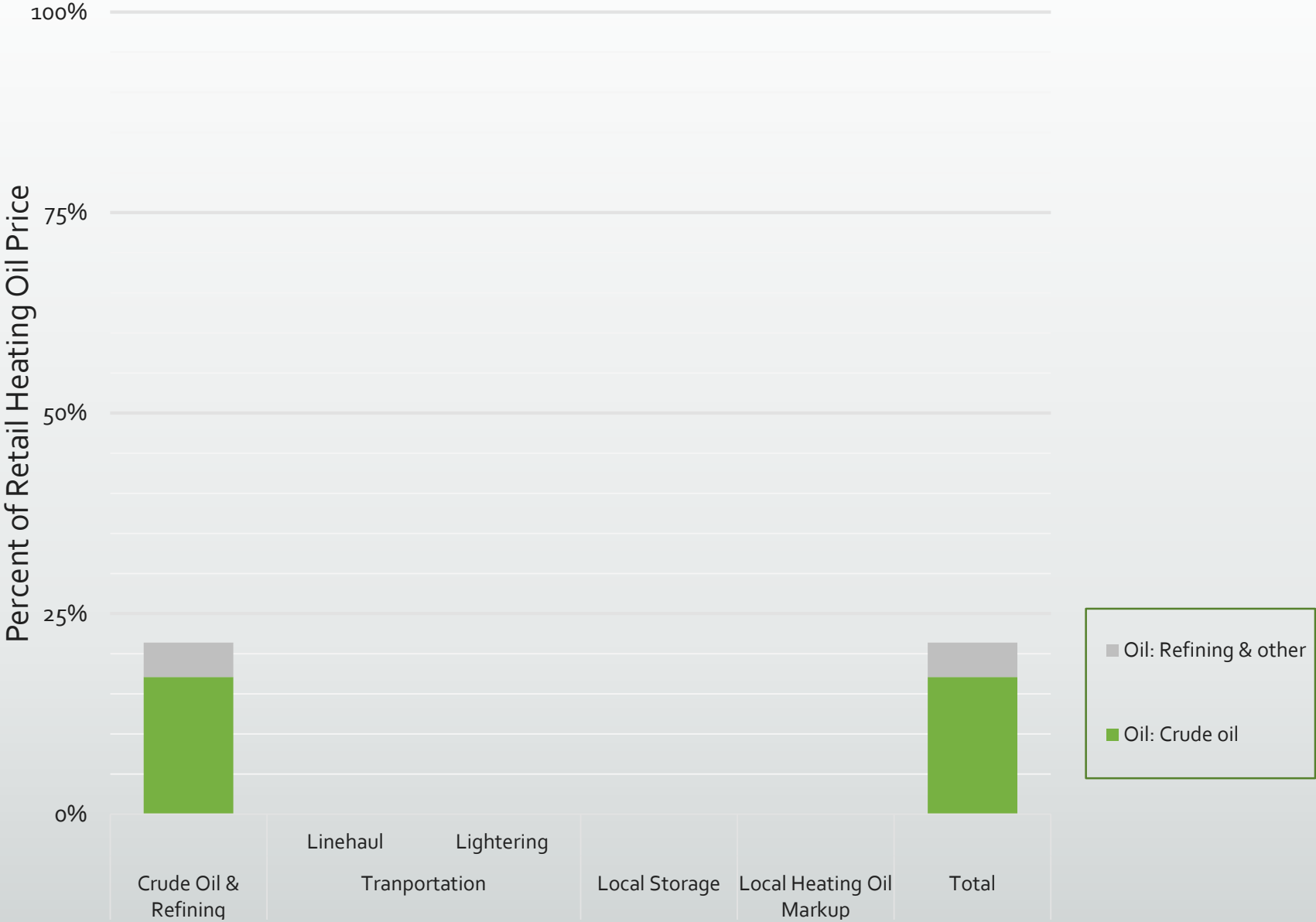
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Let's go slowly

Adapted from ISER 2010.

Components of the Delivered Price of Diesel
(Assume \$40/barrel for Crude oil)



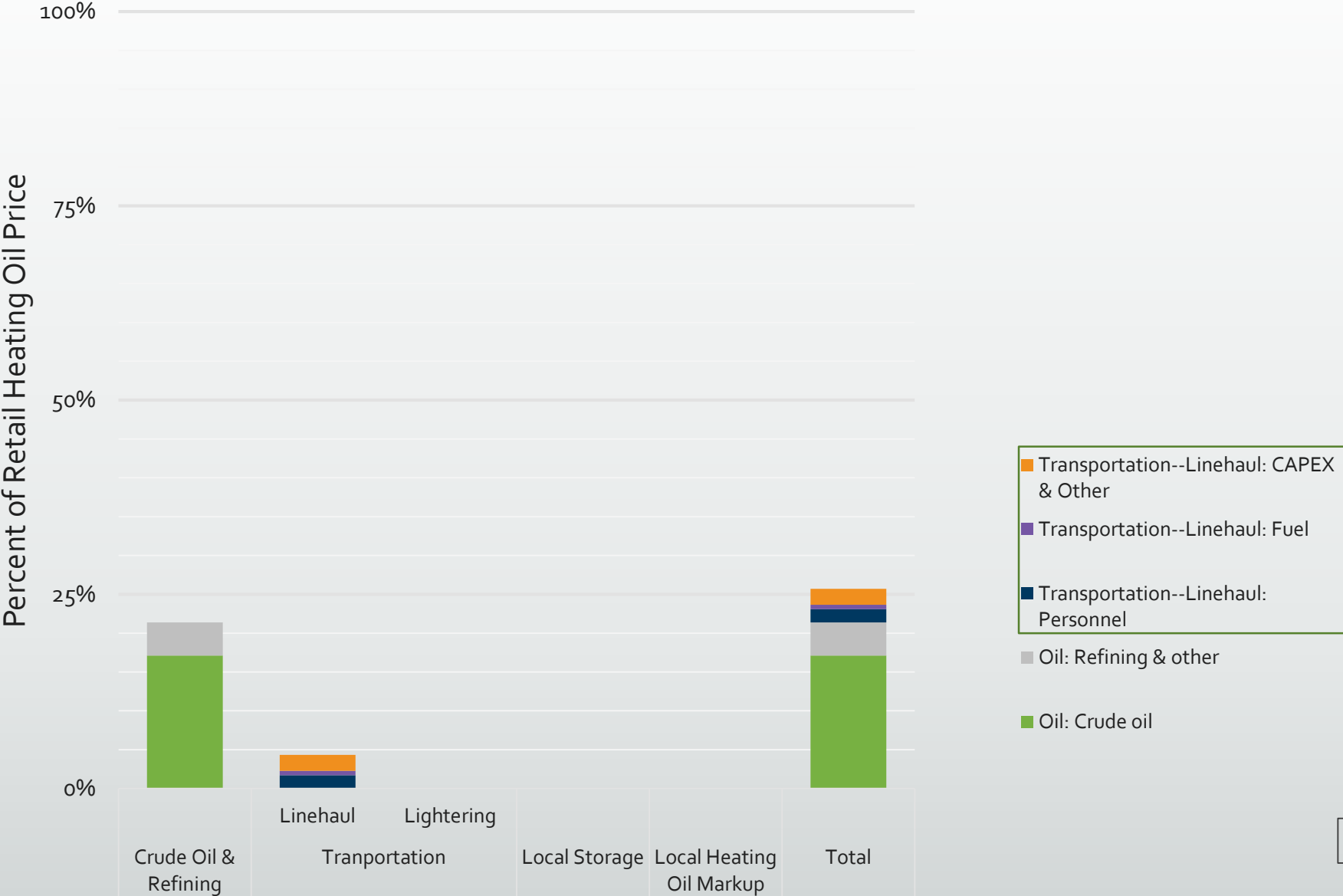
Crude Oil: Price is set by international markets

Refining & other: Turn the crude oil into diesel, heating oil, gasoline; marketing and other expenses.

Leads to wholesale price of diesel to fuel distributors—Crowley, Delta Western, etc.

Adapted from ISER 2010.

Components of the Delivered Price of Diesel
(Assume \$40/barrel for Crude oil)



Linehaul Barges: Large ocean-going barges—from Cook Inlet, Valdez, Washington.

- Carry 2-3M gallons, require 18-25' draft

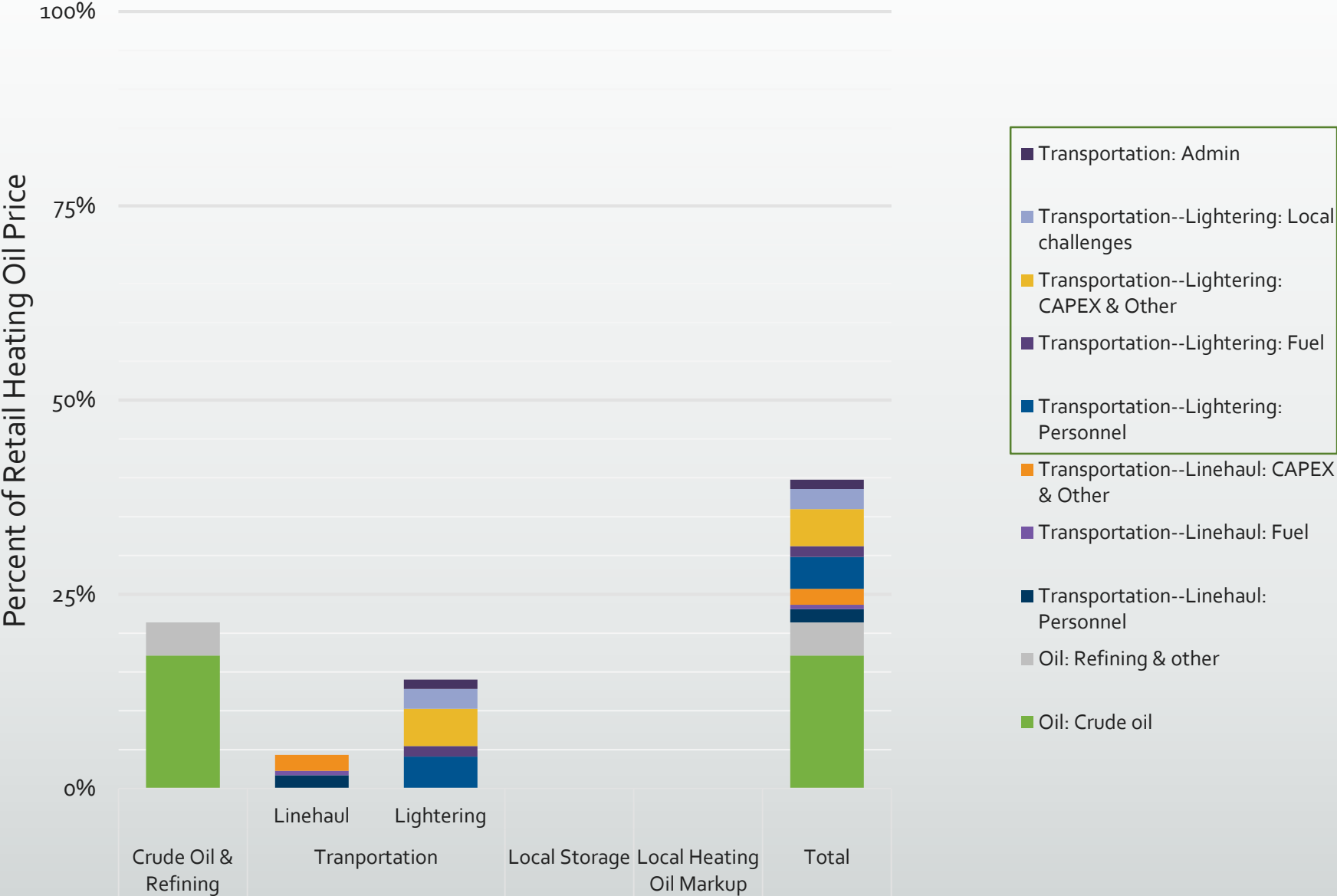
CAPEX & Other: Pay for cost of barge, insurance, administration, financing fuel, etc.

Fuel: About 10% of linehaul costs, may go up to 15% when fuel is more expensive

Personnel: About 30% of linehaul costs

Adapted from ISER 2010.

Components of the Delivered Price of Diesel (Assume \$40/barrel for Crude oil)



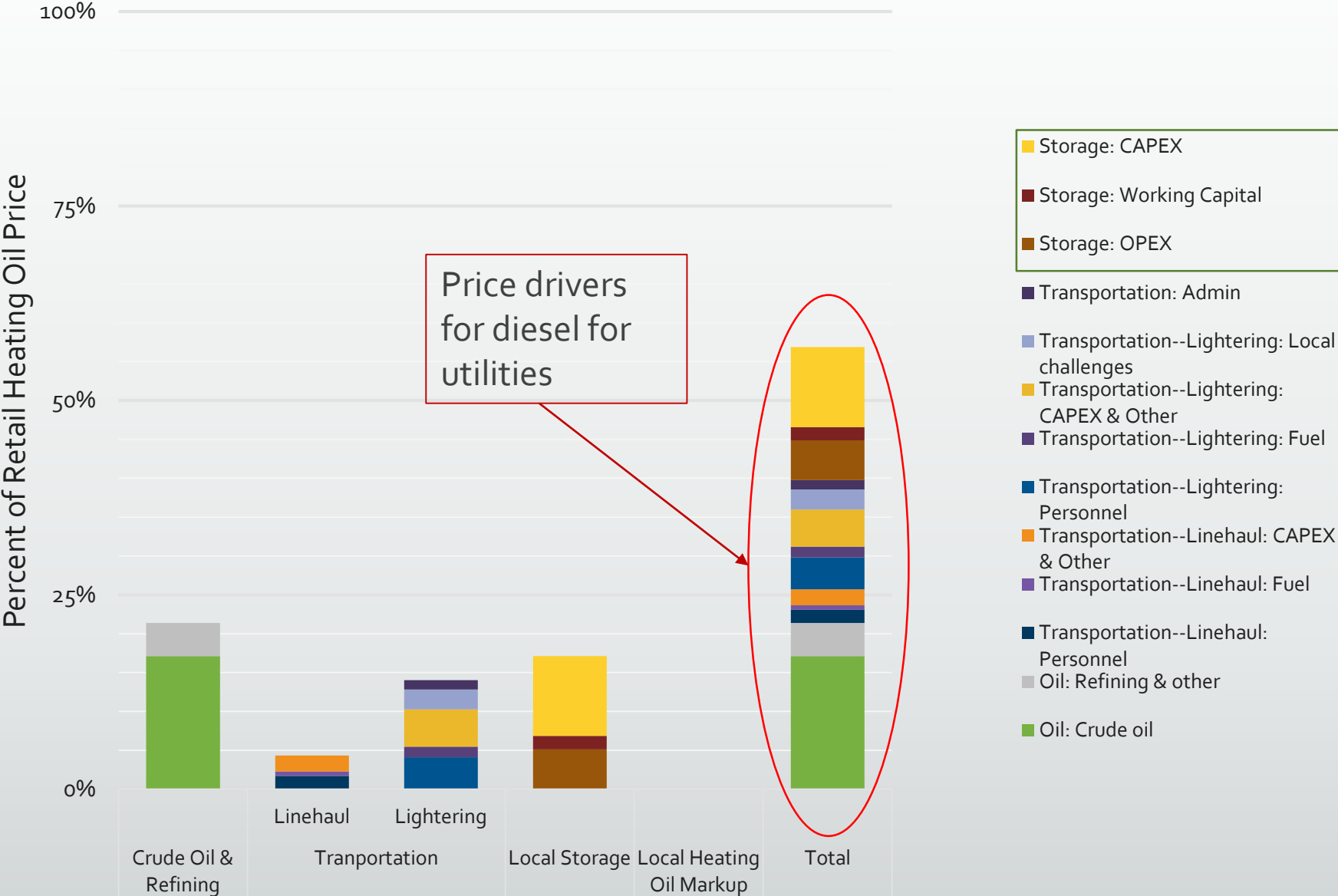
Lightering: Smaller barges for river/coastal deliveries

- 120-350,000 gallons
- May carry significantly less than maximum due to water depth

Cost Drivers Same as Linehaul: Higher costs per gallon due to lower gallons delivered per trip

Adapted from ISER 2010.

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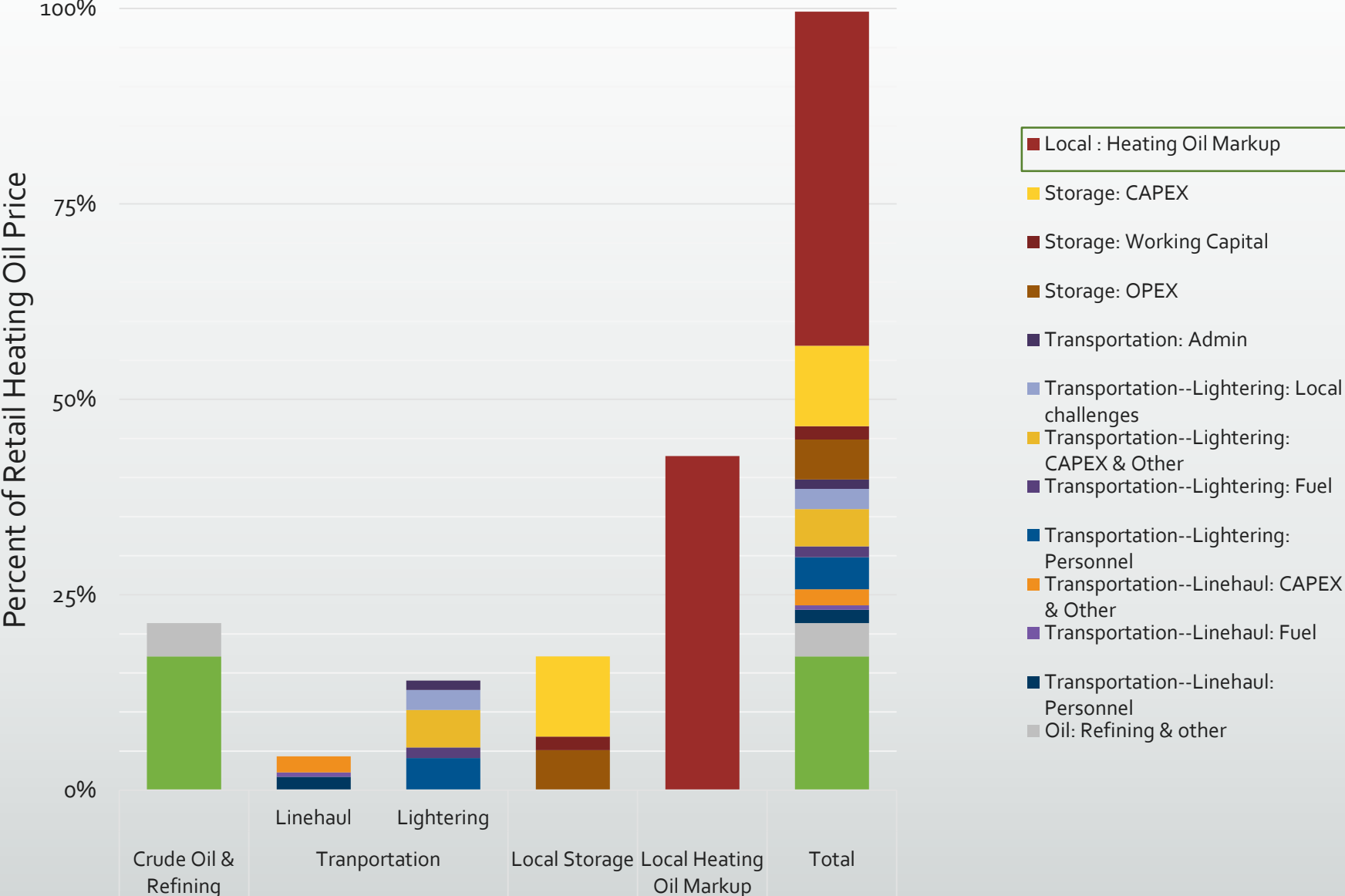


Storage:

- **CAPEX:** Capital costs generally not booked (grant funded through Bulk Fuel Upgrade program)
- **Working Capital:** Financing costs of unsold fuel
- **OPEX:** Operations; maintenance on tanks, fuel lines, pumps; other

Adapted from ISER 2010.

Components of the Delivered Price of Diesel
(Assume \$40/barrel for Crude oil)



Local Heating Oil Markup

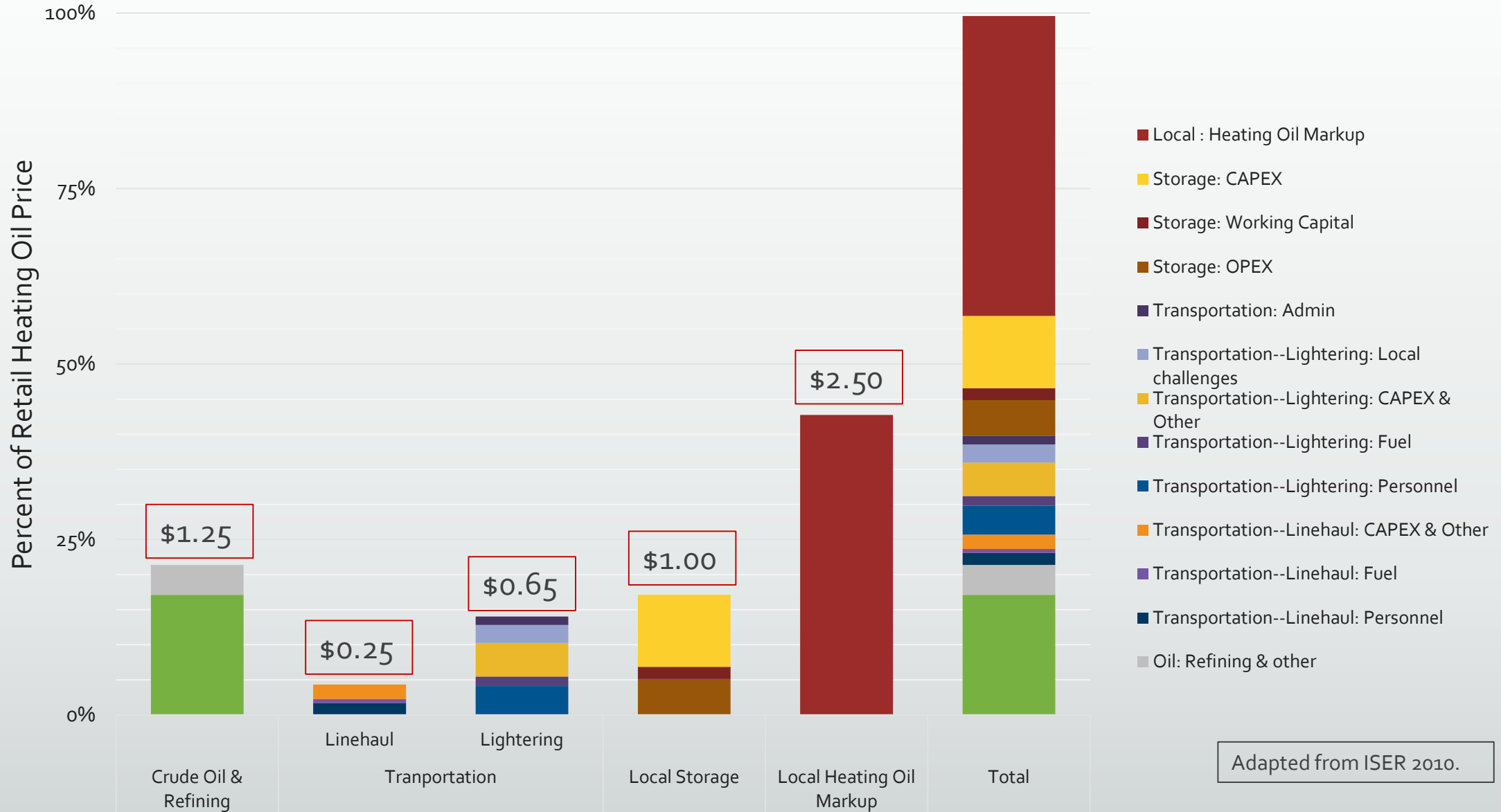
Unpredictable and factors are not well understood

Range of Markups:

- Greater than \$4/gallon markup in some communities
- Average: Less than \$1/gallon
- Low: Subsidies of more than \$5/gallon in NSB

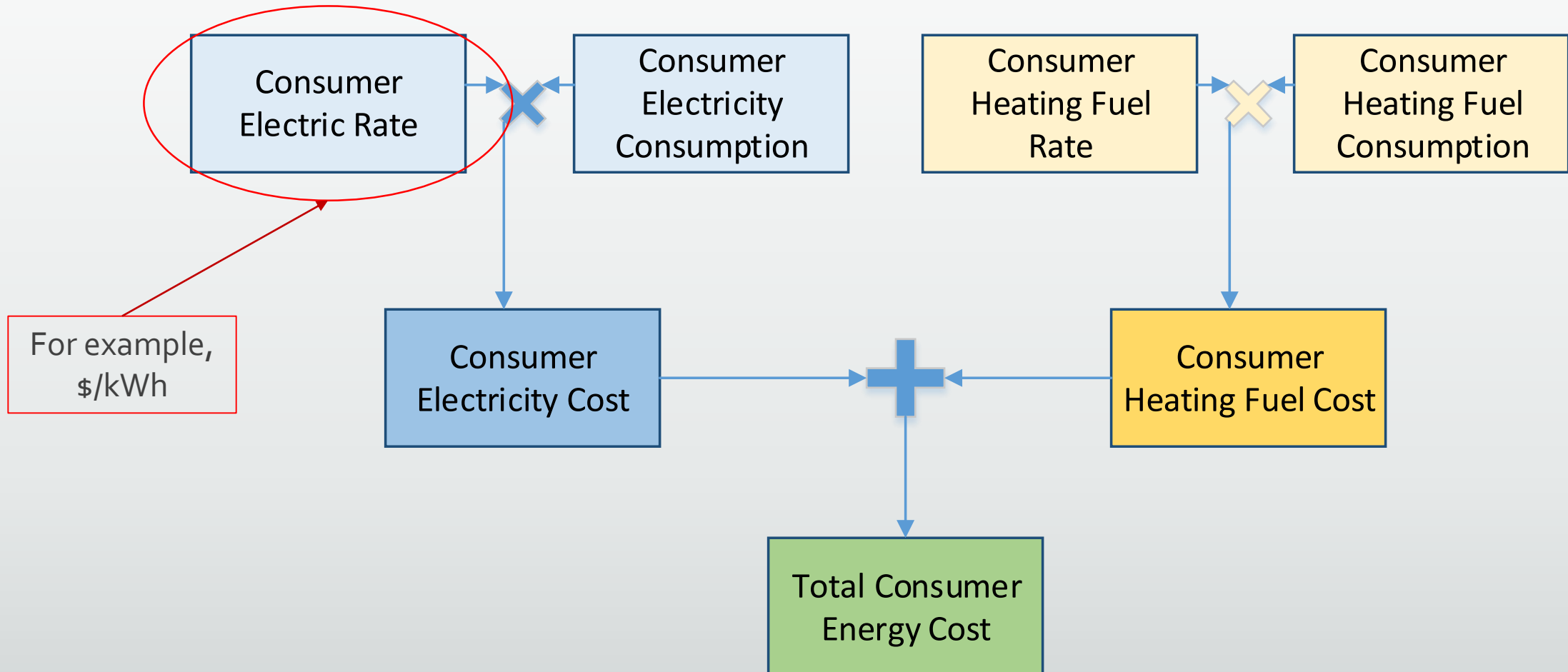
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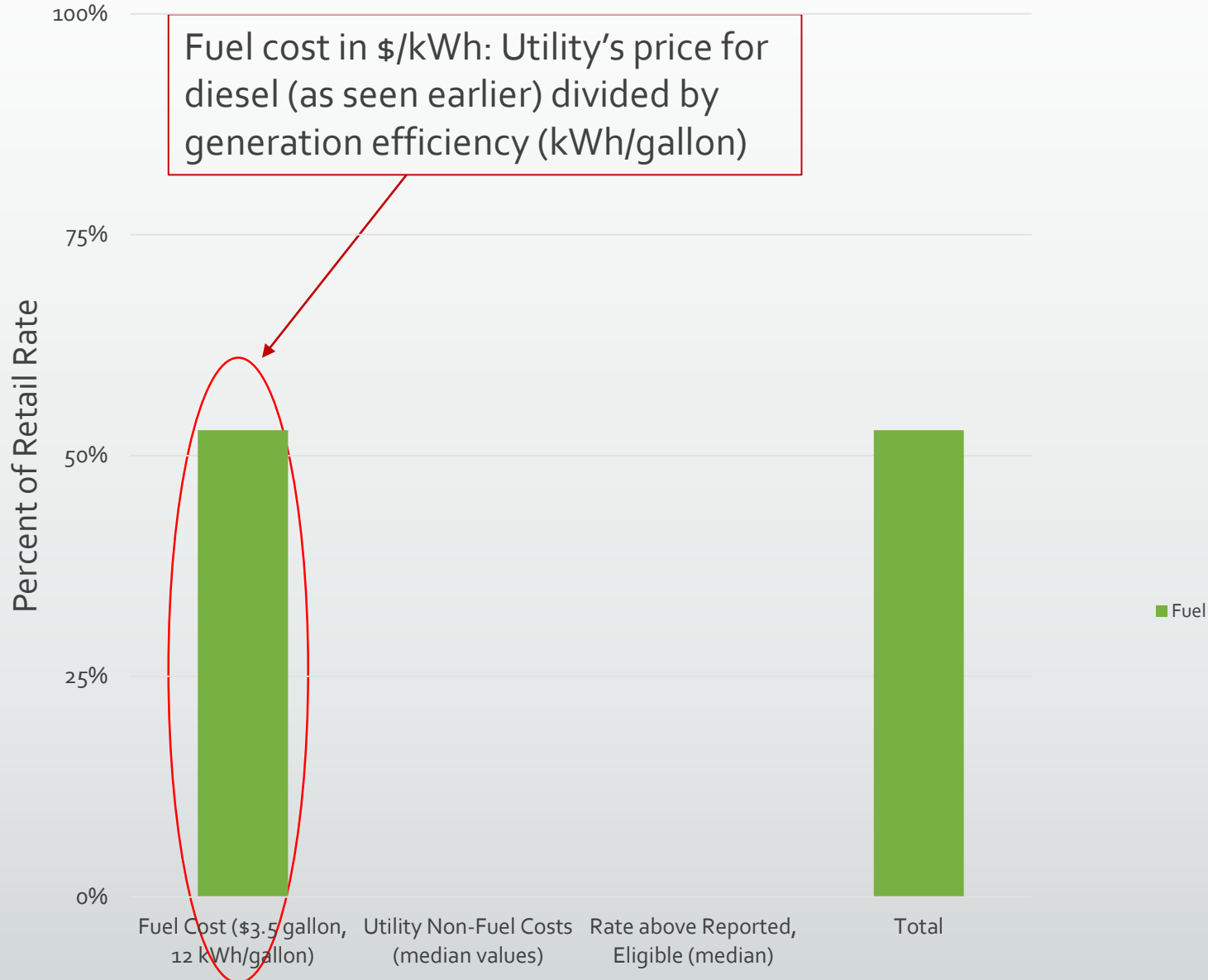


Adapted from ISER 2010.

Factors That Lead to Consumer Energy Costs



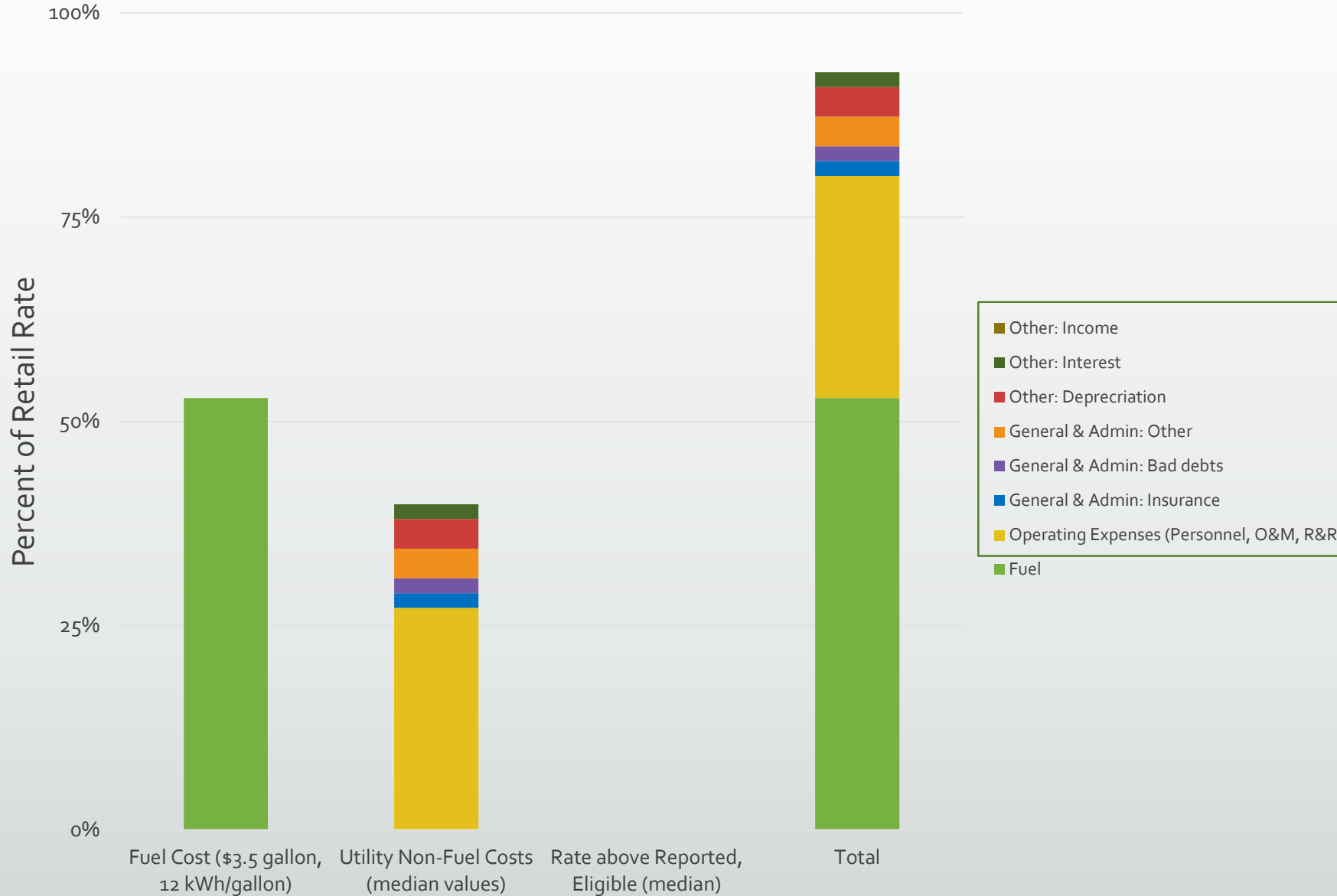
Components of Electricity Price (Assumes median values for PCE communities)



Fuel Cost:

- Depends on the percentage of generation from diesel
- Efficiency of diesel generation
- Price of diesel (as seen in Slide #19)
- Slide assumes:
 - 100% diesel generation
 - Efficiency: 12 kWh/gallon
 - Fuel price: \$3.50/gallon

Components of Electricity Price
(Assumes median values for PCE communities)



Utility Non-Fuel Costs:

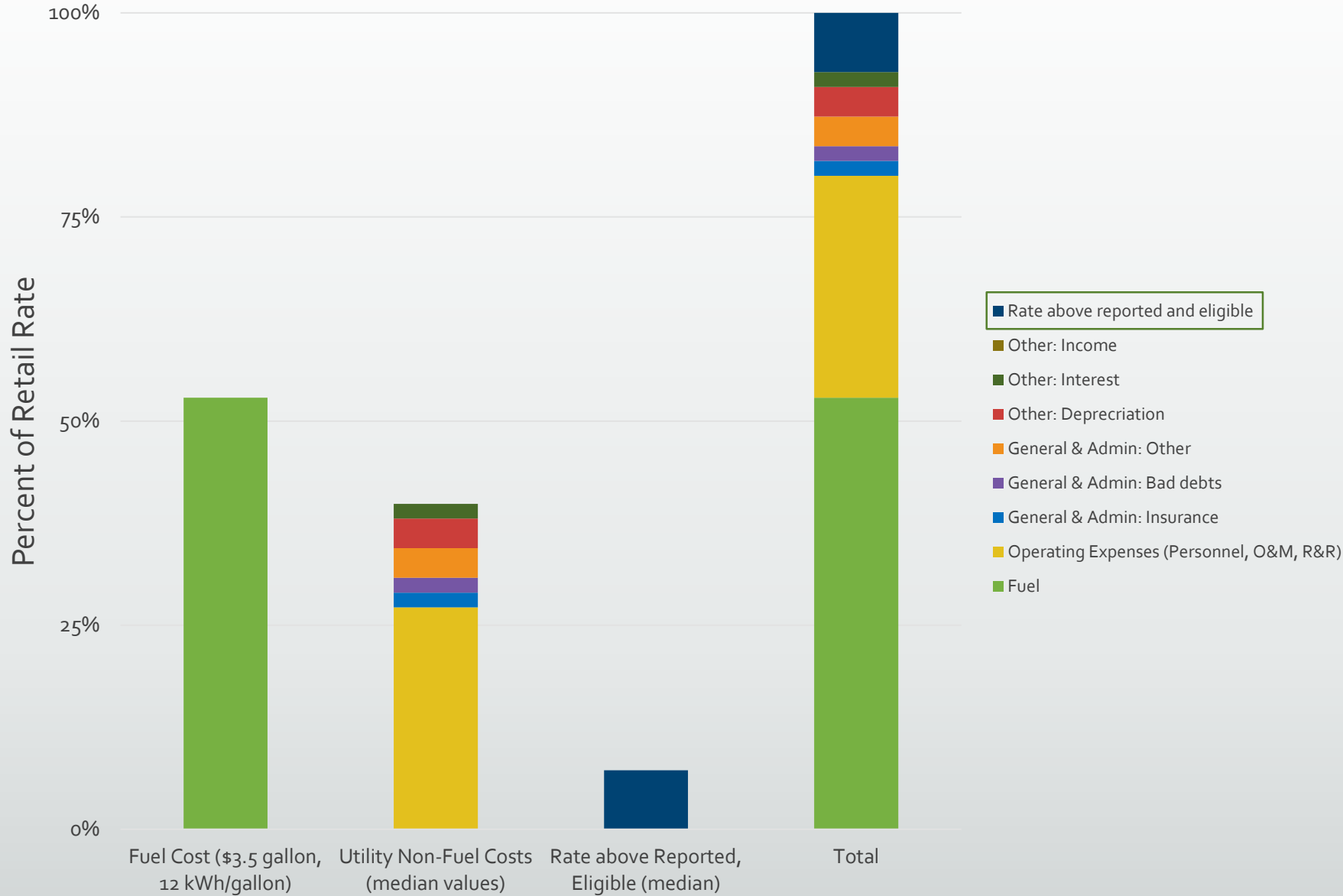
- **Depreciation**--Capital expenses
- **G&A: Other**—Other administrative costs
- **G&A: Bad Debts**—unpaid bills
- **Operations**—Personnel, O&M, R&R

Variations across utilities

- **Low:** less than \$0.10/kWh
- **High:** greater than \$0.90/kWh

Income—(Heat sales, pole rental, etc.) reduces costs to electric customers

Components of Electricity Price
(Assumes median values for PCE communities)



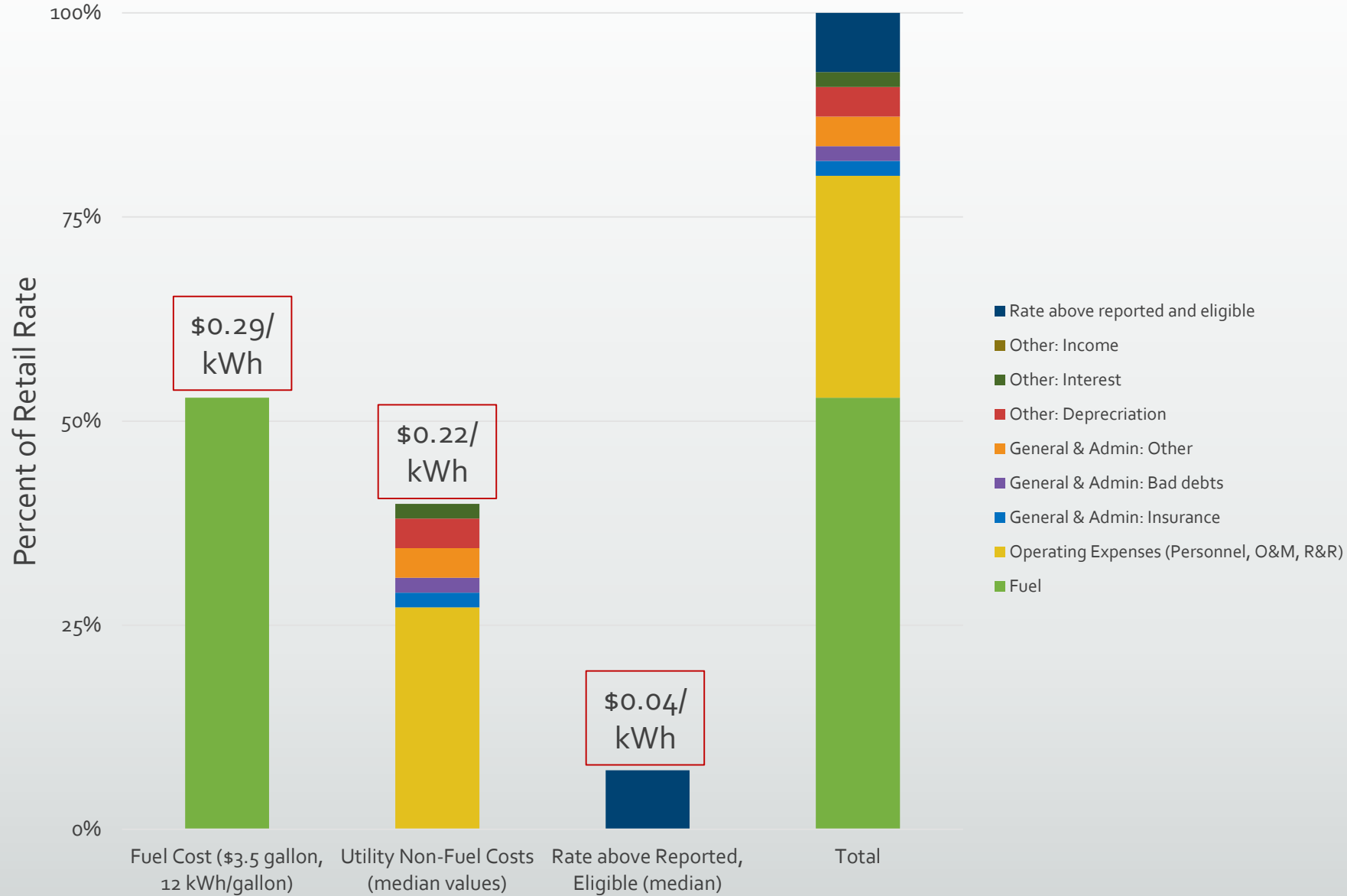
Rate above Reported, Eligible (R&E):

- Difference between R&E and residential rate, median of PCE communities

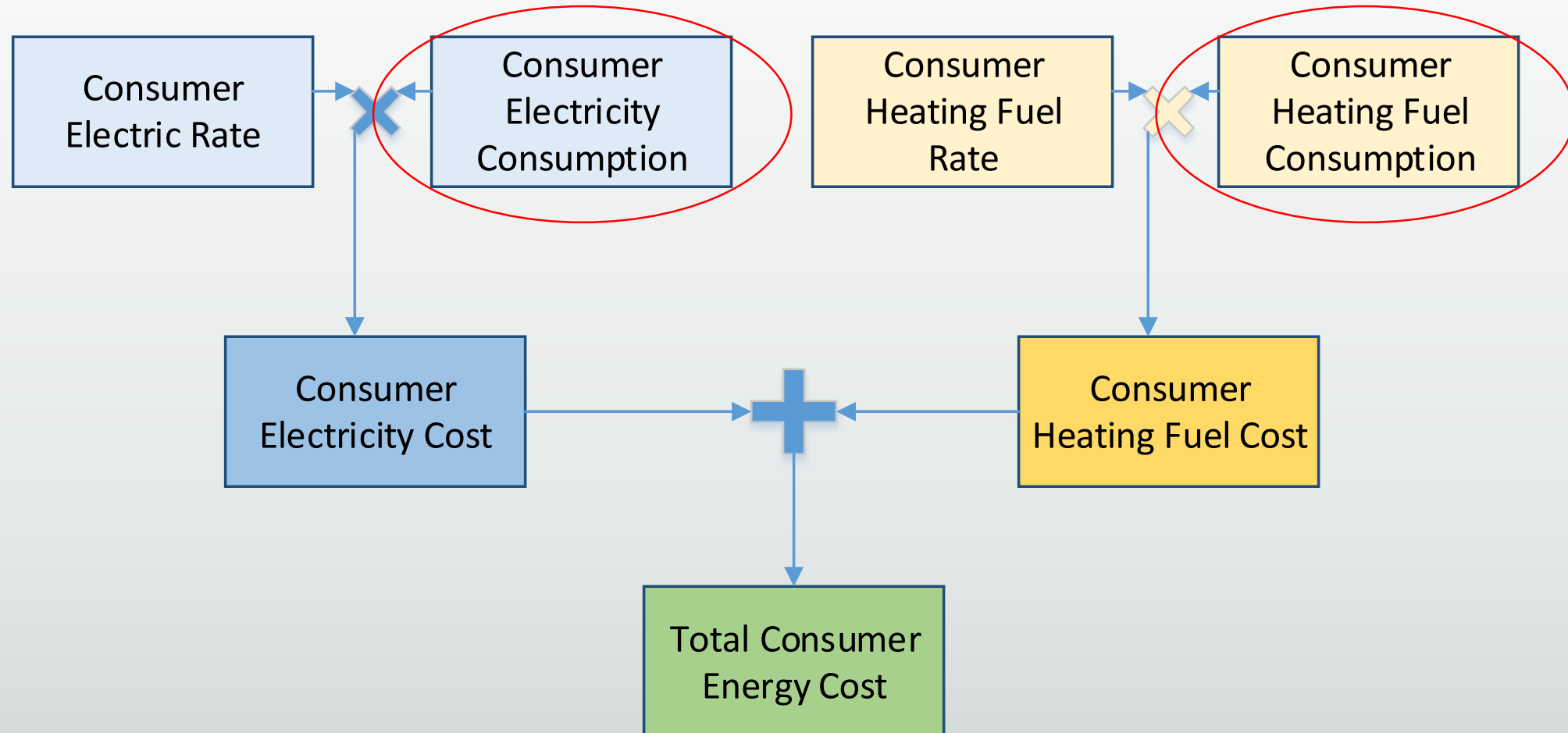
Variations across utilities

- **Low:** subsidies of \$0.70/kWh
- **High:** greater than \$0.90/kWh

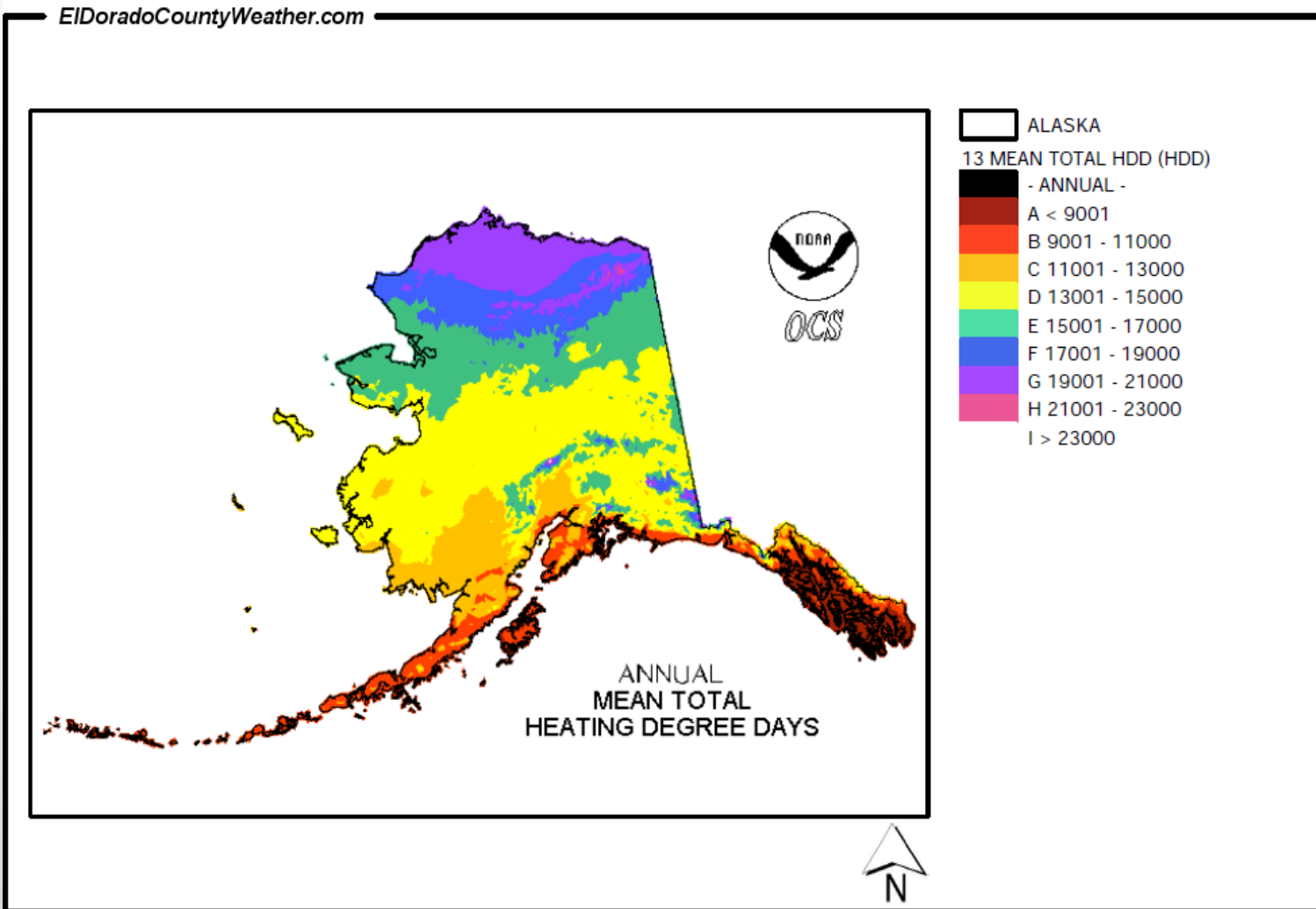
Components of Electricity Price (Assumes median values for PCE communities)



Factors That Lead to Consumer Energy Costs



Factors that Lead to Consumption



- Climate
- Building Size
- Building Use
- Building Energy Efficiency

Non-Residential Heating and Electric Demand

Building Size

- Larger communities generally have larger buildings
- Some types of buildings are larger than others on average (schools, for example)
- AEA has building square footage for approximately 3,000 buildings across the AkAES region

Building Consumption

- Some difference in heating oil consumption across building types
- Large differences in average electricity consumption across building types
- Heating oil consumption per square foot not different across community sizes
- Electricity consumption increases with community size

Residential Heating Demand

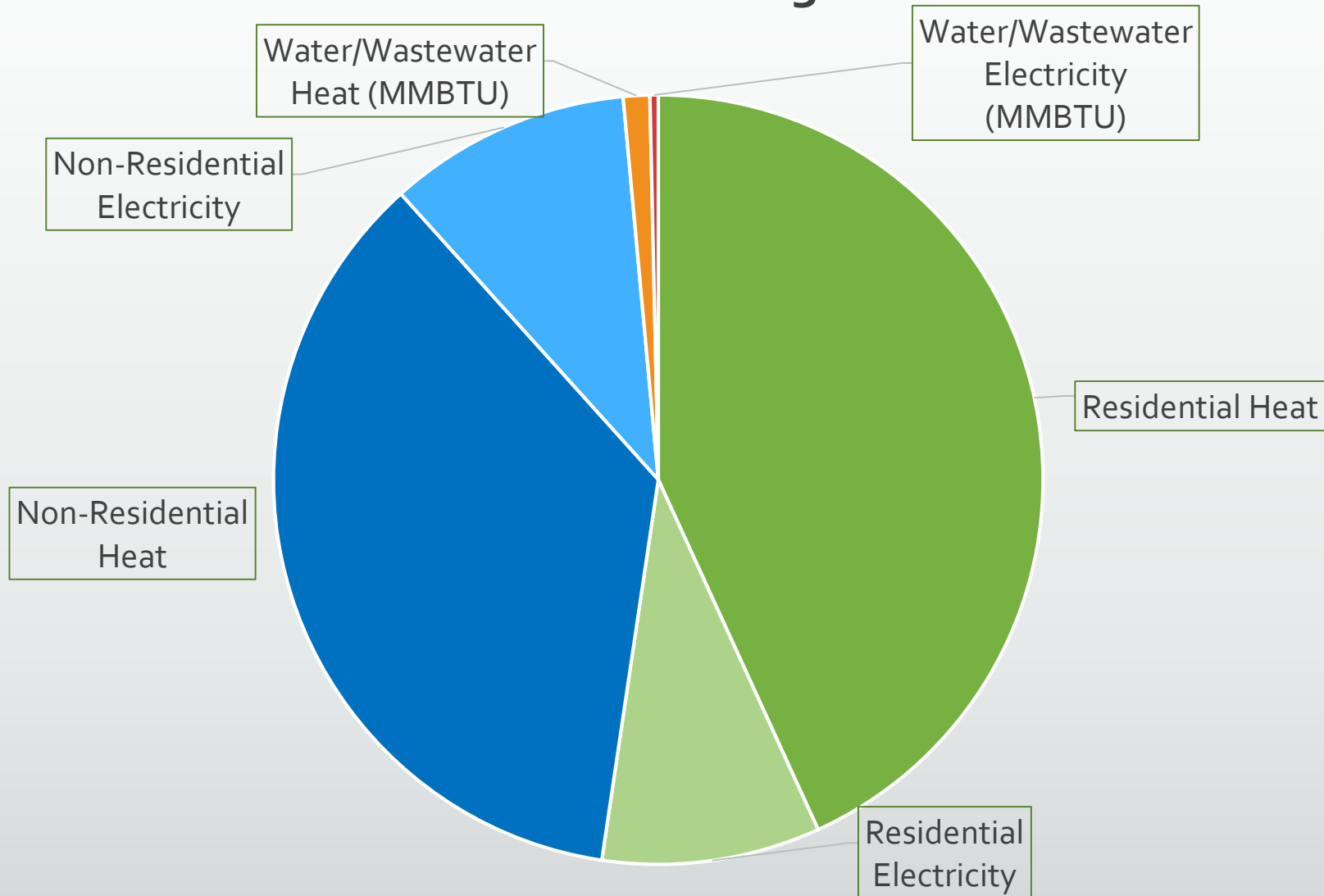
Building Size

- Significant differences in average house size within and across regions
 - From <500 sf to >2500 sf
- Reported square footages from ~17,000 records in ARIS database

Building Consumption

- Wide range of averages based on:
 - Climate, sizes, quality of housing
- Some areas use significant amounts of firewood and/or electricity for space heat

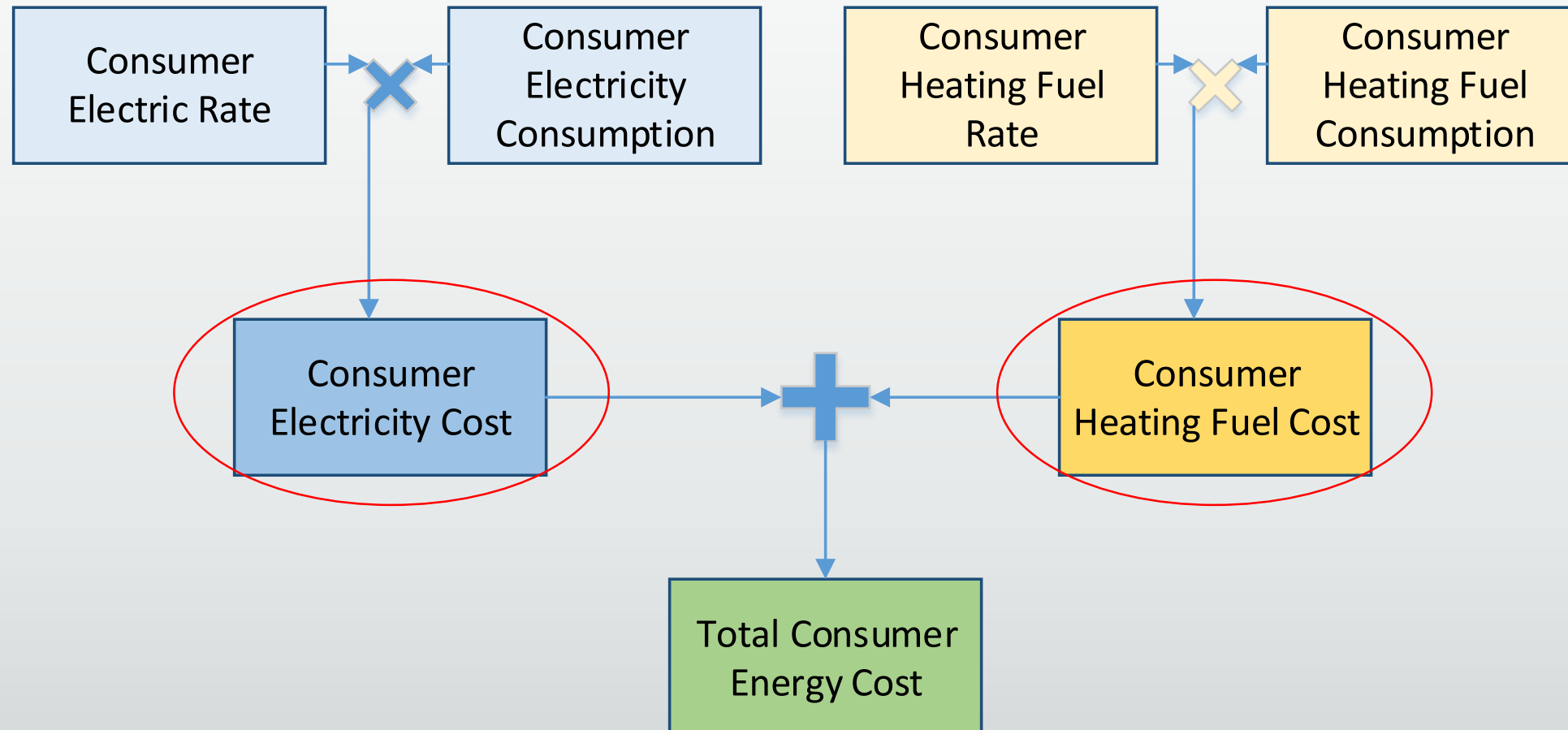
Average Community Energy Consumption by Sector Within AkAES Regions



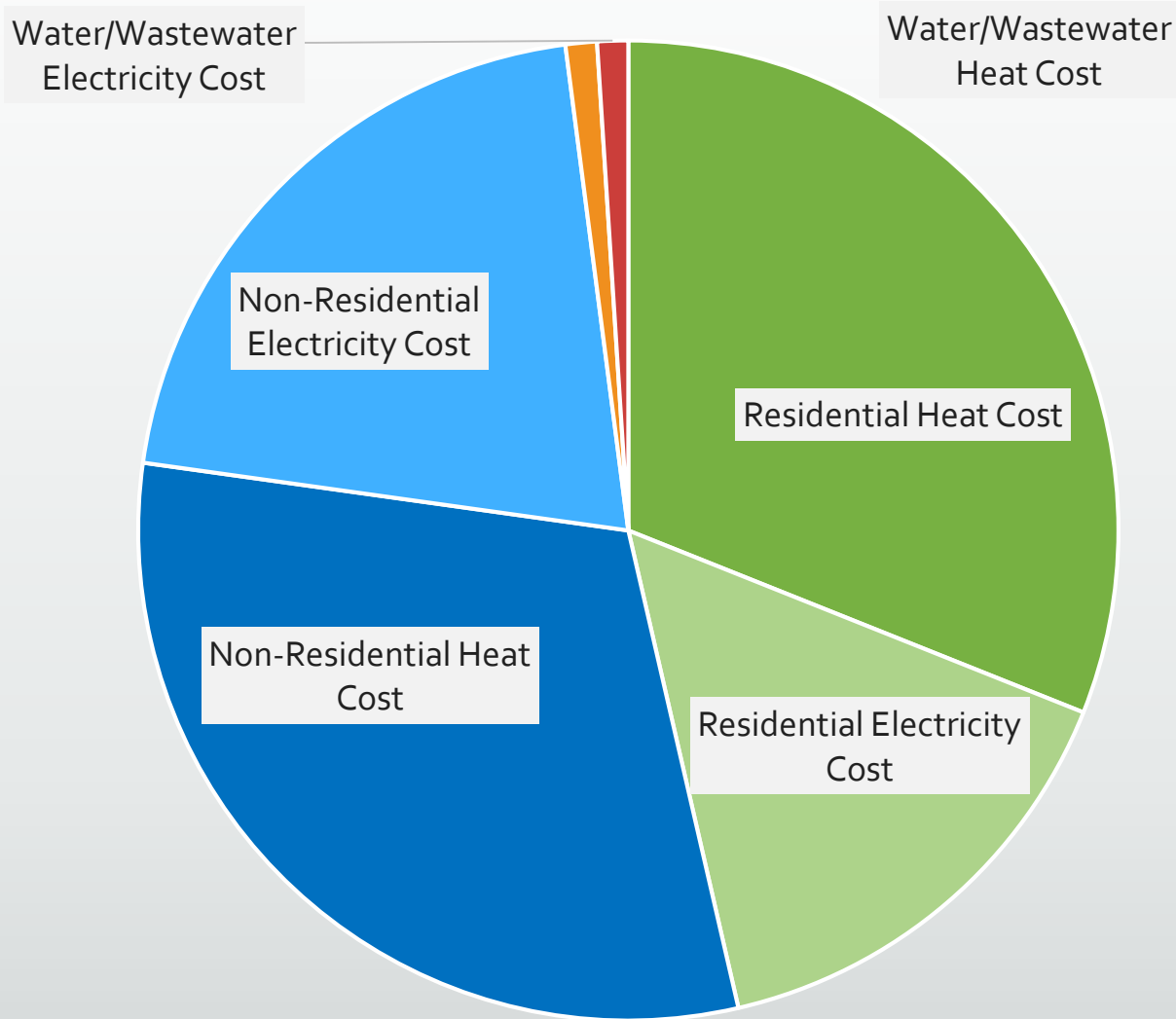
- **Heat** is the main driver for energy consumption for both residential and non-residential sectors
- On average, **residential energy** consumption is slightly more than non-residential
- **Water & wastewater** is not a main driver of total community energy consumption

(All MMBtu consumed on site)

Factors That Lead to Consumer Energy Costs



Average Community Energy Cost by Sector



- **Heat** is the main driver for energy costs for both residential and non-residential sectors
- **Electricity** costs are total costs including PCE payments
- **Electricity** costs come much closer to **heating** costs due to much higher unit costs
- On average, **residential energy** costs are slightly less than non-residential
- **Water & wastewater** is not a main driver of total community energy costs

Strategies

Areas of Study for Affordable Energy

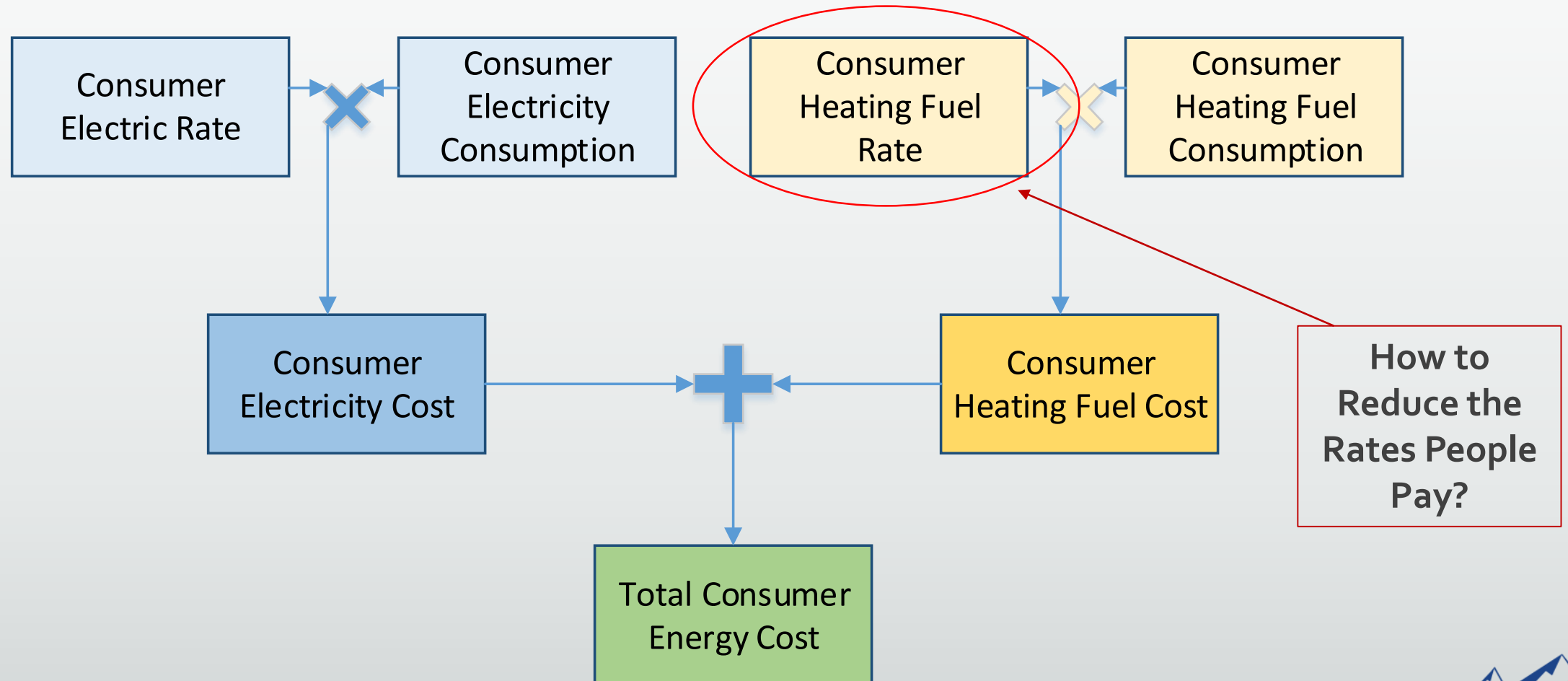
Infrastructure

- Energy Efficiency
- Diesel Efficiency
- Renewable Energy
- Transmission & Interties
- Fuel Delivery Improvements
- Fuel Switching

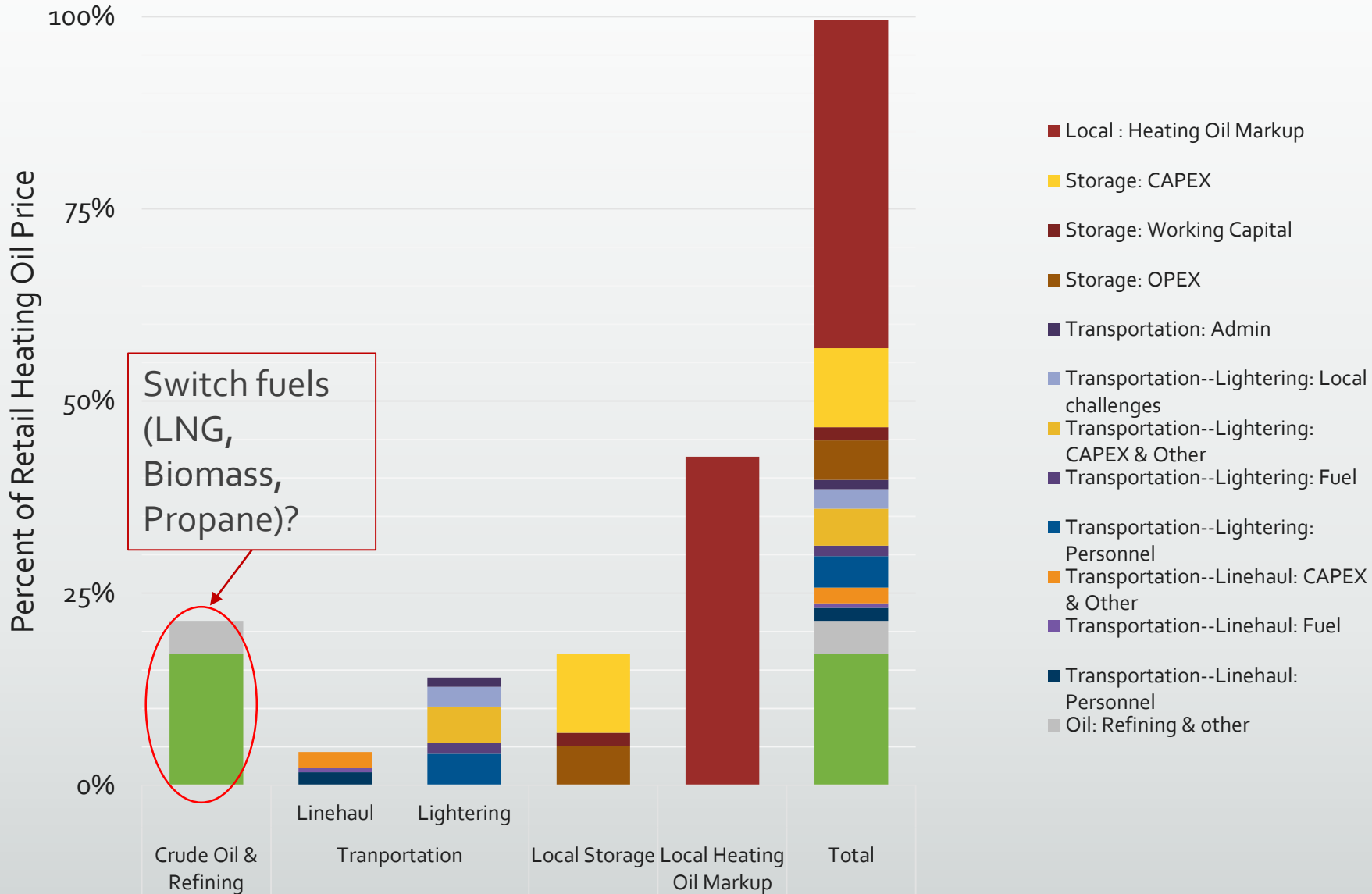
Non-infrastructure

- Direct Underwriting (subsidies)
- Management Improvements
- Ownership & Project financing

Factors That Lead to Consumer Energy Costs



Components of the Delivered Price of Diesel by (Assume \$40/barrel for Crude oil)



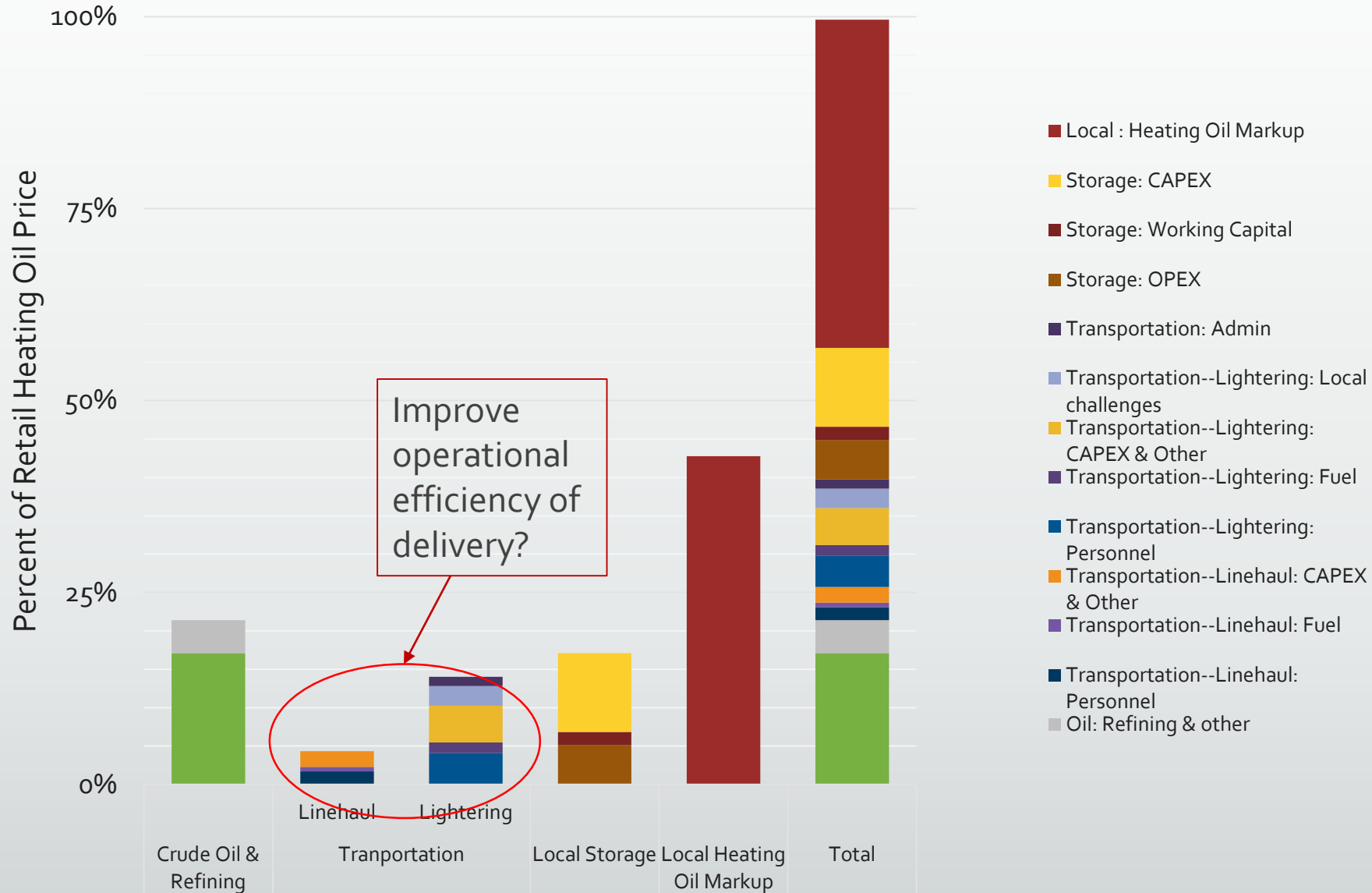
Switch fuels:

- May decrease the wholesale price of fuel but may have increased costs for transportation and storage.
- Local markup will still probably apply for the new fuel

AkAES Projects:

- LNG study
- Modeling on Biomass

Components of the Delivered Price of Diesel by (Assume \$40/barrel for Crude oil)



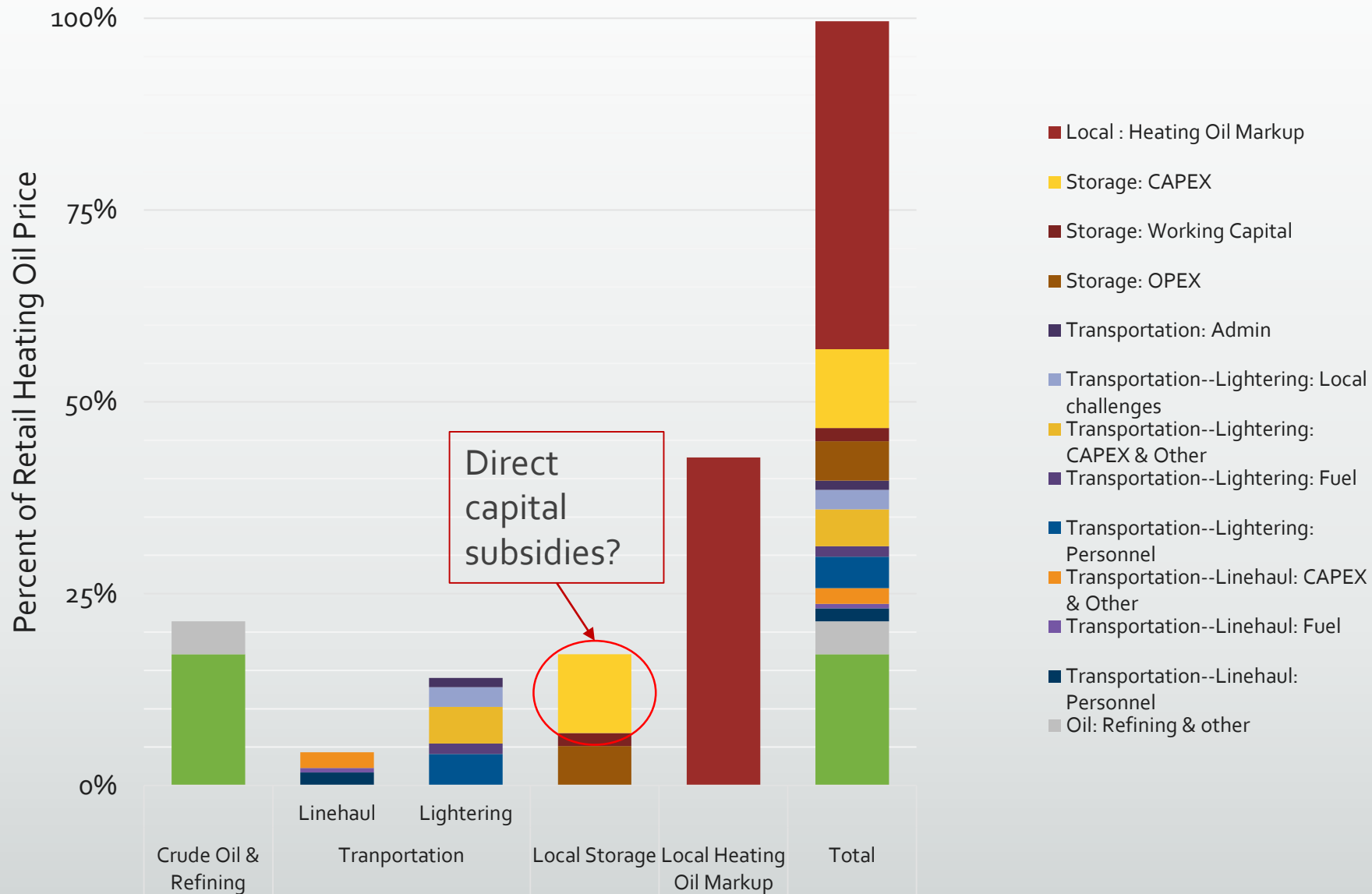
Transportation Efficiency:

- May be able to decrease the delivered cost by reducing time to deliver fuel
- Will require new regional and/or local infrastructure

AkAES Project:

- US Army Corps of Engineers study of regional and local operational efficiencies

Components of the Delivered Price of Diesel by (Assume \$40/barrel for Crude oil)



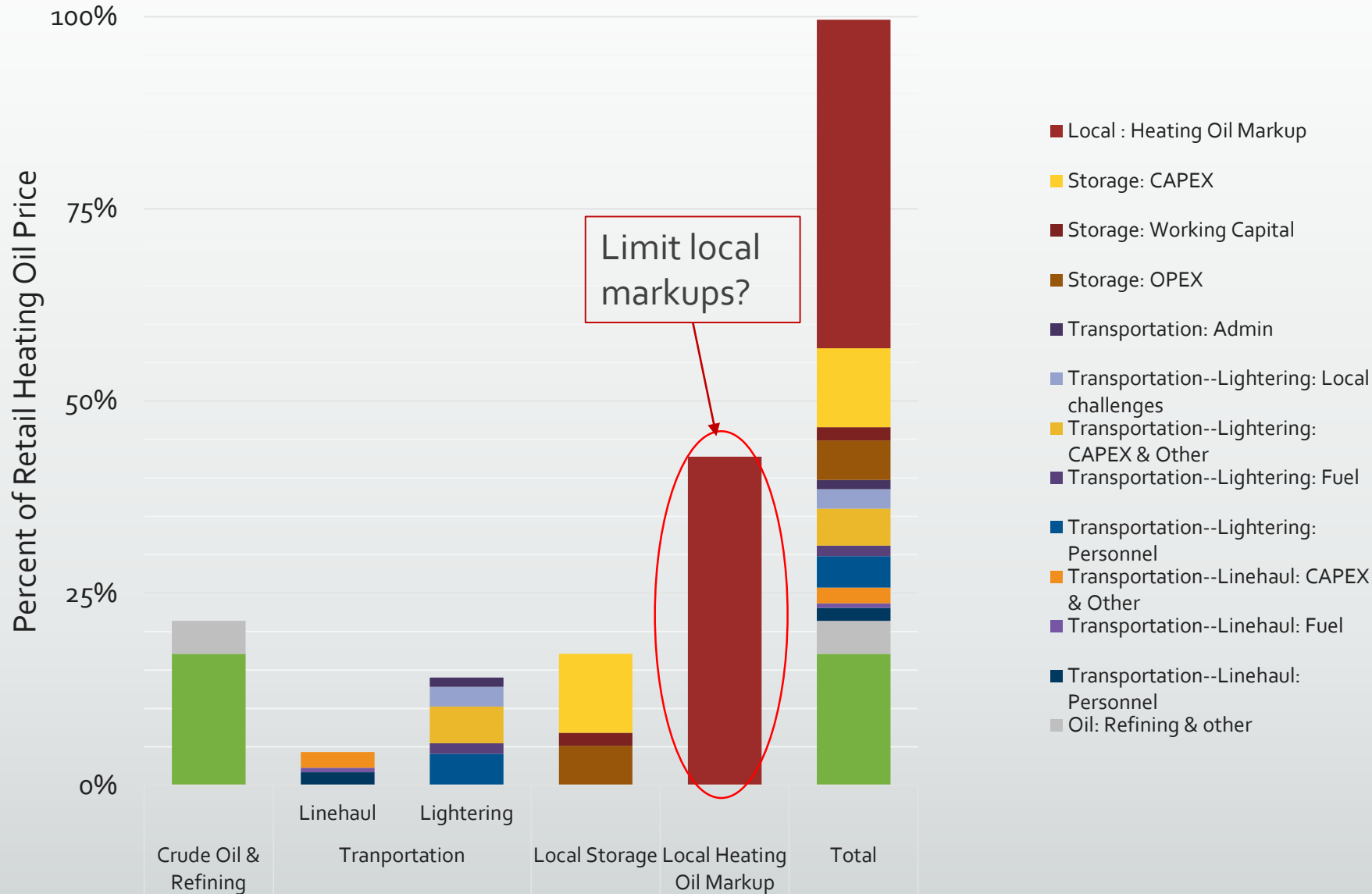
Direct Capital Subsidies:

- Existing program—bulk fuel upgrade program

AkAES Project:

- None

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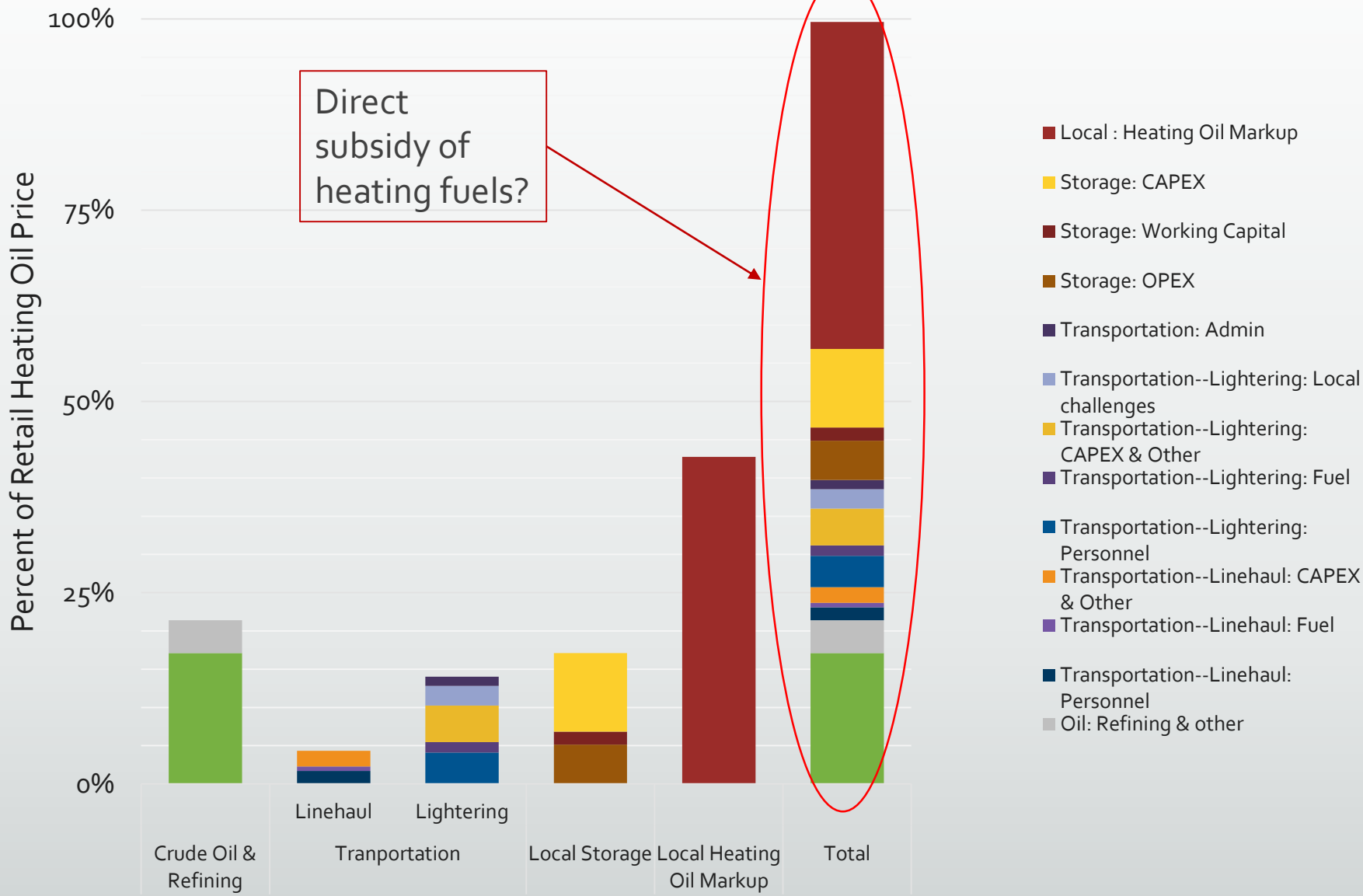
Limit local markups:

- Major cost driver in many communities
- May have unintended consequences for community finances or fuel availability

AkAES Projects:

- Still in development

Components of the Delivered Price of Diesel by (Assume \$40/barrel for Crude oil)



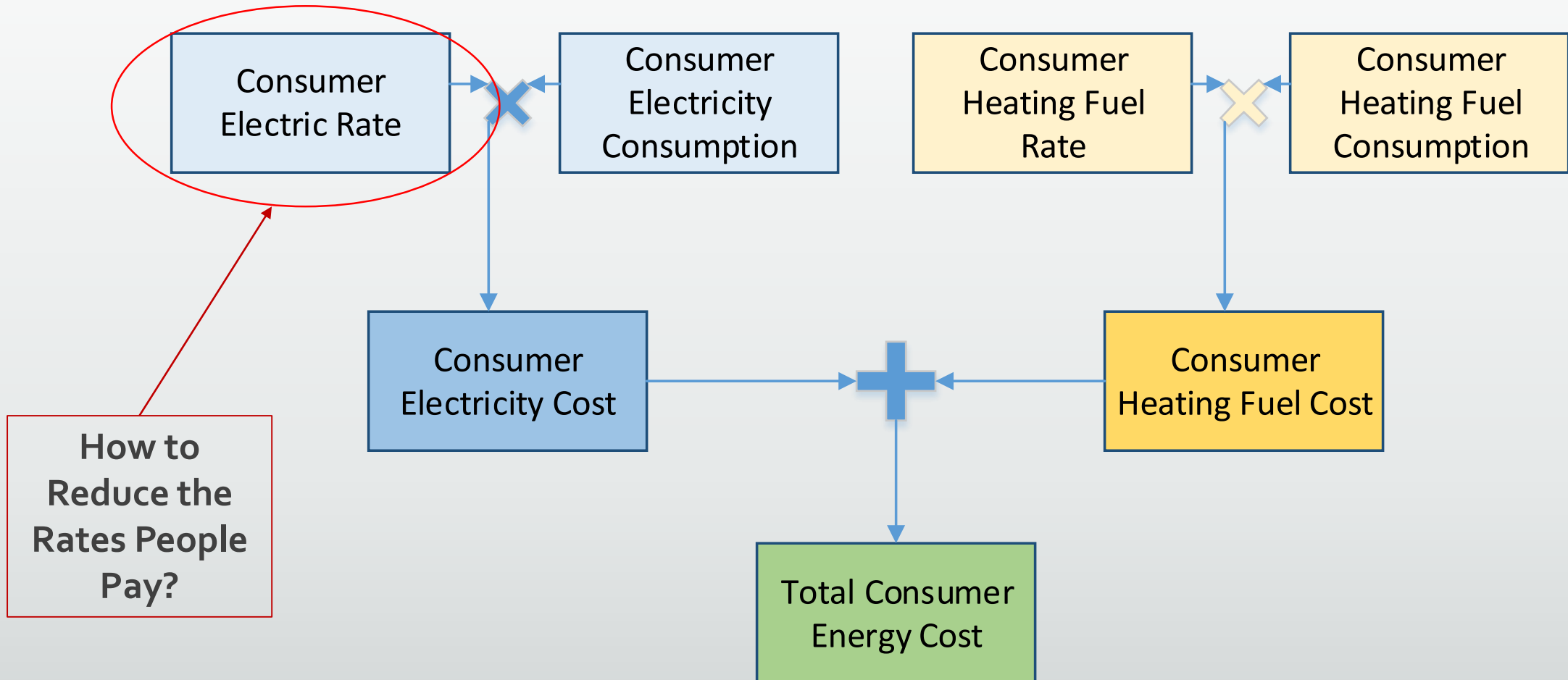
Direct Subsidy:

- Required in by enabling legislation

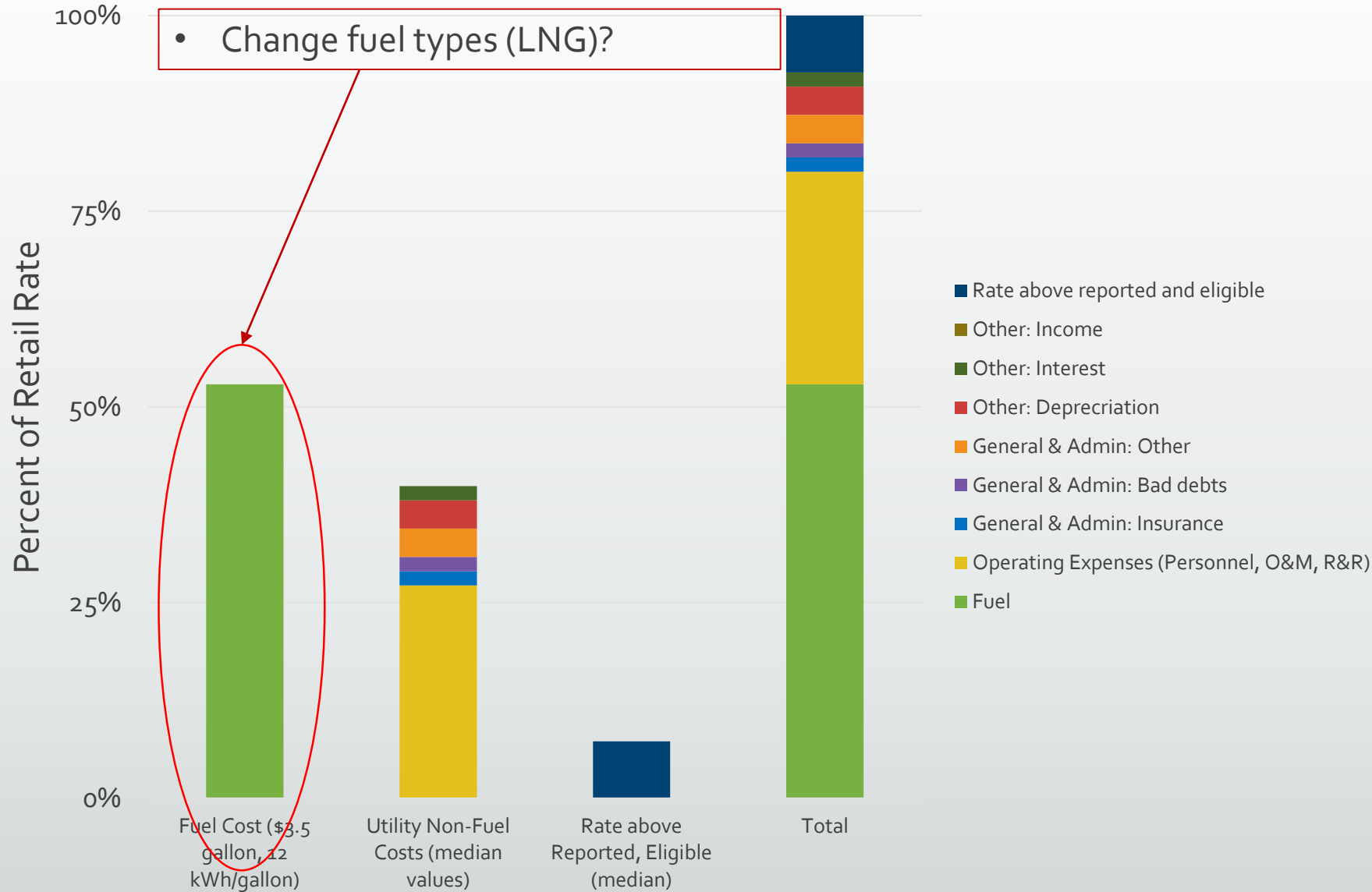
AkAES Project:

- ISER

Factors That Lead to Consumer Energy Costs



Components of Electricity Price (Assumes median values for PCE communities)



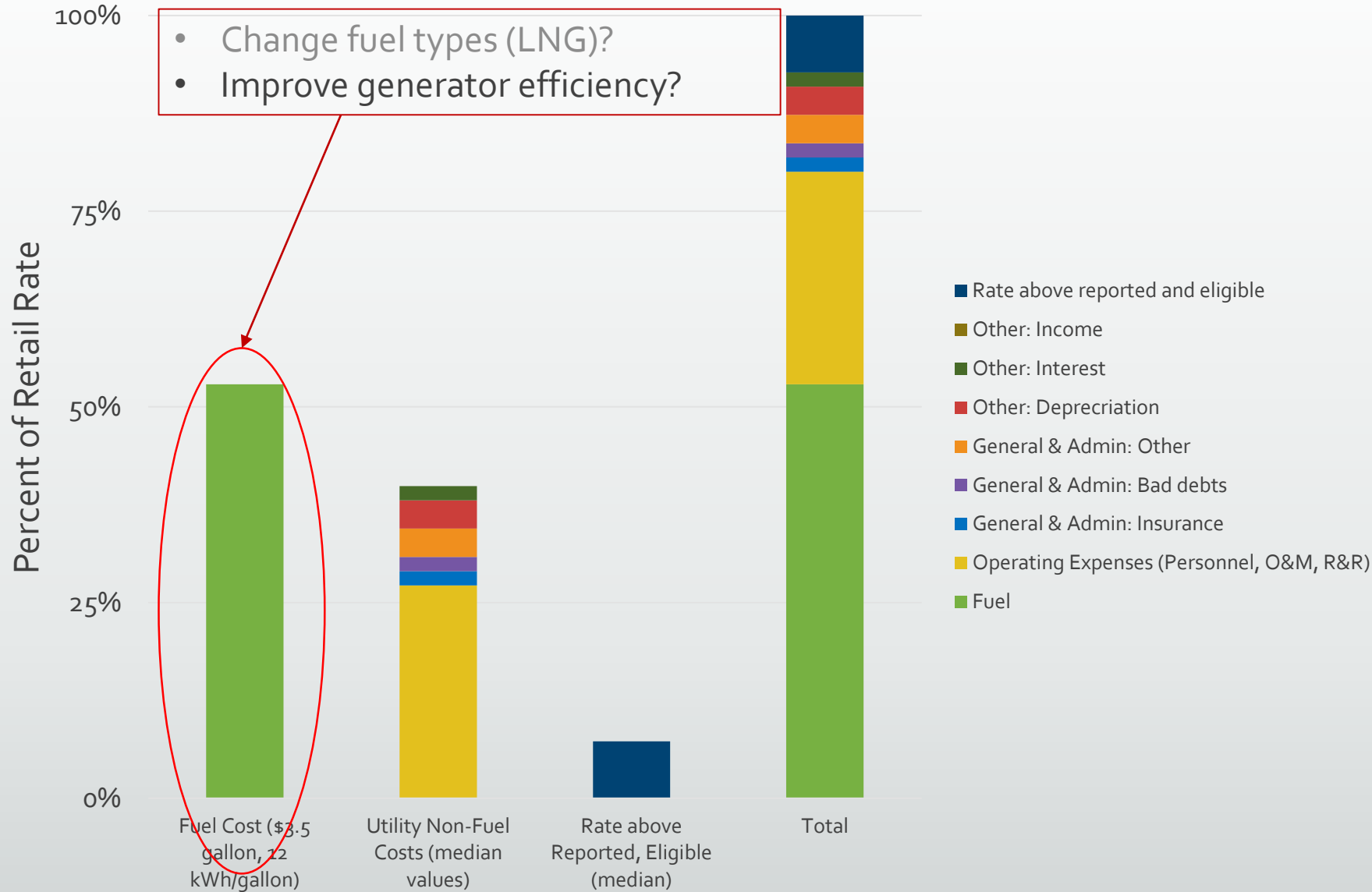
Switch fuel to LNG:

- May decrease the wholesale price of fuel
- May increase costs for transportation and storage. Significant new infrastructure may be required

AkAES Projects:

- LNG study

Components of Electricity Price (Assumes median values for PCE communities)



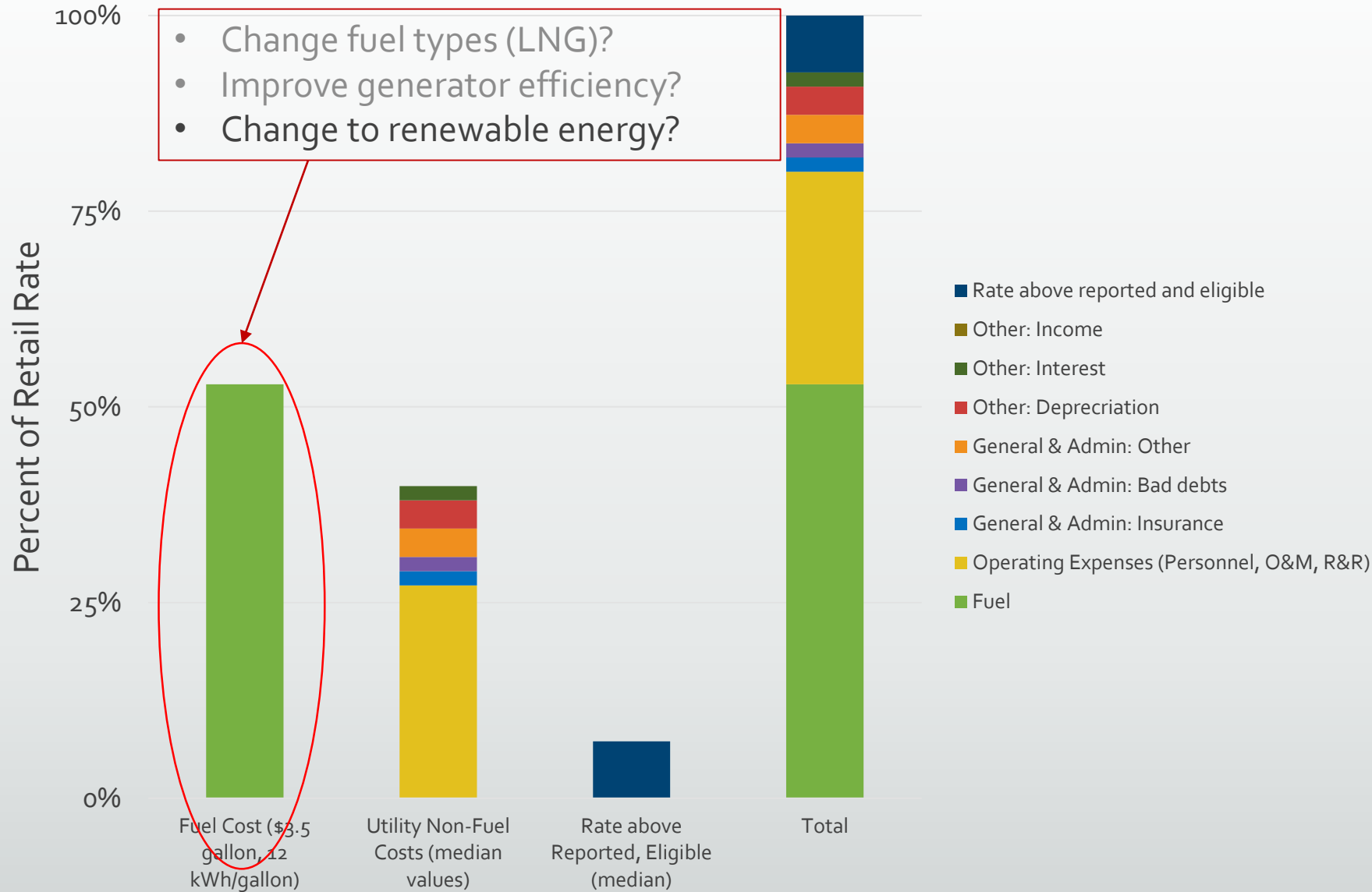
Generation Efficiency:

- Improve the number of kilowatt-hours of electricity produced per gallon of diesel
- May require new infrastructure or improved O&M

AkAES Projects:

- Modeling on benefits of generation efficiency

Components of Electricity Price (Assumes median values for PCE communities)



- Change fuel types (LNG)?
- Improve generator efficiency?
- Change to renewable energy?

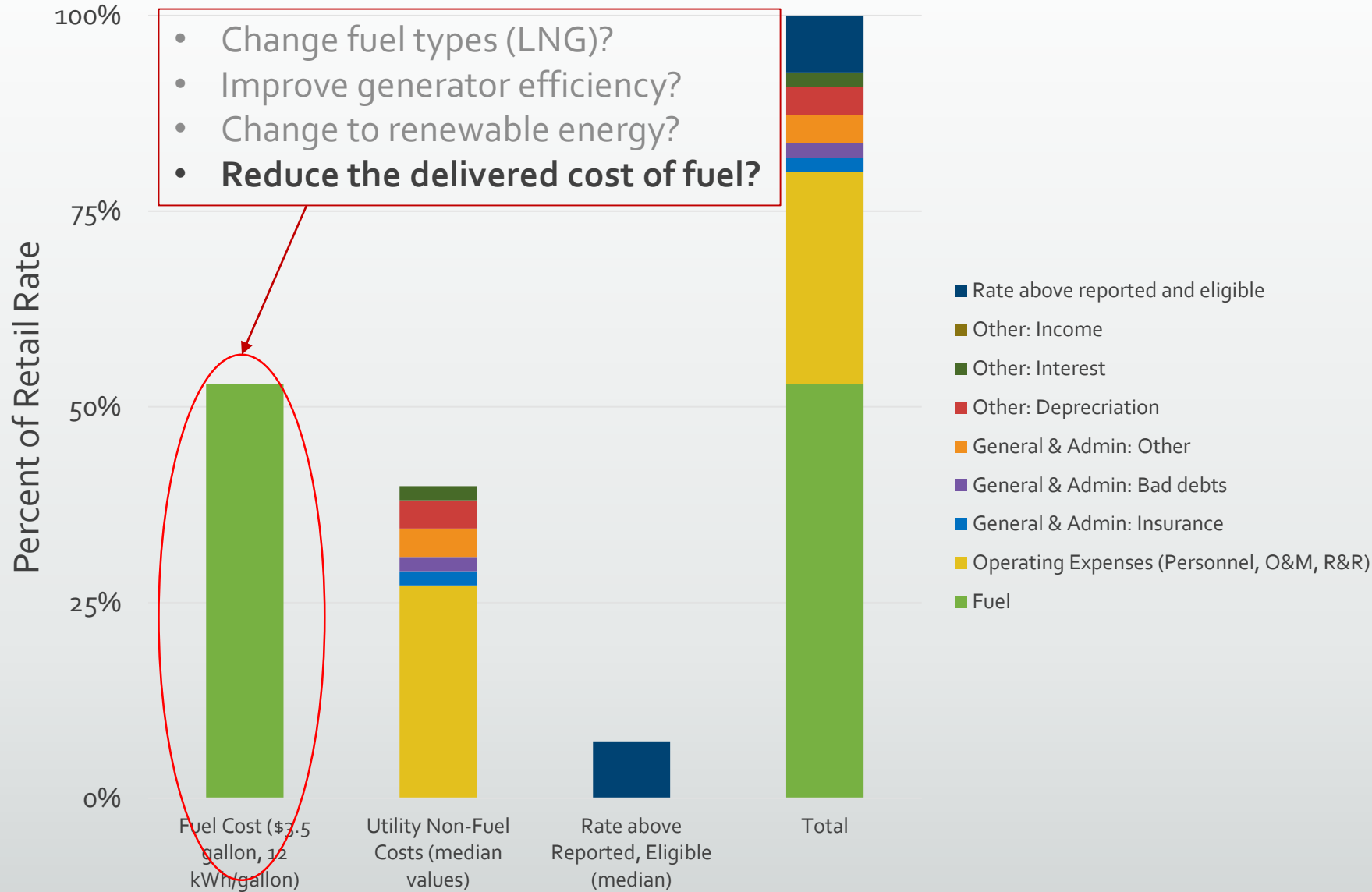
Renewable Energy:

- Will reduce the gallons of diesel consumed
- May increase the O&M, may not eliminate diesel, may require significant new infrastructure

AkAES Projects:

- Modeling on community renewable energy projects

Components of Electricity Price (Assumes median values for PCE communities)



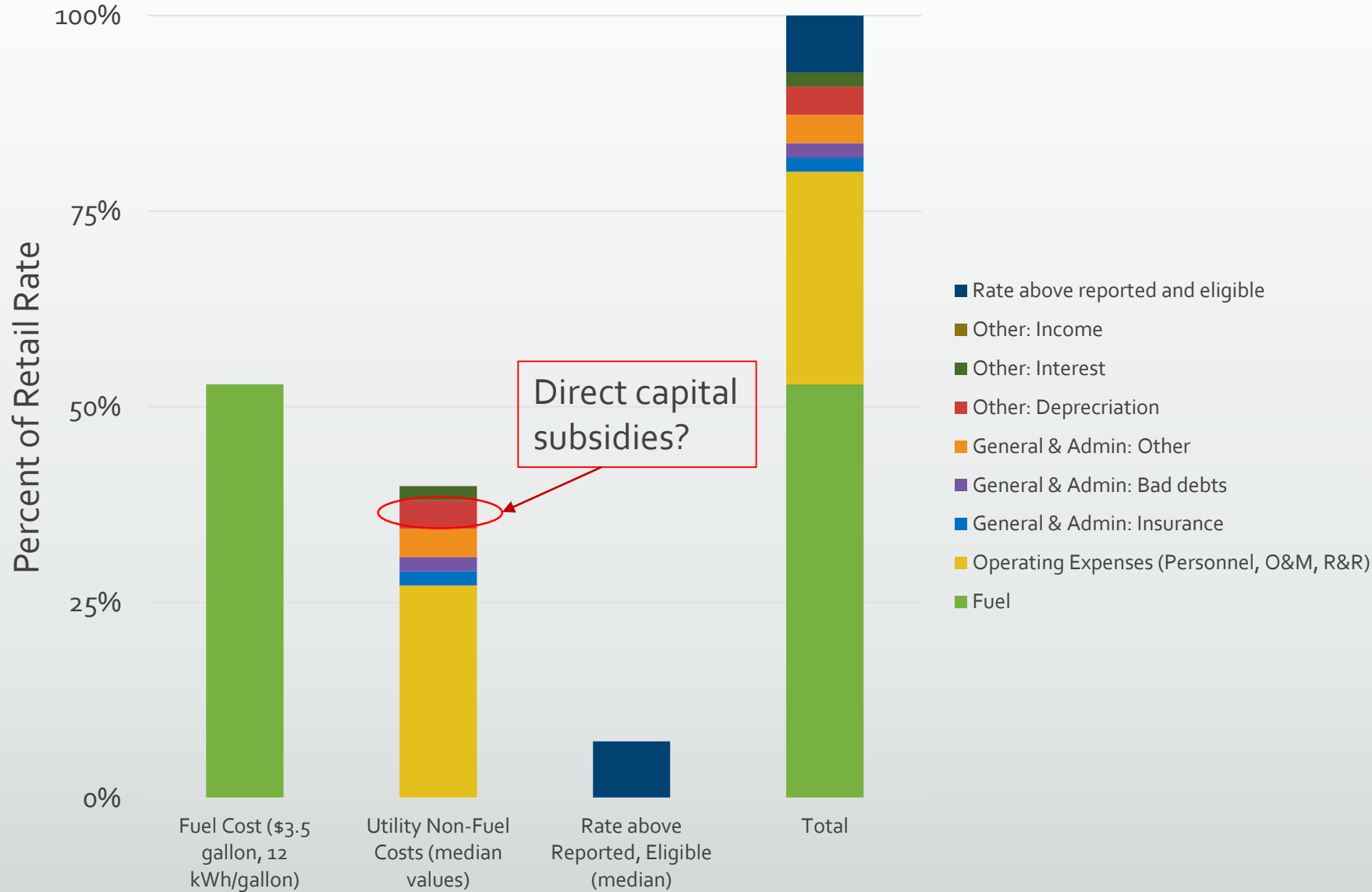
Transportation Efficiency:

- May be able to decrease the delivered cost by reducing time to deliver fuel
- Will require new regional and/or local infrastructure

AkAES Project:

- US Army Corps of Engineers study of regional and local operational efficiencies

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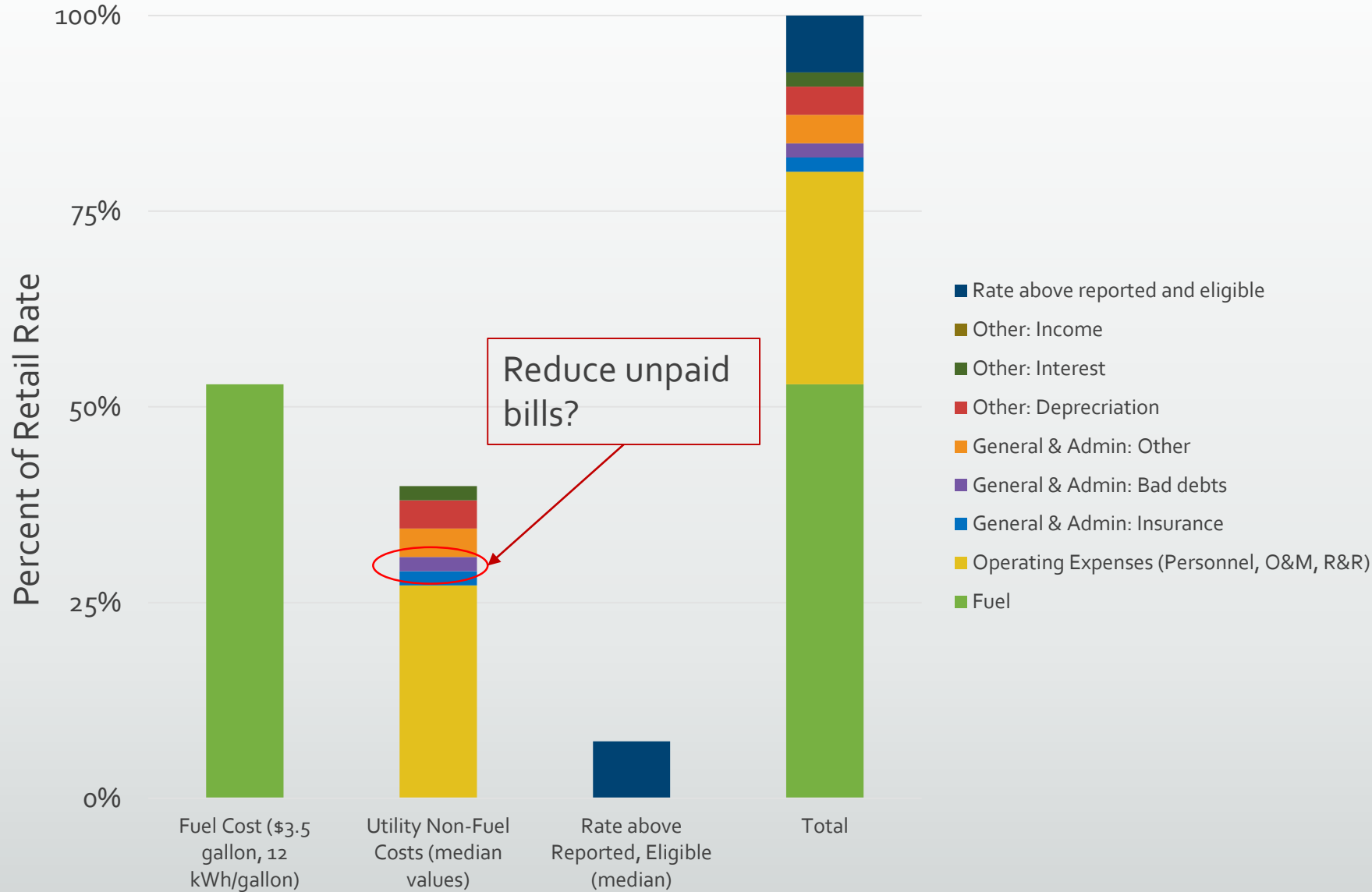
Direct Capital Subsidies:

- Existing program—rural power system upgrade (RPSU) and Renewable Energy Fund programs

AkAES Project:

- None

Components of Electricity Price (Assumes median values for PCE communities)



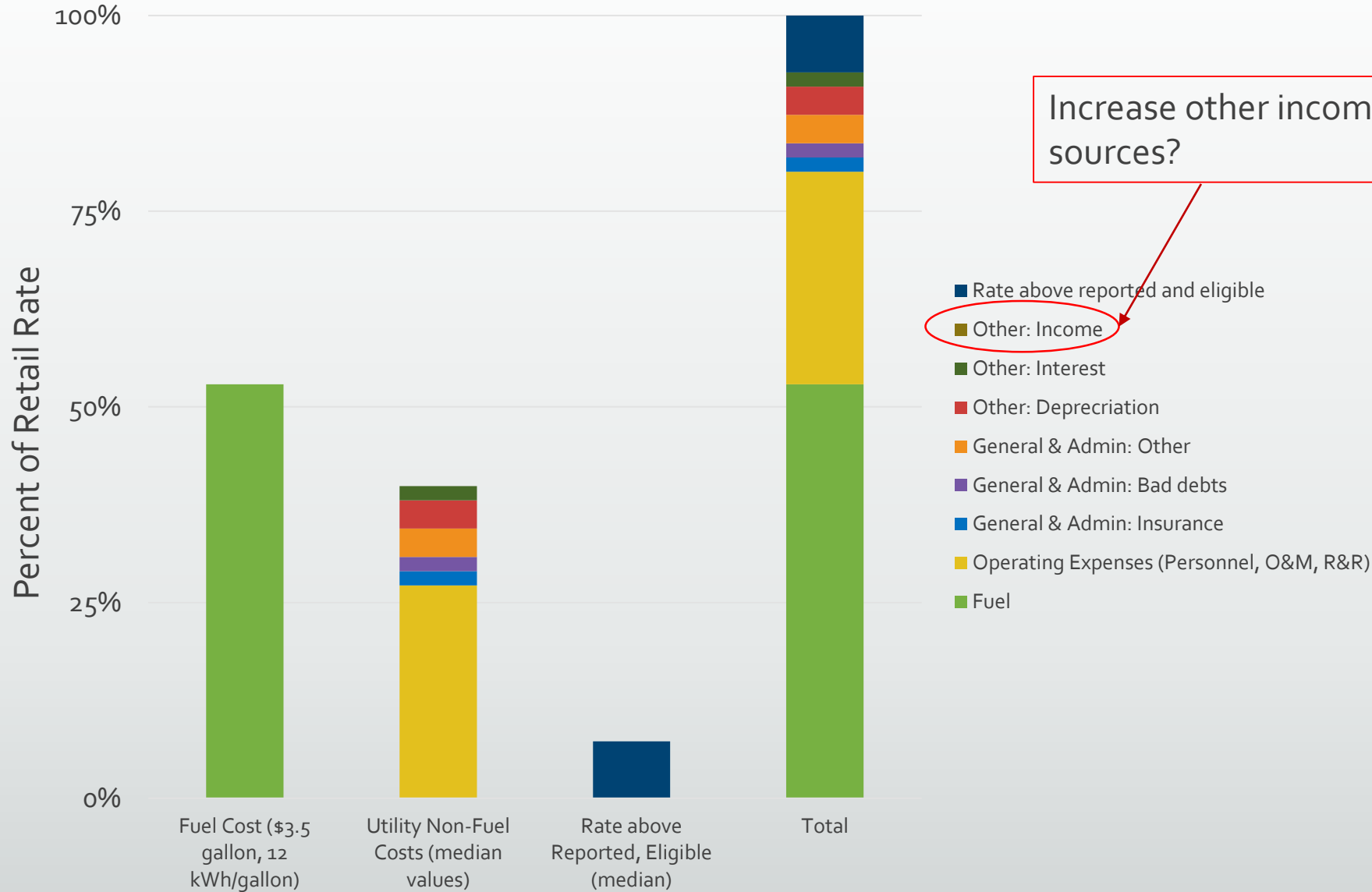
Reduce unpaid bills:

- Reduces the overhead for the utility
- Makes energy less affordable for those customers not currently paying bills

AkAES Projects:

- In development

Components of Electricity Price (Assumes median values for PCE communities)



Increase other income sources?

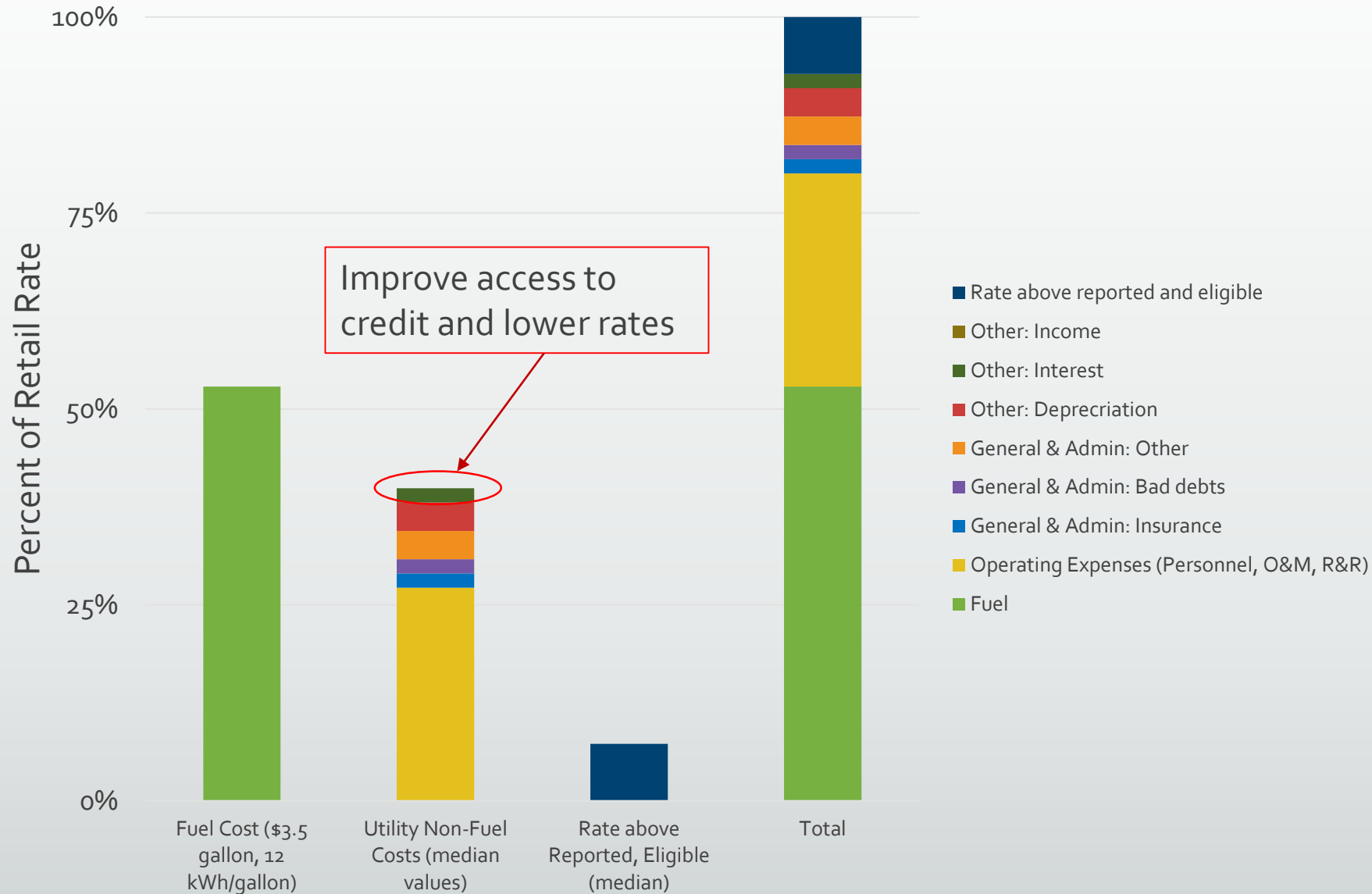
Increase Income:

- New income sources could help cross-subsidize electricity costs
- May require new infrastructure

AkAES Projects:

- In development

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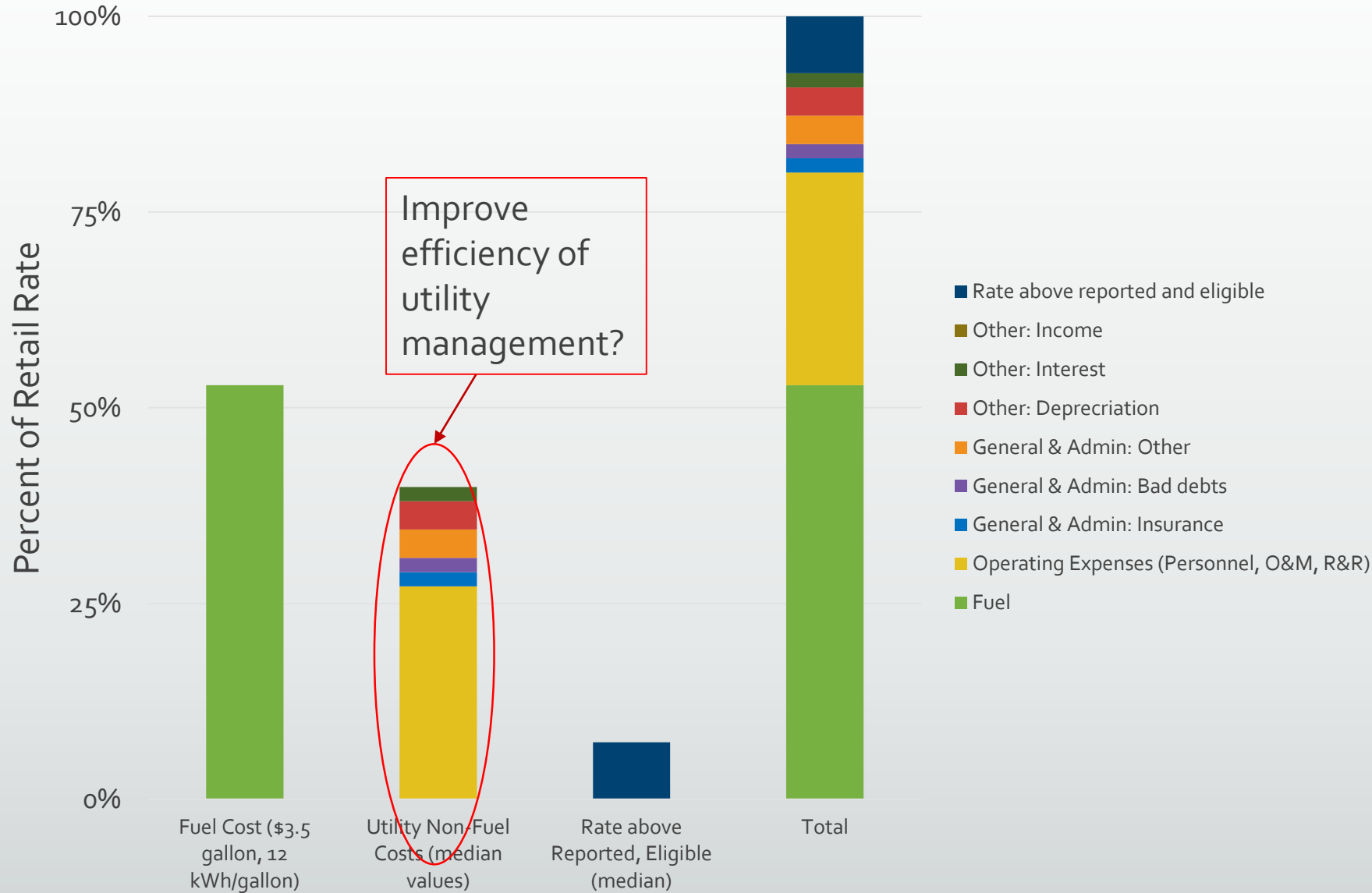
Interest:

- Improvements in utility bankability could improve access to and rates of credit
- Local markup will still probably apply for the new fuel

AkAES Projects:

- ACEP Barriers to Private Investment study

Components of Electricity Price (Assumes median values for PCE communities)



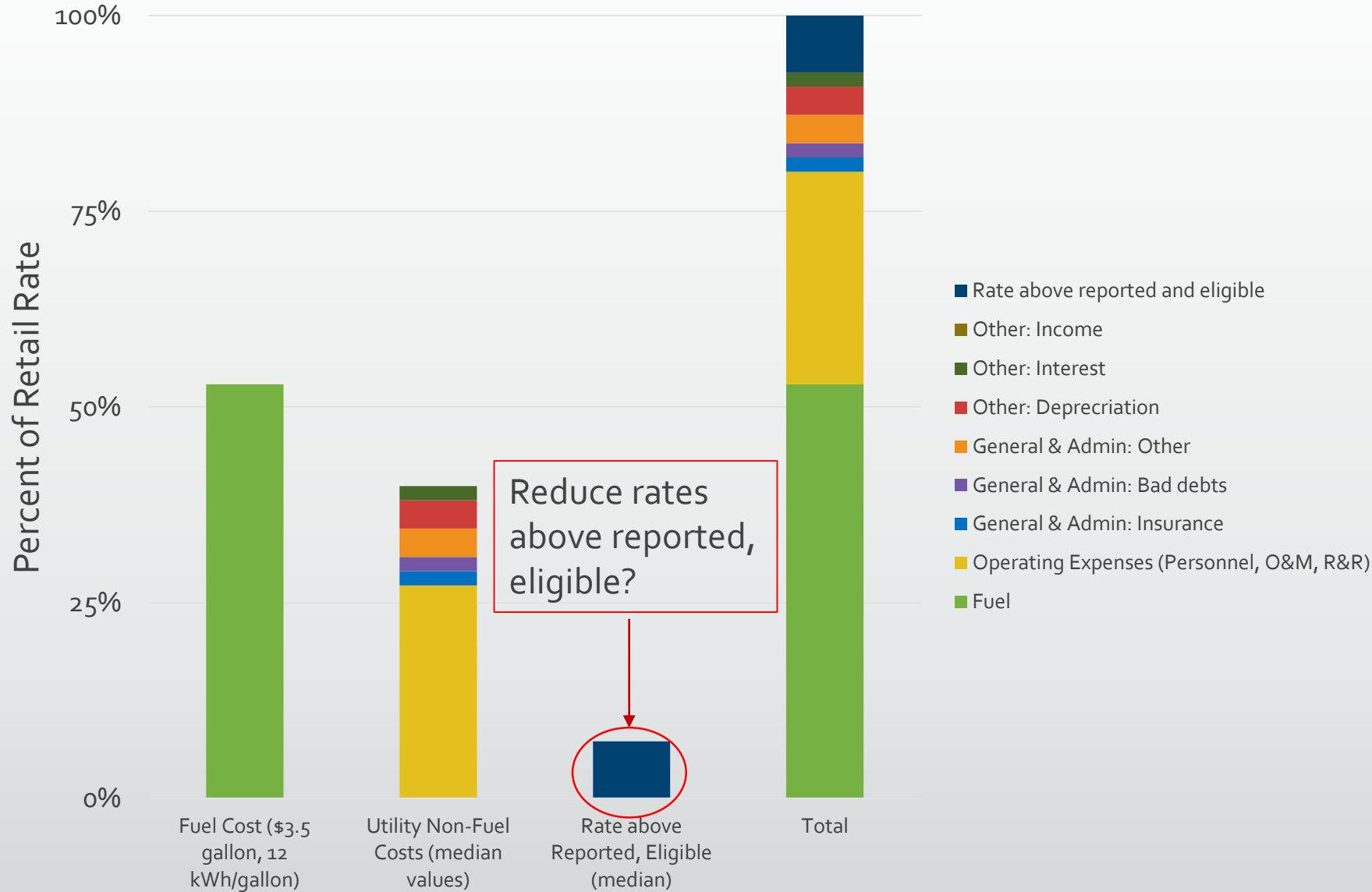
Utility management:

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AkAES Projects:

- ISER study
- UAA CED

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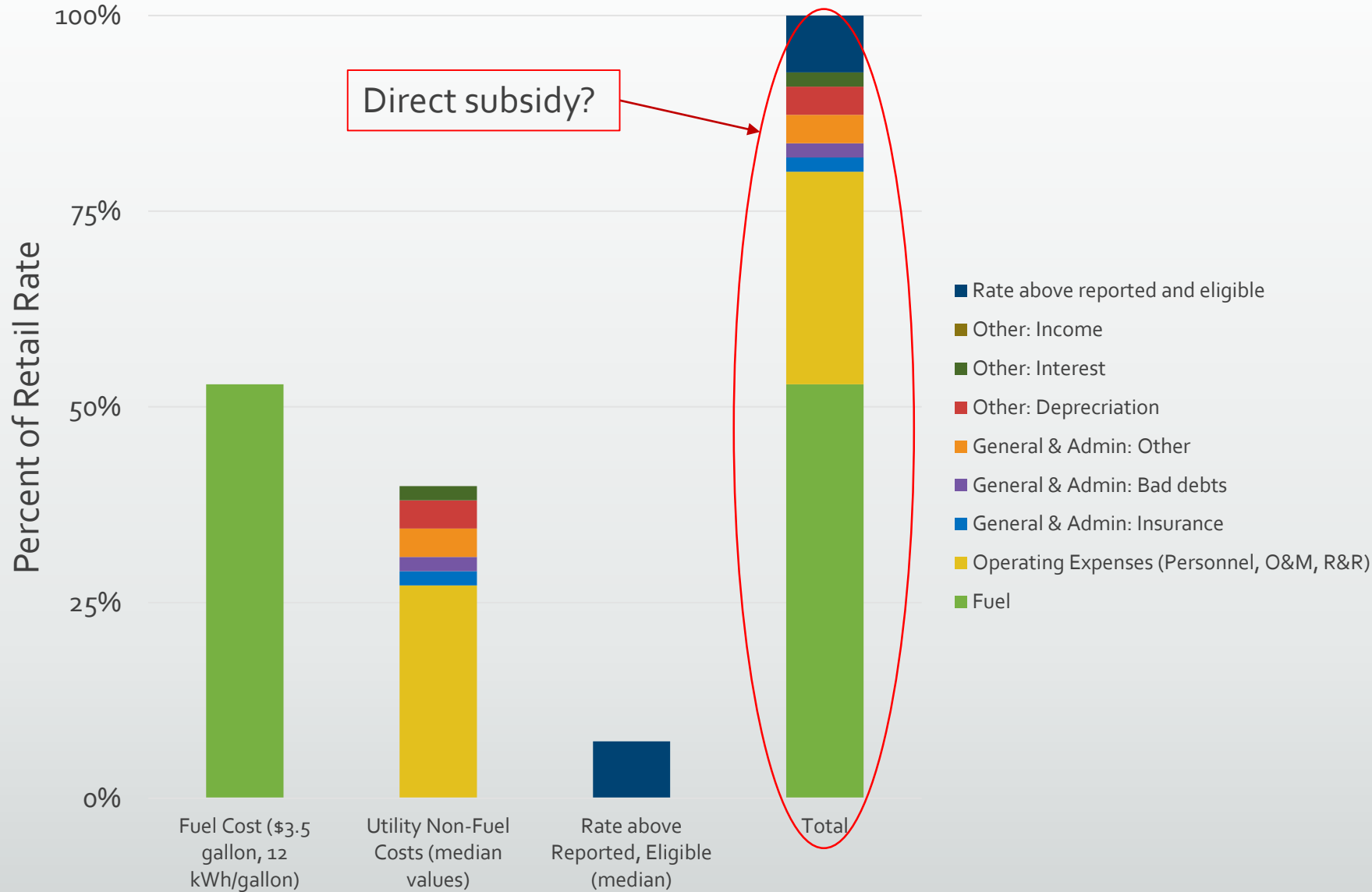
Limit Markups on Rates:

- Utilities that are not rate regulated do not need to justify rates
- Additional markup may be paying off other actual utility expenses

AkAES Projects:

- In development

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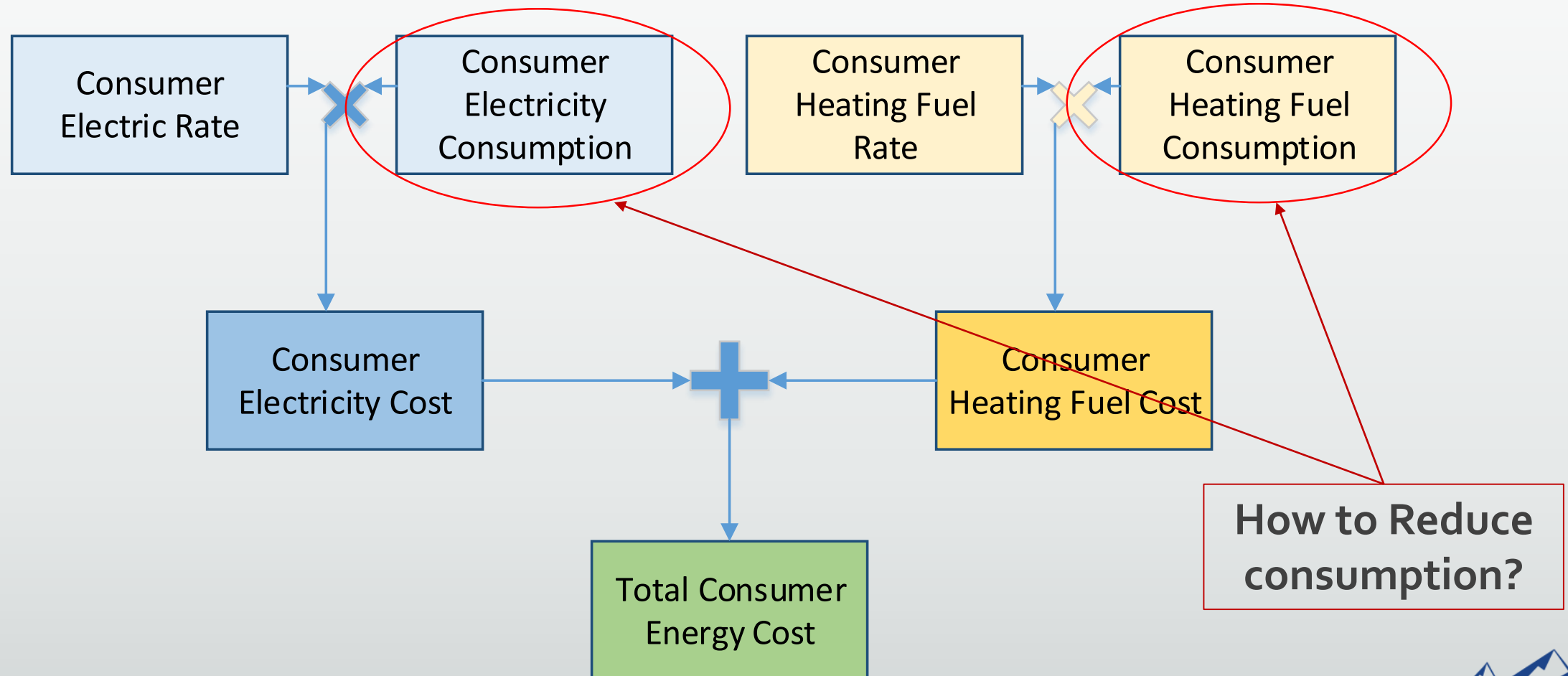
Direct Subsidy:

- Required in enabling legislation
- Existing program: Power Cost Equalization

AkAES Project:

- ISER

Factors That Lead to Consumer Energy Costs



Residential Energy Cost Savings from Weatherization (Assumes Historical Crude Oil Prices)



(Based on 2000-2016 Average Brent Crude Price)

Assumes:

- 1300 sf house in Bethel
- Pre-retrofit: 1600 gallons HO
- Post-retrofit: 32% reduction

Savings per year

- Does not include cost of retrofit
- In low cost years: **Saving of over \$2,000**
- In high cost years: **Savings of nearly \$4,000**
 - Household savings increase with the price of heating oil

Almost always cost effective

Prioritize Policies

Factors for Prioritizing Policies

- Economic analysis
 - Make sure that strategies are likely to save more money than they will cost

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- Technical analysis
 - Make sure that strategies are likely to work

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- Regional Balance
 - Ensure that there is adequate solutions for all regions

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 - Ensure that there is adequate solutions for all regions
- Incorporate constraints
 - Budgetary limitations
 - Time limitations
 - Political realities

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- Technical analysis
 - Make sure that strategies are likely to work
- Regional Balance
 - Ensure that there is adequate solutions for all regions
- Incorporate constraints
 - Budgetary limitations
 - Time limitations
 - Political realities
- Stakeholder Input

Resources for More Information

How to Learn More About AkAES

At the REC

- Public and Private Partnerships (How to Tap Private Funding for Developing Rural Energy Projects)
 - Wednesday 1:30-3pm
- Energy Efficiency: VEIC
 - Wednesday 3:45
- ACEP technology briefing papers
- Meet with me!
 - AEA booth Tuesday & Wednesday

After the REC

- Website
 - Project updates & deliverables
 - Presentations
 - Updates
 - Final report

www.akenergyauthority.org/Policy/AffordableEnergy

- Listserve
 - <http://list.state.ak.us/soalists/aea.affordable.energy.strategy/jl.htm>

How can people be involved?

Online Survey:

- <https://www.surveymonkey.com/r/2Z632Y9>

Feedback:

- AlkAESFeedback@aidea.org

AKEnergyAuthority.org

