



Renewable Biogas: Pipeline Biomethane

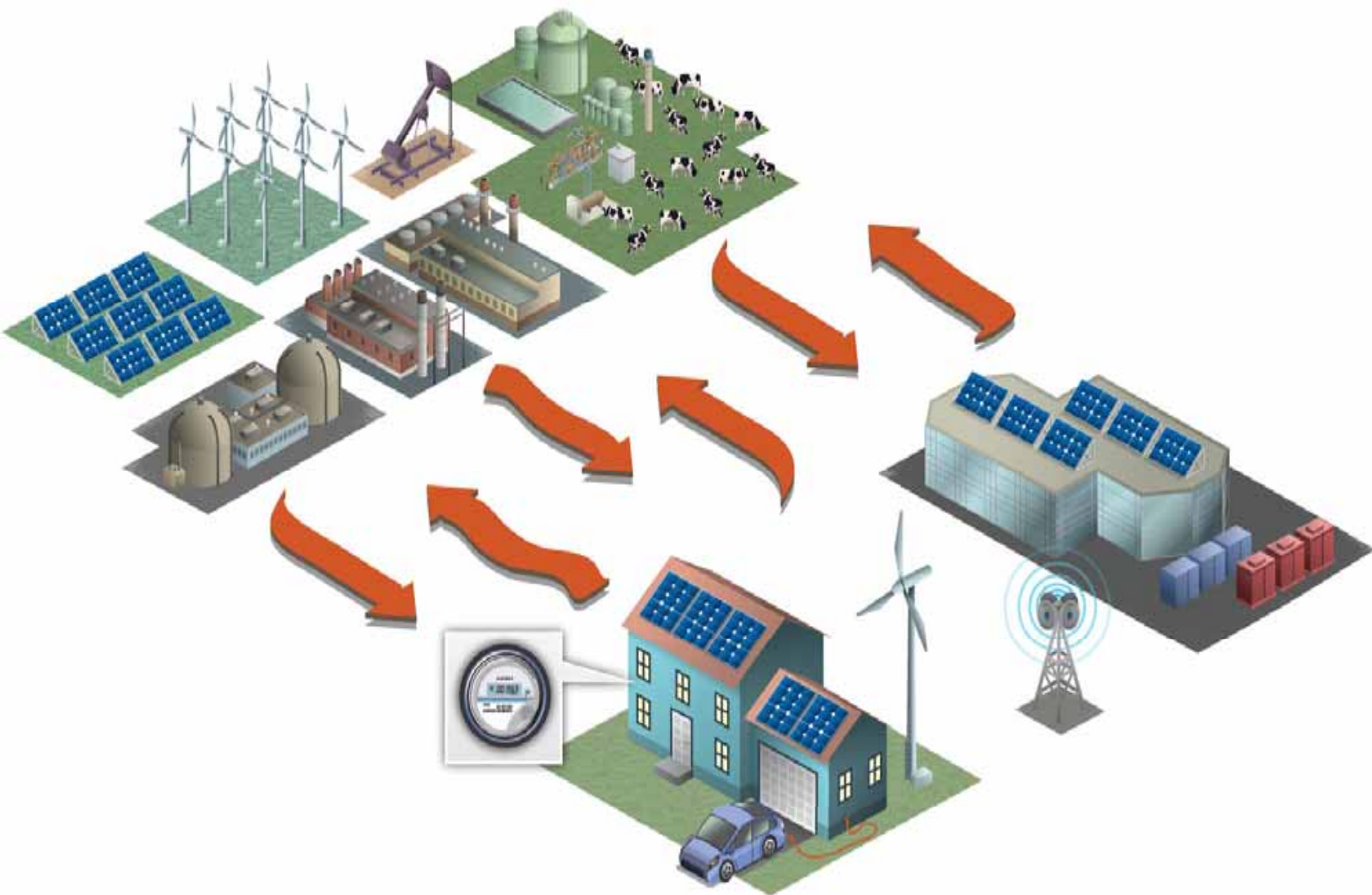
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Pipeline Biomethane & The Utility of Tomorrow



Drivers of Biomethane Production

- **California Regulatory Environment**
 - * Renewable Portfolio Standard of 20%, maybe 33%
 - * Assembly Bill 32: cap-and-trade to return to 1990 emission levels (i.e. 30% vehicle GHG emissions reductions by 2016, overall 30% state reduction from 2020 projected emissions, target high global warming potential gases)
 - * Low Carbon Fuel Standard: 10% reduction in carbon content of passenger vehicle fuels by 2020

- **Large demand for in-state renewable fuels** for on-site distributed generation, central generation, and vehicles to meet Green House Gas (**GHG**) reduction targets

- **Availability of feedstocks** that currently vent or flare methane

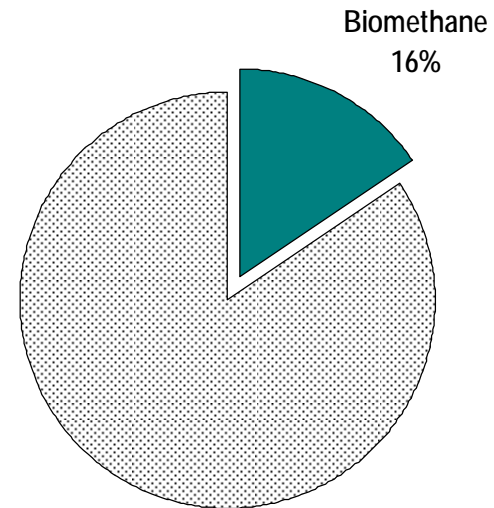
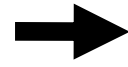
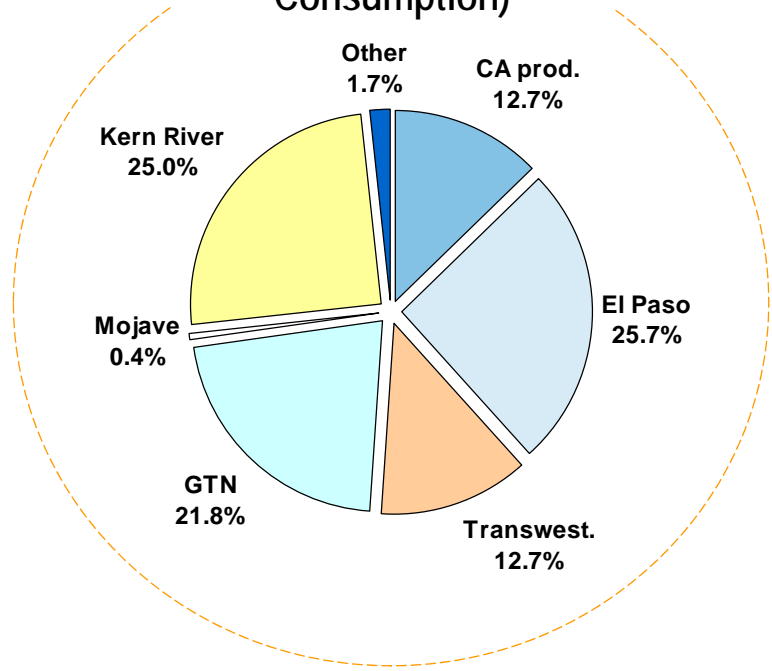
- **Potential under cap-and-trade** for credit/offset value from captured GHG emissions

California Feedstock and Significant Resource Potential



6,500 M Mcf/Day

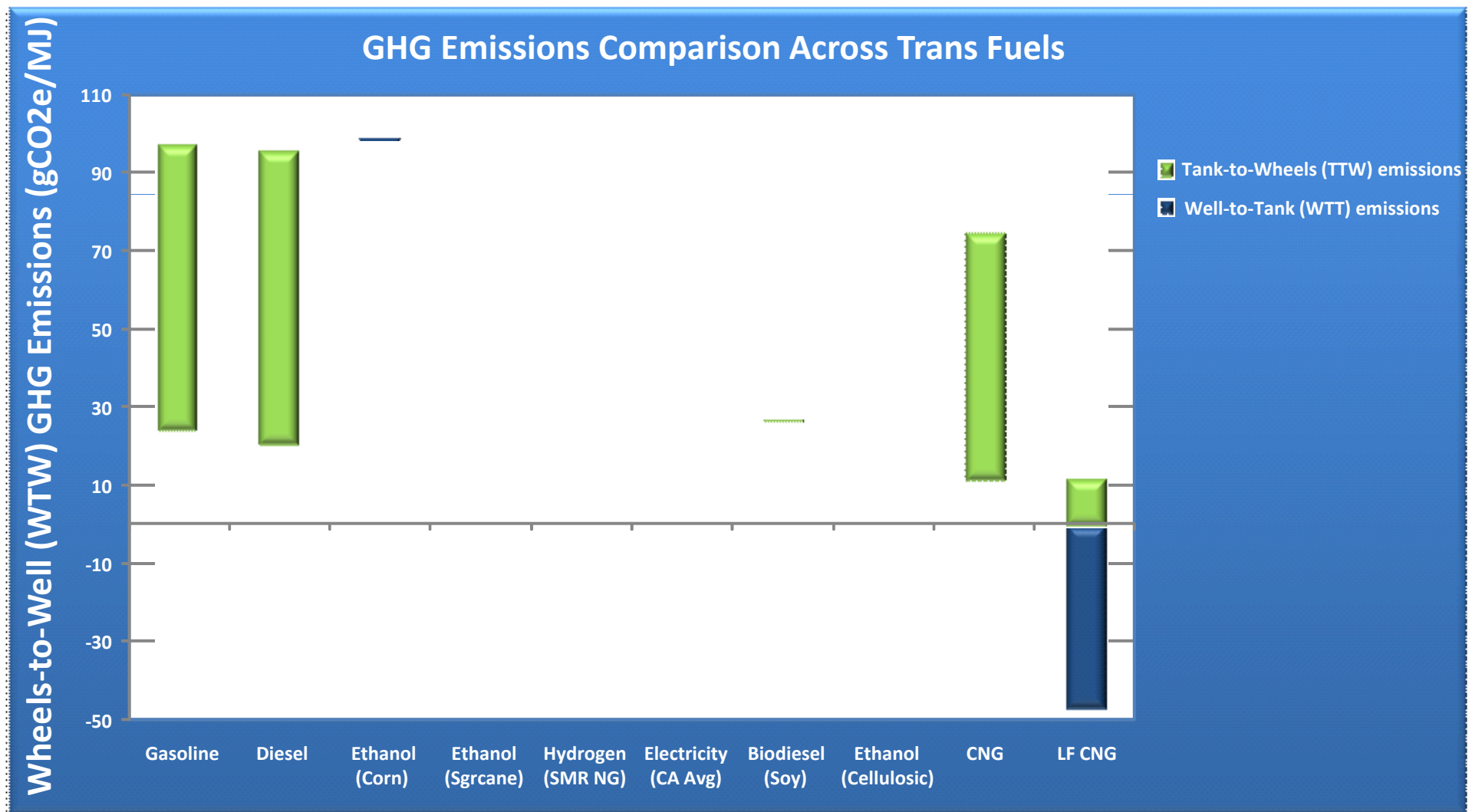
(California Natural Gas Consumption)



Source: California Bioenergy Working Group

Current Biogas Fuel Applications: On-site Generation & Transportation

- Land Fill CNG reduces GHG Emissions**; On-site generation: available federal/state incentives, i.e. CA Self-Generation Incentive Program

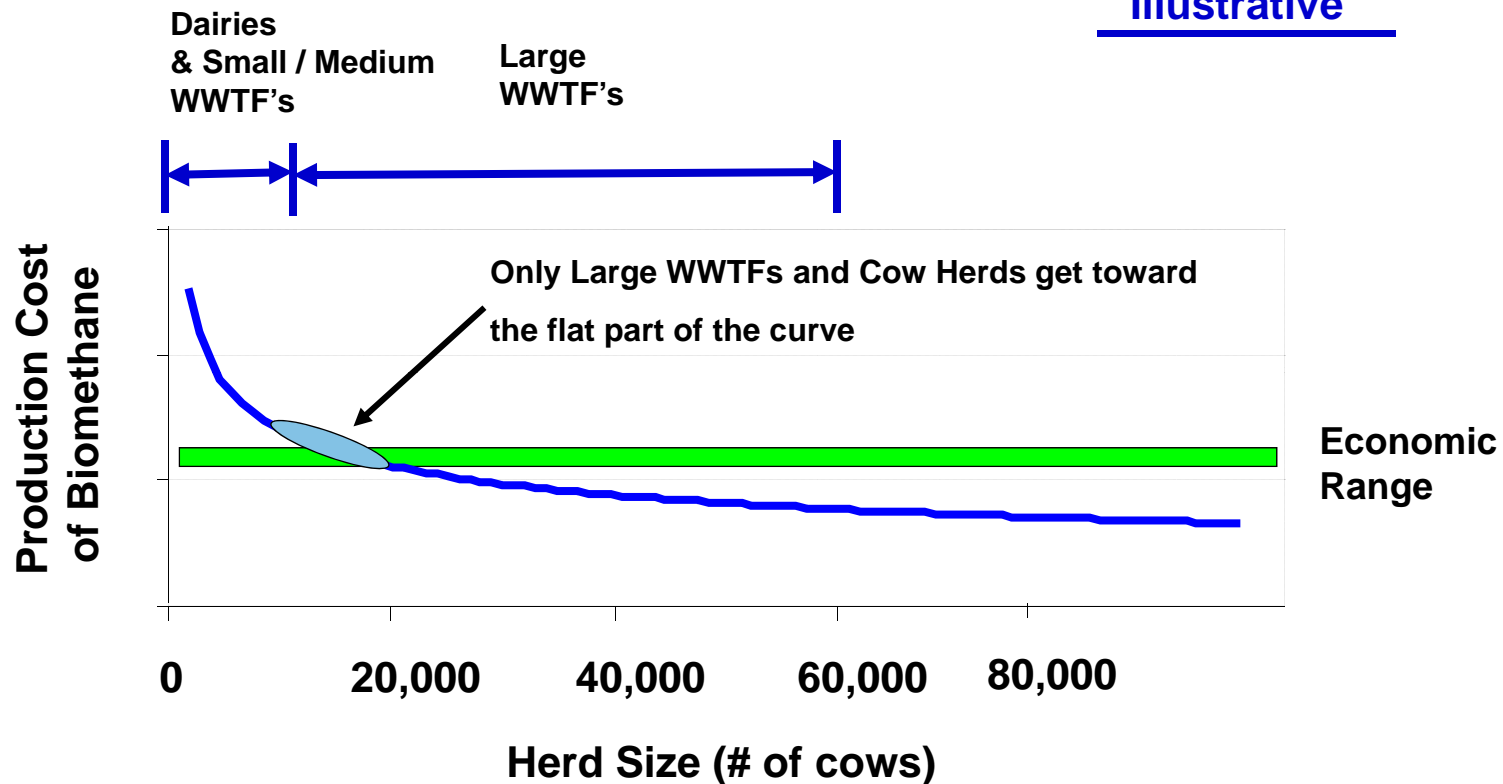


The Biomethane Opportunity / Benefits

- A Competitive Renewable Fuel: large scale biogas production facilities, e.g., wastewater treatment facilities (WWTF), can be compared to other renewables without incentives
- Storable & Dispatchable: maximizes existing infrastructure
- Proven Gas Conditioning Technology to meet pipeline gas quality standards
- Reduces Existing Emissions/Flaring, Air Permitting
- Environmental Bang-for-the-Buck: Methane, a high global warming potential gas that would otherwise be flared or vented, can be converted to a renewable source that offsets 21x the GHG potential of CO₂.

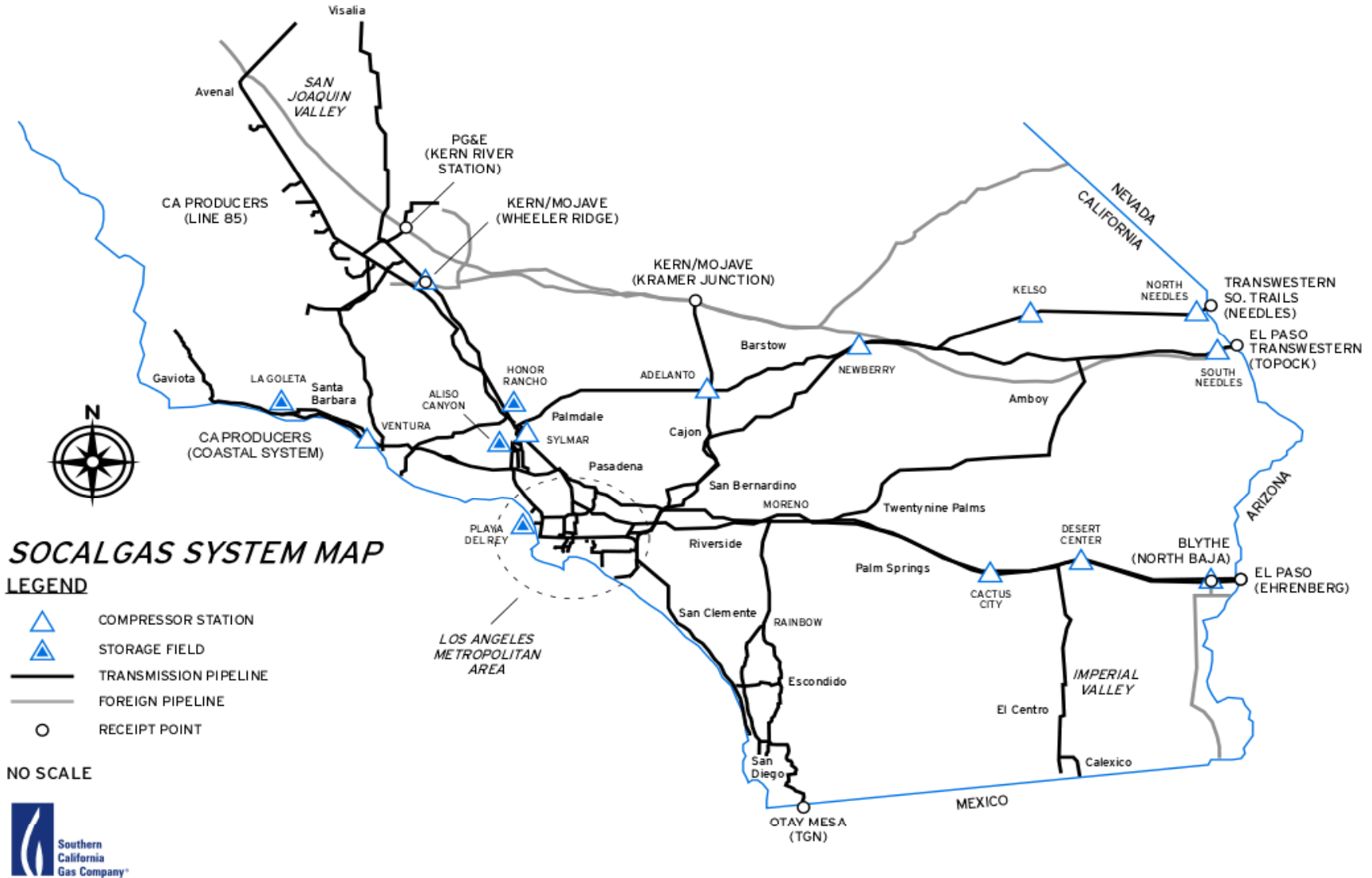
Conditioning to Pipeline Quality Can Be Cost-effective at Scale

Illustrative



- Scale economies (>1.1 mcf/m or 20,000 cows)
- Availability and cost of capital
- Availability of monetized GHG credits

Existing Infrastructure to Store and Transport Biomethane



The Challenges of Pipeline Biomethane

- **Current Situation in California**
 - Biomethane is not being injected locally 'yet'
 - Small to Medium scale bio-gas production facilities are not economical but could be justified with incentives less than those currently provided to alternative renewables
 - Unlike alternative renewables, no subsidies or tax credits are currently available to biomethane producers for pipeline injection, making economics hard to justify

- **Biomethane requires a buyer willing to pay a sufficient price**
 - Economic range is >1.1 mcf per minute raw biogas: Most wastewater plants in California are one-fourth of this size
 - Subsidies required to develop biomethane for small scale

- **Wastewater plants want to sell 'not market' energy**
 - For the gas market, the volumes are small (e.g. 800 mcf / day finished)

What are We Doing About It

- **Successful Renewable Projects (on-site generation)**
 - Gills Onion (Fuel Cell) and Enertech (Fuel Pellets)
 - Investing in RD&D: Escondido WasteWater Treatment Plant
 - Supporting Biogas in Existing Programs (Self Generation Incentive Program – 4 renewable fuel cells in territory)

- **Pipeline Biomethane Injection Readiness - Adapting Gas Quality Requirements**
 - Rule 30 Guidance Document for biogas released September 2009
 - Participating in Gas Technology Institute (GTI) studies - first dairy biogas, currently landfill gas

- **Positioning the Company for Commercially Viable Projects**
 - Currently working with multiple developers on project feasibility assessments
 - Conditioning biogas to pipeline quality with utility owned and operated equipment
 - Revising tariffs to support development from multiple feedstock sources; i.e. gas derived from all renewable organic sources

Regulatory Actions

- Support biomethane as a competitive and cost-effective resource.
- Encourage utility participation and expertise to kick start in the development of renewable biomethane.
- Support even-handed federal and state regulatory incentives and policies for biomethane as another viable alternative to wind and solar
- Support appropriate credit for avoided methane emissions.
- Streamlined, coordinated permitting and regulatory approval's to facilitate interest, investments and development