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# Renewable Propane

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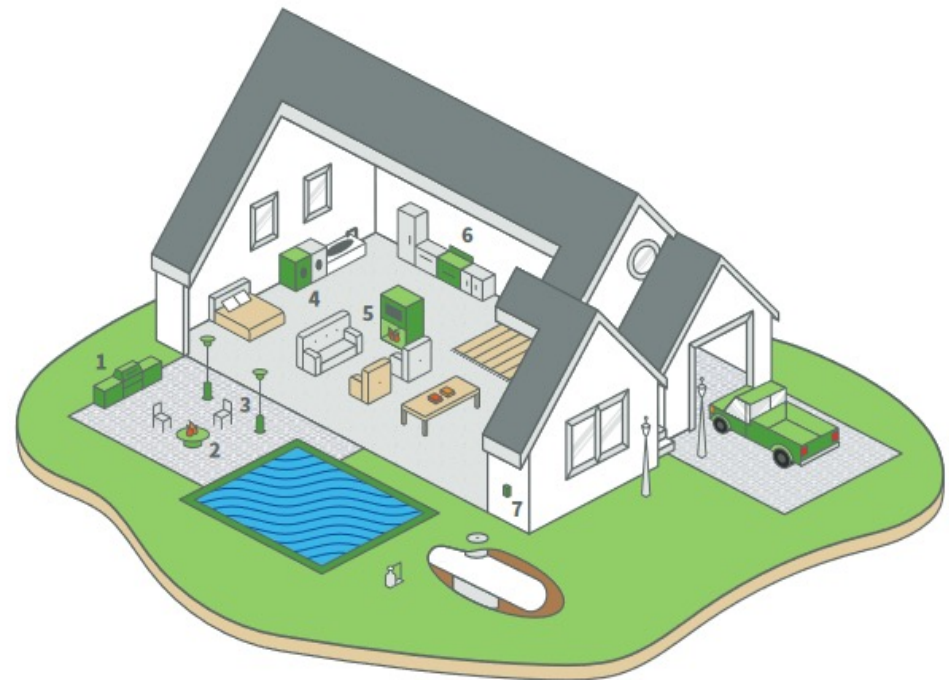
National Propane Gas Association

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## PROPANE REFRESHER

- Clean, energy-rich molecule
- Domestic production is booming
- Transported via network of pipelines, railcars and vehicles
- Used in 50 million homes
  - Versatile fuel
  - Nimble infrastructure
- Industry serves millions of commercial, industrial and agricultural accounts
- Provide an energy option for those beyond NG systems

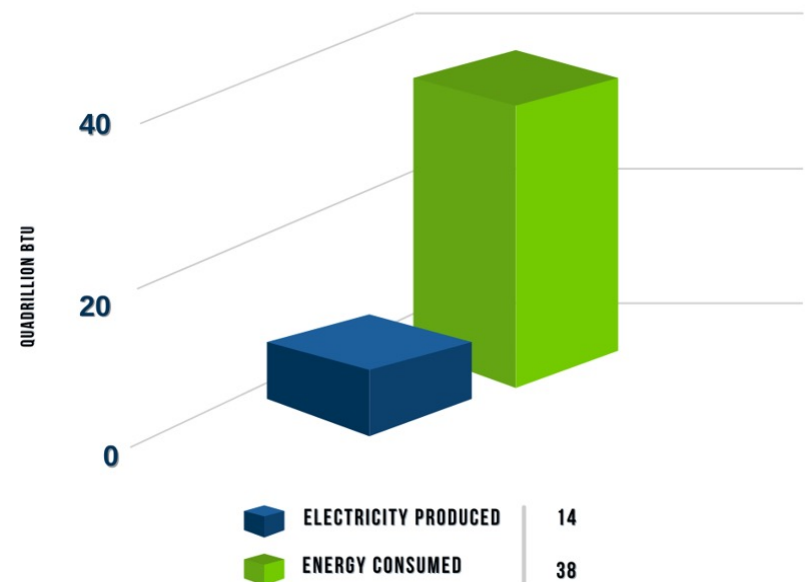
### The Propane Home



## BENEFITS OF DIRECT USE

- Avoid inherent inefficiencies and emissions from electric grid
- Lower carbon emissions across much of the country
- Reduce grid stress and manage peak demand
- Protect woodlands, soil and water resources
- Promote energy reliability, resilience and diversity
  - Complement other distributed energy resources

## 2019 UTILITY-SCALE ELECTRIC POWER GENERATION



**63% OF ALL ENERGY IS LOST!**

Source: Energy Information Agency (EIA)

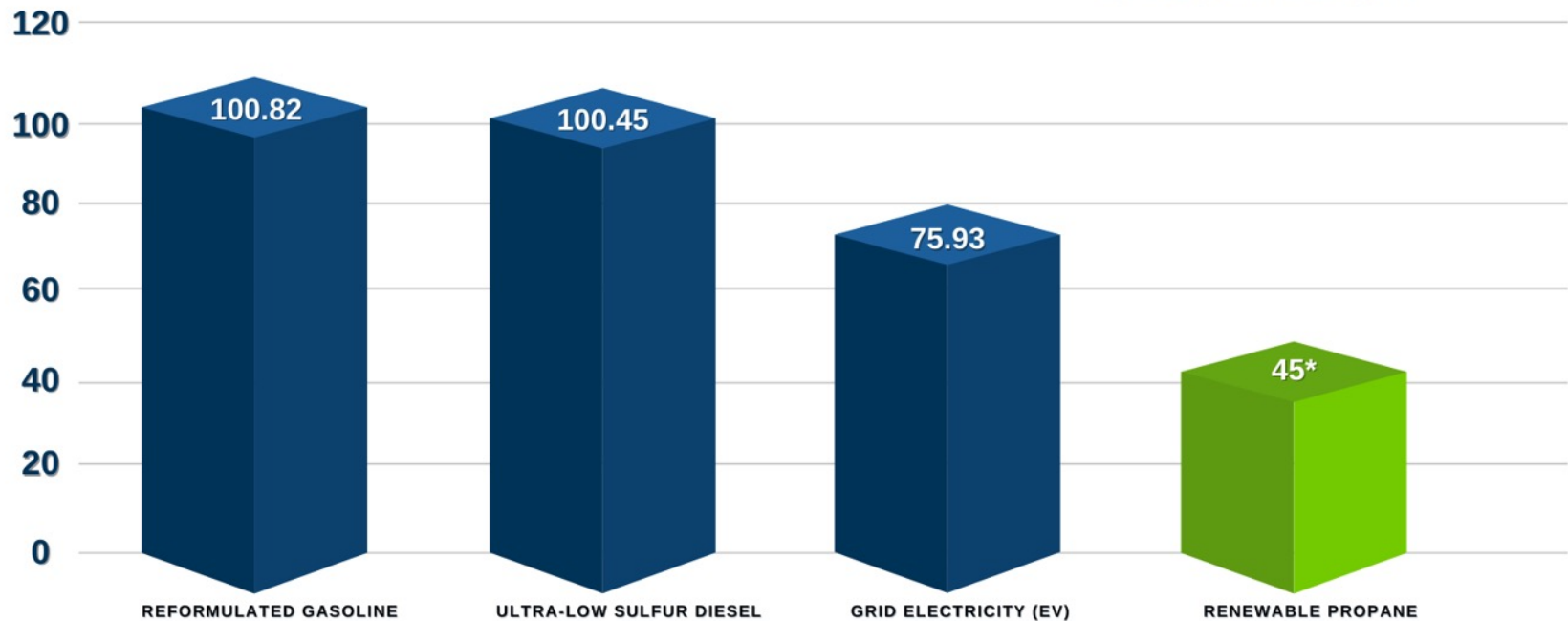
## RENEWABLE PROPANE

- Non-fossil fuel propane
- Variety of renewable feedstocks
  - Lipids, cellulosic
- Lower carbon intensity
  - No sequestered carbon
  - Divert landfill waste
- Retains all traditional eco-friendly characteristics
- Same structure & physical properties; drop-in replacement
- Industry and marketplace still developing
  - RFS, LCFS



## CARBON INTENSITY OF TRANSPORTATION FUELS: CA

CARBON INTENSITY [gCO<sub>2</sub>e/MJ]



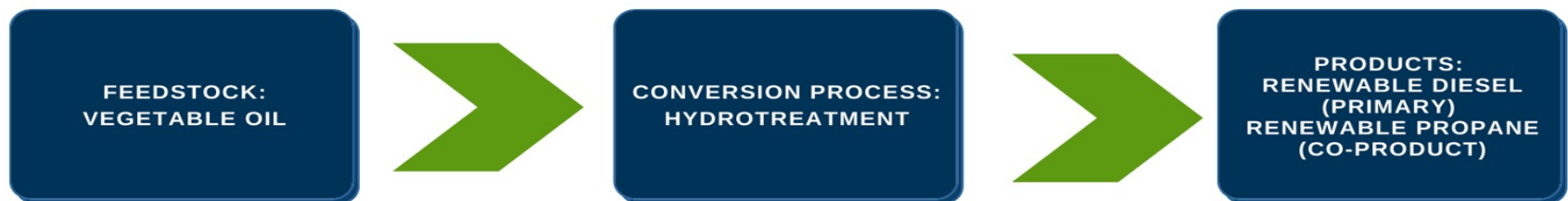
SOURCE: CALIFORNIA AIR  
RESOURCES BOARD (CARB)

\*CARB PROPOSAL

## PRODUCTION PATHWAYS

- Production pathways include: Hydrotreating, Pyrolysis and Gasification
  - Various commercialization stages
- Hydrotreatment is the most common and commercially attractive
  - rLPG produced as a co-product during conversion process; primary product is renewable diesel
  - RD has capacity to produce ~5% rLPG (production amounts can vary by feedstock)
- Renewable feedstocks include: soybean oil, distillers corn and beef tallow

### SIMPLIFIED HVO PATHWAY EXAMPLE



Sources: Atlantic Consulting, Western Propane Gas Association



## DOMESTIC PRODUCTION

- Domestic production has increased 3x since 2018
- Ensure producers understand market and profit potential
  - WPGA's 2030 Goal
  - U-Haul
- More capacity expected to come online in next few years
- Variables:
  - Gov't policies and market demand

## LOOKING FORWARD

- Global LPG industry working together to promote production and expand marketplace
  - Scale up alongside RD
  - Federal action
- Continued innovation to advance decarbonization goals:
  - rDME/LPG mixture
  - More clean, efficient applications
- Cost-effective, multipronged approach to reduce GHG emissions and support a robust energy sector





**Thank you!**

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