



AB 868

Fuel Delivery Temperature Study

Staff Workshop
California Energy Commission

Sacramento, CA
March 4, 2008

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California Energy Commission



Taking notes is optional since an electronic copy of this presentation will be posted on our web site, along with a transcript





Presentation Topics

- Goal of workshop
- Overview
- Primary study objectives
- Temperature survey status – Div. of Measurement Standards
- Fuel distribution overview
- Temperature compensation benefits
- Temperature compensation costs
- Agency impacts
- Phase-in schedule
- Other issues
- Next steps



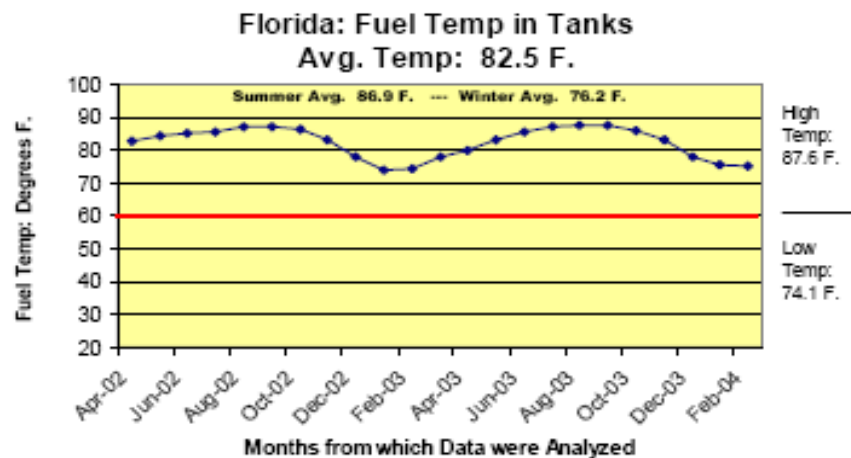
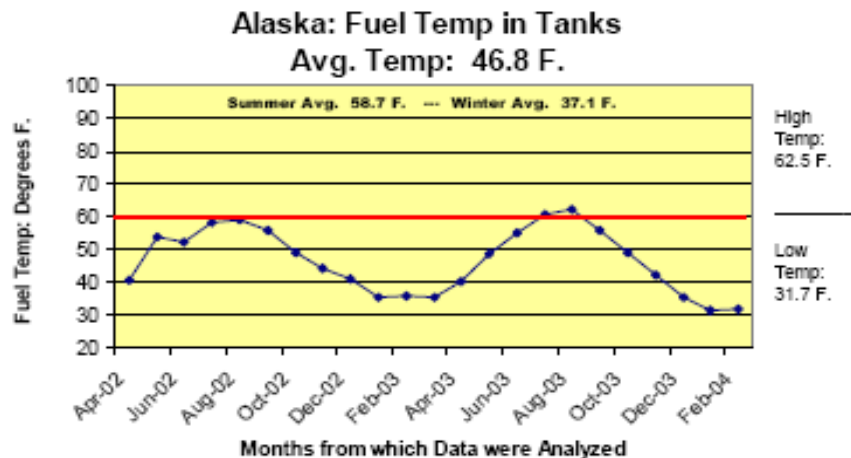
Goal of Today's Workshop

- Goal is to solidify the proposed structure of the cost-benefit study
 - Consumer impacts methodology
 - Business impacts calculation
 - Agency impacts assessment
 - Identification of additional informational resources
- We will strive for consensus on as much of the methodology as feasible
- But recognize that disagreements may exist on a number of issues that will not be resolved today



Overview - Background

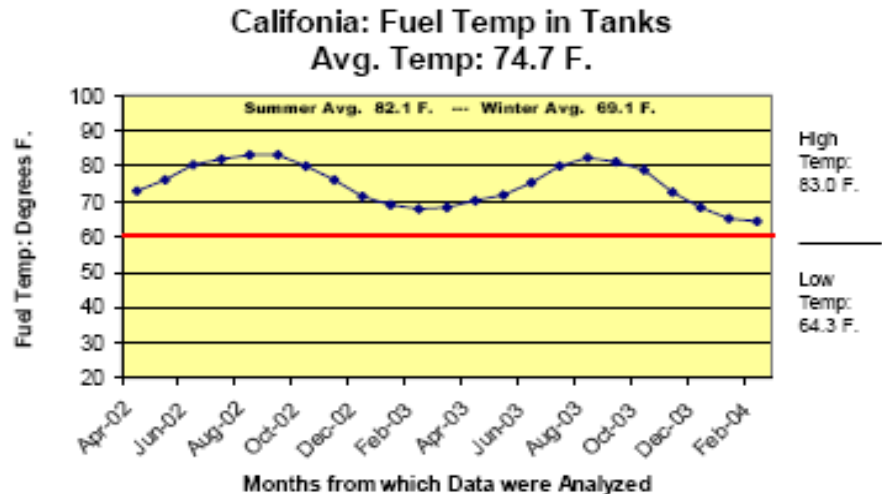
- Liquids expand and contract in response to changes in temperature
- Petroleum industry uses a reference temperature of 60°F
- Temperature of gasoline and diesel fuel delivered to retail establishments varies by geographic location and season according to an NIST study
- There are “cold” & “hot” states
- Temperature of retail fuel does not vary significantly prior to delivery to end consumer





Overview - Background

- California appears to be one of the “hot” fuel states
- Gasoline that is 15°F warmer than the standard of 60°F is estimated to expand, resulting in 1 percent less energy
- If Automatic Temperature Compensation (ATC) was required in California
 - Benefits would include more fuel for consumers
 - Costs would include expense of ATC equipment and installation labor





Overview - AB 868 Legislation

- Bill directs the California Energy Commission (Energy Commission) to a conduct cost benefit analysis for installation of automatic temperature compensation (ATC) devices at retail establishments or establishing a new reference temperature
- Energy Commission is working in partnership with DMS and CA Air Resources Board (CARB) representatives
- Advisory group formed of interested stakeholders that have expertise in various subject matter associated with temperature compensation
- Study must be completed by the end of 2008
- Will include recommendations to the Legislature



Overview - Advisory Group

- Purpose of the Advisory Group is to convene stakeholders who have expertise in a number of areas associated with the fuel delivery temperature study
- The Advisory Group members list has been posted on our website
- Advisory Group stakeholders include:
 - Equipment manufacturers
 - Consumer groups
 - Retail station and other fuel industry representatives
 - Agricultural commissioners & various county sealers
 - Trucking company representatives
 - California government agencies



Overview – Future Workshops - 2008

- Will conduct a minimum of three additional public meetings, held at the Energy Commission in Sacramento
- **June 5th** – Advisory Group panel public workshop
- **Early September** – Committee workshop
 - Share preliminary findings in the form of a draft report
 - Receive stakeholder comments
- Late October – Final workshop
 - Receive stakeholder comment on Draft Committee Report
- December – Energy Commission adoption of Final Report



Energy Commission Website

- The Energy Commission has created a website that will be used to provide information resources and status of the Fuel Delivery Temperature Study
- Link is as follows:

**[http://www.energy.ca.gov/transportation/
fuel_delivery_temperature_study/index.html](http://www.energy.ca.gov/transportation/fuel_delivery_temperature_study/index.html)**

- Interested parties may sign up on the list server or provide email address to staff in order to receive notices for future workshops & study documents



Overview – Workshop & Study Comments

- The Energy Commission encourages all interested parties to provide comments and feedback to technical staff throughout the course of this study
- Comments may be conveyed through various means:
 - Verbal
 - Written
 - Electronic
 - Documents
 - Email correspondence



Overview – Additional Discussion

Welcome to the *California Energy Commission*

WWW.ENERGY.CA.GOV / TRANSPORTATION / FUEL DELIVERY TEMPERATURE STUDY

**Fuel Delivery Temperature Study
(Docket # 07-HFS-01)**

Commission Homepage

Transportation Division Main Page

Proceeding Information

Notices and Announcements
(Updated: 02/15/08)

Documents and Reports
(Updated: 2/29/08)

Docket Log (07-HFS-1)
coming soon

Related Information

National Conference on
Weights and Measures

Assembly Bill 868

AB 868 Advisory Group
Members
(PDF file)

List Server

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ANNOUNCEMENTS

March 4, 2008

Staff Workshop on Assembly
Bill 868 Fuel Delivery
Temperature Study

Also, please visit our
[Energy Calendar](#)

Assembly Bill 868 (Davis, Chapter 398, Statutes of 2007) requires the California Energy Commission to prepare a cost-benefit analysis and to make recommendations relative to the implementation of Automatic Temperature Correction devices at retail service stations. This report is due to the Legislature no later than December 31, 2008.

Like many other liquids, fuel experiences expansion and contraction with temperature change. For gasoline, there is one percent less fuel for each fifteen degree temperature increase. So the warmer the fuel, the less energy and fewer miles to the gallon a vehicle will receive.

This report will be prepared in partnership with the Department of Food and Agriculture and the California Air Resources Board. The Division of Measurement Standards, within the Department of Food and Agriculture is currently conducting a fuel temperature survey to complement site surveys planned by the Energy Commission.

For more information on this program and proceeding, please contact:

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AB 868 – Primary Study Objectives

- Determine if temperature compensation makes economic sense for retail application in California
- Legislation requires that we examine two different approaches to temperature compensation
 - New reference temperature
 - ATC equipment at retail
- Each primary option will require the quantification and comparison of benefits to costs
- Primary focus: Will the costs outweigh the benefits?



AB 868 – Proposed Study Structure

- Cost benefit analysis will examine the following *options*:
 - Retain the current temperature reference of 60°F – do nothing
 - **Establish a different statewide reference standard – Hawaii example**
 - Establish different regional reference standards throughout the state
 - **Installation of ATC retrofit kits at all retail establishments**
 - Mandatory or voluntary
 - Installation of ATC retrofit kits at retail establishments *on a regional basis*



Study Structure – Reference Temperature Adjustment Option

- The Energy Commission will examine the option of using a different temperature reference standard for the State for both gasoline and diesel fuel
- Hawaii adopted this approach in 1974
 - Act 239
 - Revised statute 486-50
- Gallon of retail gasoline dispensed in Hawaii contains 233.8 cubic inches, rather than 231 cubic inches
 - Adjusted to reflect an average temperature of 80°F
- Gallon of retail diesel fuel dispensed in Hawaii contains 233.3 cubic inches





Study Structure – ATC Retrofit

- The Energy Commission will examine the option of installing automatic temperature compensation devices at all retail establishments in the State – mandated & voluntary
- Canada adopted this approach on a voluntary basis in 1990
 - Approximately 90 to 95 percent of the fuel dispensed to the public is from fuel dispensers that have ATC devices
 - Retailers determined that the retrofit work was economical
 - ATC devices monitor the temperature of the fuel being dispensed and adjust the delivered volume to result in a liter of fuel that contains the same energy content as a liter at 15°C



Study Structure – Discussion

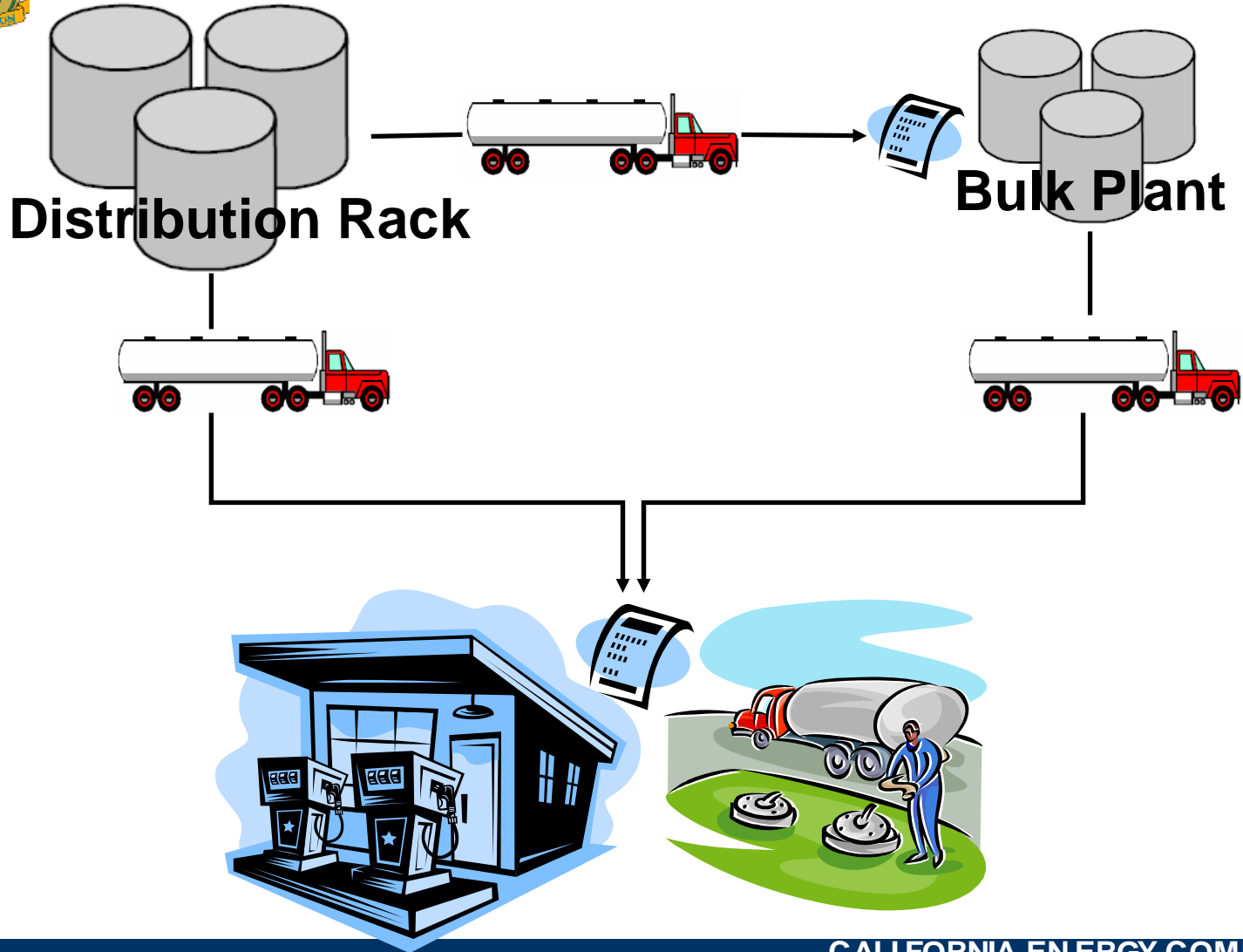


Lunch Break!





Fuel Distribution Overview





Fuel Distribution - Glossary

- Petroleum Gallon = 231 cubic inches of fuel at 60°F
 - Also referred to as a *net* gallon
- U.S. Gallon = 231 cubic inches of fuel at *any* temperature
 - Also referred to as a *gross* gallon

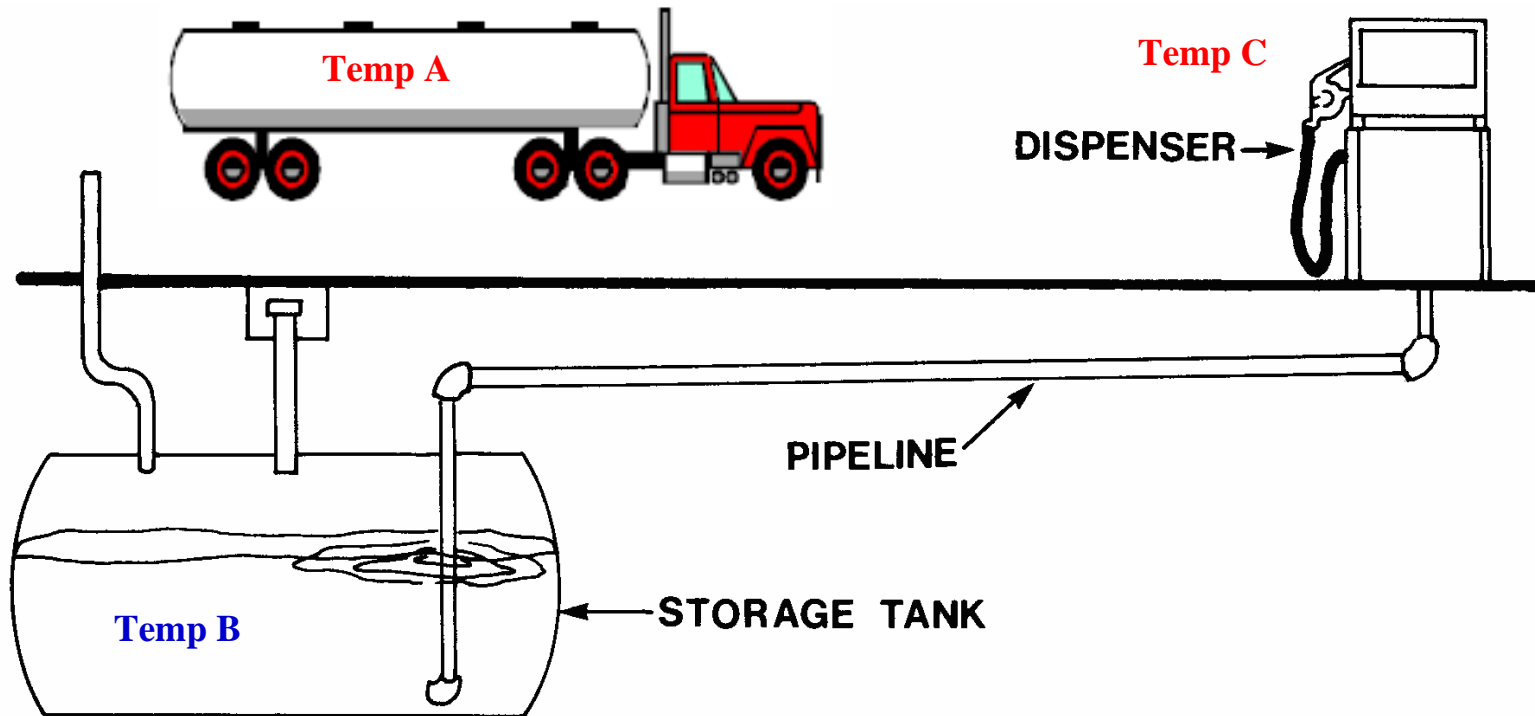


Distribution – Temperature Change

- Temperature of fuel may change from the point of loading at the distribution terminal to the point of discharge into the consumer's fuel tank
- Do not currently have California data on temperature of:
 - Fuel loaded at the distribution terminal
 - Fuel delivered to the retail establishment
- Information from outside of California may suggest that the temperature of the fuel delivered to the retail outlet could decrease by the time it is dispensed to the retail consumer – referred to as “shrinkage” or decline of inventory



Distribution – Retail Shrinkage



Fuel delivered to a retail establishment during the warmer months could decrease in temperature between the time of delivery (Temp A) and the dispensing of the fuel to the consumer (Temp C) – but how much?



Distribution – Temperature Change

- Although no fuel temperature data is being collected from distribution terminals or tanker truck deliveries, it should be noted that the installation of ATC retrofit kits at retail establishments will not alter any *physical aspect* of fuel expansion or contraction upstream of the retail dispenser



Distribution – Volume Adjustment

- Currently, fuel loaded into tanker trucks at distribution terminals is assumed to be sold as petroleum gallons
- If the fuel at the distribution terminal is *warmer* than the reference standard of 60°F, the adjustment will be that the buyer will receive additional gross gallons of fuel
- For example, if a tanker truck has a capacity of 8,000 gross or U.S. gallons and the temperature of the fuel obtained at the distribution terminal is 75°F, then:
 - 8,000 gross gallons will be loaded into the truck
 - Buyer will pay for 7,921 petroleum or net gallons



Distribution – Volume Adjustment

- If the fuel at the distribution terminal is *cooler* than the reference standard of 60°F, the adjustment will be that the buyer will receive less gross gallons of fuel
- For example, if a tanker truck has a capacity of 8,000 gross or U.S. gallons and the temperature of the fuel obtained at the distribution terminal is 45°F, then:
 - 8,000 gross gallons will be loaded into the truck
 - Buyer will pay for 8,080 petroleum or net gallons



TC Benefits – Methodology

- Retail consumer “benefits” will be calculated on a monthly basis as follows:

(fuel volume) x (fuel price) x (volume correction factor)

Fuel volume = taxable statewide gasoline sales from Board of Equalization (BOE) prorated by county (CalTrans)

Fuel price = retail price from the Oil Price Information Service

Vol. Correction Factor = function of temperature & density

- Fuel temperature from DMS survey
- Volume correction factor from ASTM



TC Benefits – Fuel Volumes

- California motorists use about 16 billion gallons of gasoline and 4 billion gallons of diesel fuel each year
- The California State Board of Equalization reports statewide taxable gasoline sales on a monthly basis
- The California Department of Transportation estimates county-specific demand for both gasoline and diesel fuel
- The Energy Commission will use both of these sources to estimate monthly demand for each county for the period April 2007 through March 2008

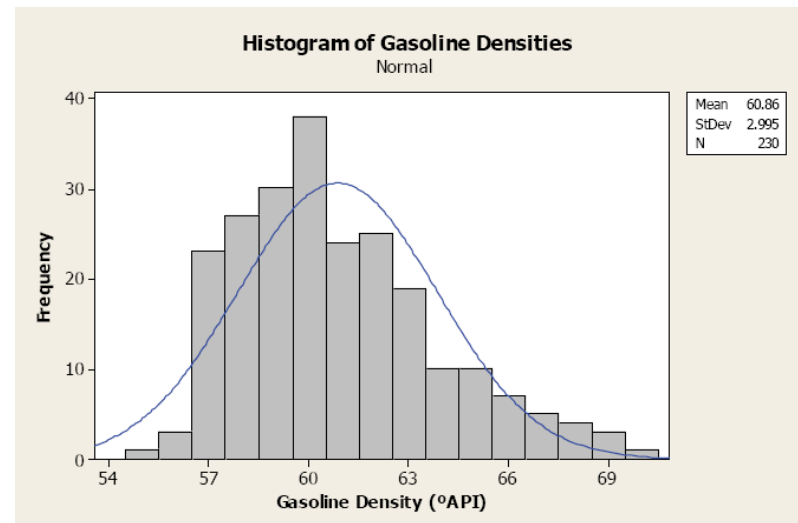
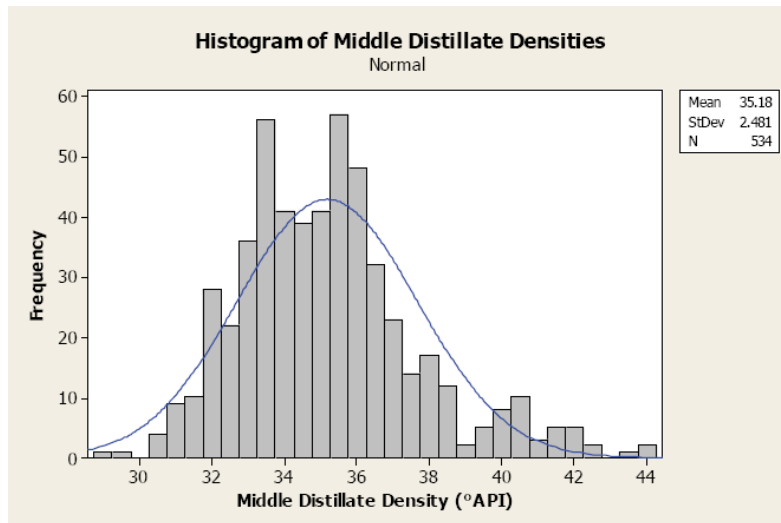


TC Benefits – Fuel Prices

- The Energy Commission purchases retail gasoline and diesel fuel prices on a daily basis from the Oil Price Information Service (OPIS)
- Technical staff will use this data to calculate monthly average fuel prices by county
- All counties have monthly retail gasoline price representation
- Coverage for retail diesel fuel does not include all counties
- Estimates will need to be used for some counties based on proximity to other counties that have pricing data



TC Benefits – Fuel Density

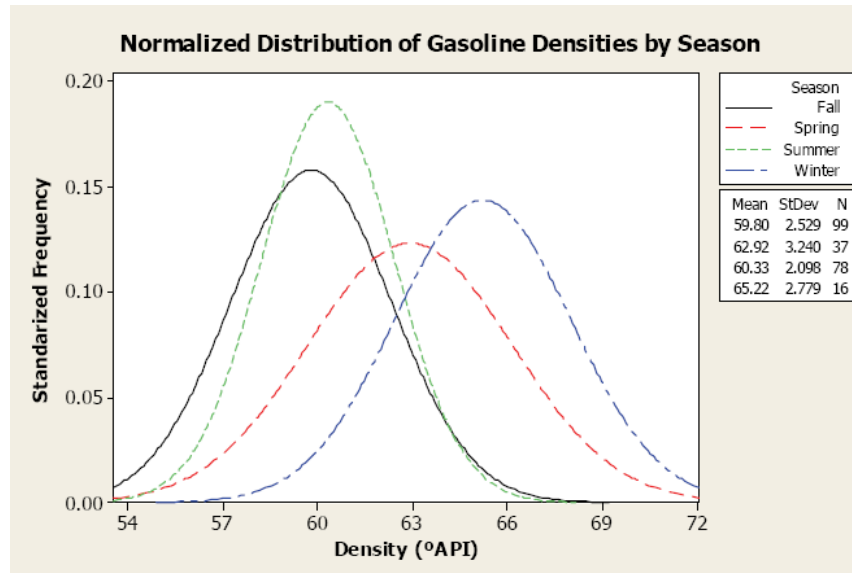


- In order to calculate how much gasoline expands or contracts relative to the 60°F reference temperature, one needs to know the density of the fuel
- Gasoline and diesel fuel densities vary based on their fuel properties



TC Benefits – Fuel Density

- But gasoline density also varies seasonally
- The CARB will analyze retail station samples to calculate density distributions
- Energy Commission will work with CARB to determine density variations for gasoline based on seasonality and ethanol content





TC Benefits – Outstanding Issues

- Should California assume an average density value for gasoline or use a different value for summer and winter seasons?
 - One average density value would be somewhat less accurate, but may decrease compliance costs for ATC
- Diesel fuel density values do not exhibit the same seasonal variation as gasoline
 - Therefore, a single average density value for diesel fuel may be sufficiently accurate
- Other outstanding ATC benefit issues?



TC Benefits – Discussion





Temperature Compensation Costs

- Business costs will be calculated using:
 - Fuel dispensers – make & model
 - ATC retrofit equipment costs @ expected lifetime
 - Installation labor costs & periodic maintenance
 - Incremental costs for ATC-capable new dispensers
- Analysis will be performed on a county-specific basis
- Gasoline and diesel fuel dispensers will be included in the assessment
 - Lack of data will likely preclude analysis for other types of transportation fuels, with possible exception of aviation gasoline



TC Costs – Data Base Development

- Data base is being developed that will be used to estimate equipment and labor costs for ATC retrofit kits by county
 - Dispenser manufacturer and model
 - Mechanical versus electronic
 - Quantity of fuel dispensers
 - Number of meters per dispenser
 - Number of gasoline grades/fuel types per dispenser





TC Costs – Data Base

- Data base has been populated with:
 - A list of retail establishments by physical location
 - Number of meters by physical location for most counties
- Make and model by physical location will be obtained for *most* regions by using information reported to air quality management districts as required for all gasoline dispensing facilities (GDFs)
- This approach will not work for all counties, so the Energy Commission will work with various County sealers to obtain the missing information through a survey to retail establishments – the extent of this work has yet to be determined



TC Costs – Installation

- The cost of labor to install the retrofit will also be included in the analysis
- Installation costs vary, but are usually greater for mechanical dispensers and will normally increase with the number of fuel types per dispenser
- Energy Commission will obtain estimated installation time by type of ATC retrofit kit from the manufacturers and installers
- An estimate range of hourly wages will be obtained for comparable retail dispenser technicians performing work in California



TC Costs – ATC-Ready Dispensers

- *If ATC retrofit is determined to be one of the more cost-beneficial solutions*, the Energy Commission will want to calculate the incremental costs to fuel dispenser manufacturers to produce ATC-capable dispensers
- It is assumed that the incremental costs to produce these types of dispensers would be less than the cost to retrofit existing ones, but how much less is not known
- This information would be relevant in determining future business costs for *new* retail establishments rather than retrofitting existing facilities



TC Costs – Hawaii Example

- *If a new reference temperature is determined to be one of the more cost-beneficial solutions, the Energy Commission will want to calculate the incremental costs for modifications to the existing retail dispensers*
- What type of modifications would be necessary?
 - Additional hardware?
 - Adjustment to existing meters?
- If so, at what estimated cost?

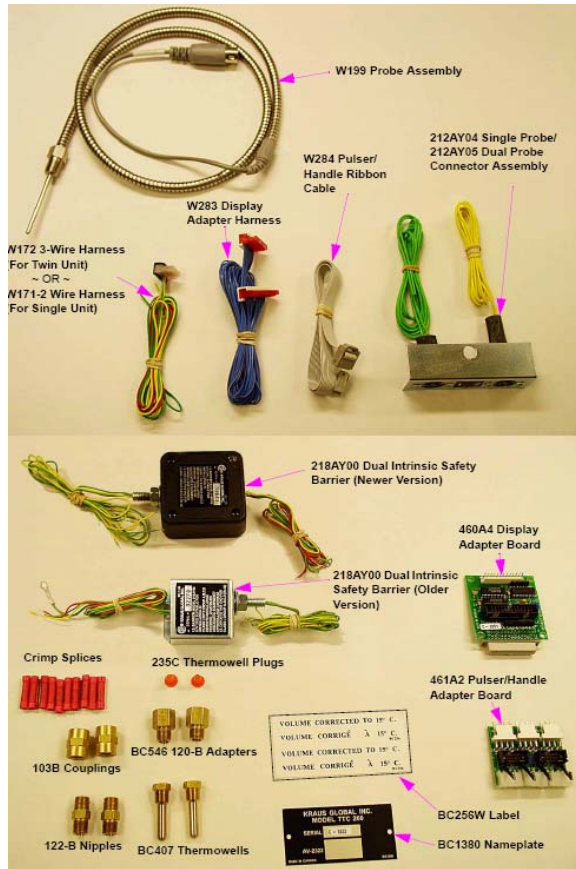


TC Costs – Outstanding Issues

- How may the costs of retail station operators change as a consequence of temperature compensation?
- Direct expenses incurred by retailers are assumed to pass through to consumers over the long-run
- This means that retailers may need to increase their street prices to compensate for the additional expense
- Therefore, should we assume that retail margins will be the same pre and post-ATC?
- If so, might retail station operators also adjust their street price to maintain similar margins if their revenue stream declines?



ATC Costs – Discussion





Agency Impacts

- State agencies potentially impacted
 - DMS
 - County sealers
 - Possibly others
 - SWRCB
 - BOE
 - FTB
- DMS impacts will include:
 - Regulation development
 - Calibration test procedure development
 - Equipment certification
 - Other activities?



Agency Impacts

- County sealer impacts will include:
 - Calibration equipment costs
 - Temperature measuring device
 - County sealer increased workload
 - Incremental time per retail dispenser
- How would county sealers recover their costs?
 - California Business & Professions Code (sec. 12240) limit total fees that can be collected from each retail establishment
 - These limits will need to be addressed in the study
- Analysis will be performed on a county-specific basis
- Are there other impacts that need to be addressed?



Agency Impacts – Discussion





Phase-in Schedule

- *If ATC retrofit is determined to be one of the more cost-beneficial solutions*, the Energy Commission will want identify the critical steps associated with implementing a statewide or regional ATC program
- How quickly could the new standards be put into place?
- Regulatory development
 - How long?
- Guidelines and procedures
 - Calibration enforcement
 - Equipment approval



Phase-in Schedule

- When should regulation be enforced?
 - Date certain
 - Phased in over time
- Date certain
 - Equitable for consumers
 - Could create constraints for material and specialized labor availability
 - Does the 1998 UST upgrade program provide any guidance?
- Phased in over time
 - Limited to new sites and station renovations?
 - Could decrease equipment costs and risk of labor constraint
 - But could place non-ATC sites at competitive disadvantage



Phase-in Schedule – Discussion





Other Issues

- The Energy Commission will also address a number of other issues during the study, including but not limited to:
 - Potential funding sources
 - Disproportionate economic impacts
 - Labeling and consumer outreach
 - Potential environmental benefits – early leak detection
 - Potential safety concerns
 - Renewable fuels and the proposed Low Carbon Fuel Standard



Other Issues

Potential Funding Sources

- *If ATC retrofit or new reference temperatures are concluded to be cost-beneficial solutions, who could pay?*
- If all or most retail establishment operators pay for installation of ATC, costs are assumed to be passed through to consumers over the long-run
- A fee could be assessed on each gallon of gasoline and diesel fuel sold at retail
 - Money could be used to help offset ATC installation costs
 - As an *example*, the application of a 1 cent per gallon fee would generate approximately \$190 million per year of funding



Other Issues

Disproportionate Economic Impacts

- *If ATC retrofit is recommended*, it is possible that the cost could be prohibitive to smaller business owners
- Loss of retail establishments in areas of the state with fewer stations could disproportionately impact availability of fuel supplies
- Economic impact for retail establishment with lower average sales volumes per fuel dispenser could be greater
- Energy Commission technical staff intend to examine these issues and may provide recommended actions designed to lessen the potential impact of these scenarios



Other Issues

Disproportionate Economic Impacts

- Options to consider for compensating costs based on:
 - Average annual fuel sales throughput
 - Does not address other revenue streams from non-petroleum merchandise sales
 - What level of sales?
 - Ability to pay
 - Would require submission of financial records
 - Economic hurdle benchmark would need to be set
 - Fuel availability geographic location
 - Retail outlet concentration
 - No affordability test



Other Issues - Labeling

- *If ATC retrofit or new reference temperatures are concluded to be cost-beneficial solutions, what labeling issues may be addressed?*
 - Labeling on the retail fuel dispenser
 - Labeling on the large street sign
 - Printed consumer receipts
- Retail dispensers
 - Simple or detailed statement
 - Canada has elected to use the simple approach
 - Expense assumed to be minor



Other Issues - Labeling

- Retail street signs
 - Simple notation due to space limit
 - Would be higher cost than retail dispenser labels
- Printed receipt notation
 - Temperature compensation notation could be printed on each receipt – minimal effort
- A requirement to print the net and gross gallons or temperature of the fuel on the receipt could create significant technical and software challenges
- ATC retrofit costs could be greater if receipts would be required to include temperature or compensated gallons



Other Issues – Consumer Outreach

- *If ATC retrofit or new reference temperatures are concluded to be cost-beneficial solutions*, what are some options for informing consumers?
- Are labels on the dispenser and street sign sufficient?
- Should retail stations be *required* to have brochures available?
- Should majors send out some ATC literature to their credit card holders?
- Should the state have any involvement in outreach?



Other Issues

Potential Environmental Benefits

- Based on the experience of fuel retailers in Canada, it has been noted that fuel throughput can be tracked with greater precision
- To what extent, if any, does this increased inventory monitoring accuracy improve the capability to detect low-level releases from underground storage tanks?
- Energy Commission technical staff may examine this issue in greater detail and seek input from other stakeholders to verify the accuracy of these claims and to quantify a range of potential environmental benefits
 - Water agencies, Canadian inspectors, California county sealers & environmental inspectors



Other Issues

Potential Environmental Benefits

- What is the current accuracy of inventory tracking for retail establishments in California?
- Would the installation of an ATC retrofit kit increase the accuracy of inventory tracking capability or have no impact beyond the status quo?
- What safeguards are currently in place for UST standards with regard to leak prevention?
 - Such as the minimum leak detection limits and would ATC retrofit kits make any difference?



Other Issues

Potential Safety Concerns

- A potential safety concern has been raised by some stakeholders regarding an increased risk for spilling fuel when consumers fill gasoline cans or other portable containers
- Energy Commission will investigate to determine if in fact the safety features integral to the retail dispenser nozzles are sufficient to prevent overfill of portable containers for systems using ATC
- It is possible that experience to date in Canada could provide some useful information for those regions of the country that have warmer, not colder, fuel at retail



Other Issues

Renewable Fuels & LCFS

- AB 868 also requires that:
“The commission shall evaluate how different reference temperatures or temperature correction devices apply to alternative fuels and low-carbon fuel standards.”
- Alternative fuels and their respective thermal expansion properties vary
 - Various blends of alternative fuels may necessitate density values and associated volume correction factors (VCF) for each type
 - E85, B5, B10, and B20
 - New alternative fuels introduced to the market may require a density designation



Other Issues

Renewable Fuels & LCFS

- Average concentration of ethanol in California gasoline is expected to increase over time
 - Currently an average of 6 percent by volume (E6)
 - Could reach 10 percent by 2010 or 2012 (E10)
 - The density of E6 and E10 vary
- Assessment of potential LCFS impacts may not be feasible since regulatory development is ongoing
 - But addressing the density differences may be sufficient



Other Issues – Discussion



Next Steps

- The Energy Commission will conduct the next public staff workshop for the Fuel Delivery Temperature Study on **June 5, 2008 at 9 AM**
- A notice for this meeting will be emailed during April
- An agenda for this meeting will be emailed during mid-May
- Format of workshop will include the presentation of preliminary analysis to date
- Will outline additional work to be conducted in June and July
- Targeting mid-August for release of draft staff report



Additional Questions & Resources

