TOWARD ZERO-EMISSION FREIGHT AT SOUTHERN CALIFORNIA'S PORTS
PROSPECTS, PITFALLS & POLICY NEEDS

A UCLA LAW / BERKELEY LAW CONFERENCE
SPONSORED BY BANK OF AMERICA

June 8, 2018
UCLA Covel Commons
KEYNOTE ADDRESS | Mary Nichols Chair, California Air Resources Board
PANEL 1 | State of Electrification Technologies Applicable to Goods Movement at the Ports

- Joe Lyou, President and CEO, Coalition for Clean Air; Governor’s Appointee, South Coast Air Quality Management District Governing Board
- Renee Moilanen, Manager of Air Quality Practices, Port of Long Beach
- Jimmy O'Dea, Senior Vehicles Analyst, Union of Concerned Scientists
- Cara Horowitz (moderator), Co-Executive Director, UCLA Law Emmett Institute
Panel 1: State of Electrification Technologies Applicable to Goods Movement at the Ports

Joseph K. Lyou, Ph.D.
President & CEO, Coalition for Clean Air
Governor’s Appointee, South Coast AQMD Governing Board
@joe_lyou
The mission of the Coalition for Clean Air is to protect public health, improve air quality, and prevent climate change.
L.A. Area Needs

45% NOx emission reductions by 2023

55% NOx emission reductions by 2031
Top NOx Sources in 2031

* ~300 largest stationary sources, including refineries & power plants.

Source: South Coast AQMD, 2016 Air Quality Management Plan
TABLE G-2: Statewide Health Effects and Valuation (2013 $) Associated with Freight Emissions Contributing to PM2.5—Midpoint Projections

<table>
<thead>
<tr>
<th>PM2.5 and NOx</th>
<th>2012</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>2,200</td>
<td>980</td>
<td>1,100</td>
</tr>
<tr>
<td>Hospitalizations*</td>
<td>330</td>
<td>150</td>
<td>160</td>
</tr>
<tr>
<td>ER Visits†</td>
<td>950</td>
<td>420</td>
<td>450</td>
</tr>
<tr>
<td>Valuation (billions)</td>
<td>$20</td>
<td>$9</td>
<td>$10</td>
</tr>
</tbody>
</table>

* Includes respiratory and cardiovascular hospitalizations.
† Includes asthma and cardiovascular emergency room visits.

TABLE G-3: Statewide Health Effects and Valuation (2013 $) Associated with Freight Emissions Contributing to PM2.5—Uncertainty Ranges**

<table>
<thead>
<tr>
<th>PM2.5 and NOx</th>
<th>2012</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>1,700-2,700</td>
<td>770-1,200</td>
<td>830-1,300</td>
</tr>
<tr>
<td>Hospitalizations*</td>
<td>43-770</td>
<td>19-340</td>
<td>20-370</td>
</tr>
<tr>
<td>ER Visits†</td>
<td>600-1,300</td>
<td>260-570</td>
<td>280-620</td>
</tr>
<tr>
<td>Valuation (billions)</td>
<td>$16-$24</td>
<td>$7-$11</td>
<td>$7-$12</td>
</tr>
</tbody>
</table>

* Includes respiratory and cardiovascular hospitalizations.
**Uncertainty ranges only reflect uncertainty in the concentration-response function, and do not reflect uncertainty in emission projections, spatial interpolation, and aggregation.
† Includes asthma and cardiovascular emergency room visits.

The Path Forward

- Deal with our prisoners’ dilemma
- Be honest and admit shortcomings
- Be an effective advocate

Vincent Van Gogh  ◦◦◦  Crows Over the Wheat Field
Prisoner's Dilemma

Prisoner A

Confess

Confess

5 years

5 years

0 year

20 years

Remain silent

Remain silent

20 years

0 year

1 year

1 year

Source: Encyclopedia Britanica
Compete Cooperate

Near-Zero Emission Advocates

Compete
- Petroleum Industry Wins
- Near-Zero Emission Advocates Win

Cooperate
- Zero Emission Advocates Win
- Alternative Fuel Supporters Win
California Voter Views of Clean Air and Clean Vehicle Policies

Key Findings from a Survey of Voters
Statewide and in Impacted Communities
Conducted March 3-15, 2018
Methodology

✓ 638 interviews with registered voters in California
✓ Margin of sampling error of ±3.9% at the 95% confidence level
✓ Additional oversample in the following regions:
  ▪ CA-99 Corridor: Fresno to Bakersfield within 1.5 miles of the highway (N=209)
  ▪ I-710 Corridor: within 1.5 miles of the highway (N=222)
  ▪ Inland Empire Cities: Chino, Colton, Corona, Fontana, Jurupa Valley, Ontario, Redlands, San Bernardino (N=216)
  ▪ West Oakland (N=206)
✓ Margin of sampling error of ±6.6% to 6.8% at the 95% confidence level for each region
✓ Interviews conducted March 3 - 15, 2018
✓ Interviews available on landlines and cell phones in English and Spanish
✓ Some percentages may not sum to 100% due to rounding
Respondents were asked about two proposals: switching to zero-emissions vehicles when they are available and near-zero emissions vehicles now.

Some people have said that we should set a goal that, at some specific date in the future, all trucks and heavy-duty vehicles in California should be **zero-emission vehicles** – meaning waiting until vehicles are available that are powered by electricity or hydrogen that do not create any emissions from the vehicles while they drive.

Some people have said that there are trucks and heavy-duty vehicles that produce far less pollution than the trucks on the road today, and could be put into use by trucking companies and others right away. These are known as **“near-zero vehicles”** because they emit 90% less pollution than the cleanest diesel-powered trucks on the road today. These people have suggested we set the goal of switching to near-zero emissions trucks now.

Question: “Does this goal sound like something you would support or oppose?” Questions were rotated.
Two-thirds of respondents statewide support both proposals and fewer than one in ten want a ZEV-only approach.

Question: “Does this goal sound like something you would support or oppose?”

- **Support both**: 67% (Statewide: 67%, Impacted Areas: 63%)
- **ZEV only**: 7% (Statewide: 7%, Impacted Areas: 10%)
- **NZEV only**: 8% (Statewide: 8%, Impacted Areas: 11%)
- **Oppose both**: 13% (Statewide: 13%, Impacted Areas: 8%)
- **Don't know/other**: 4% (Statewide: 4%, Impacted Areas: 7%)
My favorite podcast . . .
Former U.S. Attorney Preet Bahrara

Defense Attorney Ben Brafman
- Battery Electric:
  - Too expensive
  - Too heavy
  - Limited range
  - Limited availability
  - Takes a long time to charge
  - Lack of charging infrastructure
  - Currently relies on fossil fuels

- Hydrogen:
  - Too expensive
  - Very limited availability
  - Lack of fueling infrastructure
  - Currently relies on fossil fuels

- Natural Gas:
  - More expensive than diesel
  - Bad experience with 9L trucks
  - Not zero emissions
  - Limited fueling infrastructure
  - Currently relies on fossil fuels
**Battery Electric**
- Battery technology advancements will help with cost, weight, and range issues
- More companies developing trucks and equipment
- Fast charging & opportunity charging being developed
- SB 350 helping address infrastructure needs
- Reduced reliance upon fossil fuels as use of renewable energy increases

**Hydrogen**
- Cost will come down with additional production
- More companies developing trucks and equipment
- Short-term and long-term fueling infrastructure options available
- Reduced reliance upon fossil fuels as use of renewable energy increases

**Natural Gas**
- Total cost of ownership can be less than diesel with large scale production
- New 12L trucks are performing well
- Near-zero trucks are as clean as the average car
- Fueling infrastructure will take care of itself if demand is there
- Policies like the Low-Carbon Fuel Standard make renewable natural gas cost competitive
Advocate Effectively

Zero Emission Freight Future

Policy
- Fulfill commitments
- International agreements

Technology
- Commercialization
- Innovation

Money
- Agree on who pays what
- Well structured incentives

Leadership
- Beneficial cargo owners
- Everyone else
The end.
PANEL 1 | State of Electrification Technologies Applicable to Goods Movement at the Ports

- **Joe Lyou**, President and CEO, Coalition for Clean Air; Governor’s Appointee, South Coast Air Quality Management District Governing Board

- **Renee Moilanen**, Manager of Air Quality Practices, Port of Long Beach

- **Jimmy O'Dea**, Senior Vehicles Analyst, Union of Concerned Scientists

- **Cara Horowitz (moderator)**, Co-Executive Director, UCLA Law Emmett Institute
Heavy-duty vehicles: The next frontier for electrification

Jimmy O'Dea, Senior Vehicles Analyst
The need for electrification
Heavy-duty vehicles in California...

- Vehicle population: 7%
- Transportation GHG: 20%
- Transportation PM2.5: 27%
- Transportation NOx: 40%

Source: California Air Resources Board
Diesel particulate matter

Source: US EPA EJSCREEN
California’s GHG emissions over time, by fuel

CO₂ emissions over time from select fuels in California

Life cycle global warming emissions, e.g. buses

Source: ucsusa.org/ElectricTrucks
State of technology
Electric trucks are here and coming

- BYD: 92 miles
- Eaton: 24 hours
- Cummins: 100 miles
- Toyota: 200 miles
- Nikola: 500+ miles
- ZE: 150 miles
- Fuso: 220 miles
- Nikola: 500 miles
- Fuso: 300 miles
Electric trucks are high performing
Shenzhen
Purchase incentives

VW funds from diesel scandal will pay for zero-emission buses, trucks in California
Charging infrastructure

ELECTRIC VEHICLES

California Regulators Approve Landmark Utility EV-Charging Proposals

“What we’re seeing is one of the largest and most well-thought-out approaches to advancing electrification of vehicles.”

EMMA FOEHBRINGER MERCHANT | MAY 31, 2018
PANEL 1 | State of Electrification Technologies Applicable to Goods Movement at the Ports

- **Joe Lyou**, President and CEO, Coalition for Clean Air; Governor’s Appointee, South Coast Air Quality Management District Governing Board
- **Renee Moilanen**, Manager of Air Quality Practices, Port of Long Beach
- **Jimmy O'Dea**, Senior Vehicles Analyst, Union of Concerned Scientists
- **Cara Horowitz (moderator)**, Co-Executive Director, UCLA Law Emmett Institute
LUNCHTIME DISCUSSION | Challenges for Zero-Emission Trucking

- **Vincent Pellecchia**, Strategic Account Manager, BYD Motors
- **Ryan Popple**, Chief Executive Officer, President and Director, ProTerra
- **Daniel Witt**, Senior Manager of Business Development and US Policy, Tesla Motors
- **Jordan Diamond (moderator)**, Executive Director, Center for Law, Energy, and the Environment, UC Berkeley School of Law
PANEL 2 | Financing and Other Implementation Challenges for Zero-Emission Technologies

- **Michelle Iturralde**, Senior Vice President, Bank of America
- **Victor La Rosa**, Chief Executive Officer, President & Founder, Total Transportation Services Inc. (TTSI)
- **Bryon Rockwell**, Managing Director, Western Region Public Finance Bank of America Merrill Lynch
- **Chris Shimoda**, Vice President of Government Affairs, California Trucking Association
- **Ted Lamm (moderator)**, Climate Law and Policy Fellow, Center for Law, Energy & the Environment at UC Berkeley School of Law
Towards Zero-Emission Freight at Southern California Ports

Financing and Other Implementation Challenges

Chris Shimoda
Vice President, Government Affairs,
California Trucking Association
Who Operates at the Port?

- 97% port fleet operates <100 trucks. Move ¾ of all freight.
Current Fuel/Technology Mix

- As of Nov 2017, 97% diesel and 3% LNG/CNG

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Trucks</th>
<th>Percent Trucks</th>
<th>Moves</th>
<th>Percent Moves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>16,856</td>
<td>96.7%</td>
<td>192,814</td>
<td>96.9%</td>
</tr>
<tr>
<td>LNG</td>
<td>565</td>
<td>3.2%</td>
<td>7,700</td>
<td>3.9%</td>
</tr>
<tr>
<td>CNG</td>
<td>15</td>
<td>0.1%</td>
<td>190</td>
<td>0.1%</td>
</tr>
<tr>
<td>Electric Hybrid</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other and Blanks</td>
<td>1</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td>17,437</td>
<td>-</td>
<td>198,927</td>
<td>-</td>
</tr>
</tbody>
</table>

Trucks Fuel Type

- Diesel: 96.7%
- LNG: 3.2%
- CNG: 0.1%
- Electric Hybrid: 0.0%
- Other and Blanks: 0.0%

Gate Moves by Fuel Type

- Diesel: 96.9%
- LNG: 3.9%
- CNG: 0.0%
- Electric Hybrid: 0.0%
- Other and Blanks: 0.0%
Current Fuel/Technology Mix

- More than 50% of all moves by 2007-2009 MY Engines
ZEV Deployment Challenges

- Commercial availability
  - Service/Parts
  - Warranties
- Infrastructure
- Cost
- Performance
  - Range
  - Weight
NACFE Guidance Report:
BEVs have potential to better baseline diesel performance
Conclusions of NACFE Study

“BEVs will not be a solution for every application or market, but commercial BEVs will have an increasing role in freight transportation in Classes 3 through 8.

The rapid pace of battery energy density improvement will spur increases in BEV efficiency that likely cannot be matched by evolutionary changes to the internal combustion engines.

The transition in specific market segments will be drawn out over decades, sharing space with traditional gasoline, diesel, and other alternative-fuel powertrains and also competing with other emerging technologies like fuel cells and hybrids.

Mixed fleets (including diesel, natural gas, hybrid, and BEV products) optimized for specific routes and duty cycles will likely be the norm through 2050.”
“BEVs will not be a solution for every application or market, but commercial BEVs will have an increasing role in freight transportation in Classes 3 through 8.

The rapid pace of battery energy density improvement will spur increases in BEV efficiency that likely cannot be matched by evolutionary changes to the internal combustion engines.

The transition in specific market segments will be drawn out over decades, sharing space with traditional gasoline, diesel, and other alternative-fuel powertrains and also competing with other emerging technologies like fuel cells and hybrids.

Mixed fleets (including diesel, natural gas, hybrid, and BEV products) optimized for specific routes and duty cycles will likely be the norm through 2050.”
PANEL 2 | Financing and Other Implementation Challenges for Zero-Emission Technologies

• **Michelle Iturralde**, Senior Vice President, Bank of America

• **Victor La Rosa**, Chief Executive Officer, President & Founder, Total Transportation Services Inc. (TTSI)

• **Bryon Rockwell**, Managing Director, Western Region Public Finance Bank of America Merrill Lynch

• **Chris Shimoda**, Vice President of Government Affairs, California Trucking Association

• **Ted Lamm (moderator)**, Climate Law and Policy Fellow, Center for Law, Energy & the Environment at UC Berkeley School of Law
Alternative Fuel Vehicle Program

Victor La Rosa, CEO, President & Founder, TTSI
At TTSI, we are committed to leaving as small a footprint as possible on our precious environment. That's why we are committed to several ecological goals designed to drastically reduce our operational emissions and subsequent environmental pollution. Our goal is to operate a zero emission fleet that services our customers while being a steward to the environment.
TTSI announced during the press conference that it would convert its entire fleet to comply with the provisions of the CAAP.
Prior to the implementation of the CAAP, trucks that transported containers in and out of the port complex were much older trucks with little to no emission standards.
Progression to Zero Emissions
# Alternative Fuel Vehicle Demonstrations

<table>
<thead>
<tr>
<th>Alternative Fuel Vehicle Type</th>
<th>Manufacturer</th>
<th>Projected Demonstration</th>
<th>Number of Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Battery Truck</td>
<td>BYD Motor</td>
<td>April 2018</td>
<td>2</td>
</tr>
<tr>
<td>Compressed Natural Gas Hybrid (Electric Motor)</td>
<td>CTE/Kenworth</td>
<td>Mid 2018</td>
<td>1</td>
</tr>
<tr>
<td>Compressed Natural Gas Hybrid (Electric Motor)</td>
<td>Efficient Drive Train</td>
<td>Late 2018</td>
<td>2</td>
</tr>
<tr>
<td>Compressed Natural Gas Hybrid (Electric Motor)</td>
<td>TransPower</td>
<td>May 2018</td>
<td>1</td>
</tr>
<tr>
<td>Electric Battery Truck</td>
<td>TransPower</td>
<td>May 2018</td>
<td>4</td>
</tr>
<tr>
<td>Electric Battery Truck</td>
<td>US Hybrid Corporation</td>
<td>In Progress</td>
<td>2</td>
</tr>
<tr>
<td>Fuel Cell Battery Truck (Hydrogen)</td>
<td>CTE/Kenworth</td>
<td>May 2018</td>
<td>1</td>
</tr>
<tr>
<td>Fuel Cell Battery Truck (Hydrogen)</td>
<td>Hydrogenics</td>
<td>Late 2018</td>
<td>2</td>
</tr>
<tr>
<td>Fuel Cell Battery Truck (Hydrogen)</td>
<td>TransPower</td>
<td>May 2018</td>
<td>4</td>
</tr>
<tr>
<td>Fuel Cell Battery Truck (Hydrogen)</td>
<td>US Hybrid Corporation</td>
<td>Jan 2018</td>
<td>1</td>
</tr>
<tr>
<td>Liquid Natural Gas Hybrid (Electric Motor)</td>
<td>US Hybrid Corporation</td>
<td>In Progress</td>
<td>2</td>
</tr>
<tr>
<td>Liquid Natural Gas Hybrid (Electric Motor)</td>
<td>US Hybrid Corporation/POLB</td>
<td>Mid 2018</td>
<td>4</td>
</tr>
<tr>
<td>Repower 12 Liter, Low NOx Engine (LNG)</td>
<td>Cummins/Clean Energy</td>
<td>In Progress</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

*CTE - Center for Transportation and Environment*
Battery Electricity
LNG/CNG Technology
Hydrogen Fuel Cell
Fueling Infrastructure

- CNG
- LNG
- Solar
- Hydrogen
- Electricity
Electric Truck Chargers
LNG & CNG Fuels
Hydrogen Fueling

Hydrogen Dispensing Equipment

Hydrogen Generation Equipment
HPEC
(Harbor Performance Enhancement Center)
HPEC - 100 Acres (now)
HPEC - Future

KEYNOTES
1. EXISTING CUSTOMS HOUSE - HISTORICAL BUILDING
2. ADMINISTRATION BUILDING (EXISTING STRUCTURE)
3. CELL PHONE HOLDING YARD / BOSTAILS
4. TERMINAL ACES
5. PROPOSED GRADE SEPARATION
6. ENTRY / EXIT GATE (4 LANE EACH DIRECTION)
7. SECURITY BOOTH
8. WHEELED CONTAINER STORAGE, TYP
9. CHASSIS POOL (FLEXIBLE)
10. POTENTIAL SECONDARY AGLE

LEGEND
- CONTAINER TERMINAL SUPPORT FACILITIES BOUNDARY - 126 ACRES
- FUTURE PROPOSED LIQUID & BULK AREA - PORT MASTER PLAN - 85 ACRES
- WHEELED STORAGE (DRY) - 3.55 BL (TS)
- CHASSIS POOL (FLEXIBLE)
- GATE FACILITY
- PROPOSED GRADE SEPARATION
- ENTRY TRAFFIC FLOW
- EXIT TRAFFIC FLOW
For more information on TTSI, please visit our website at: www.tts-i.com

Thank You
PANEL 2 | Financing and Other Implementation Challenges for Zero-Emission Technologies

- **Michelle Iturralde**, Senior Vice President, Bank of America
- **Victor La Rosa**, Chief Executive Officer, President & Founder, Total Transportation Services Inc. (TTSI)
- **Bryon Rockwell**, Managing Director, Western Region Public Finance Bank of America Merrill Lynch
- **Chris Shimoda**, Vice President of Government Affairs, California Trucking Association
- **Ted Lamm (moderator)**, Climate Law and Policy Fellow, Center for Law, Energy & the Environment at UC Berkeley School of Law
PANEL 3 | Policy Needs to Deploy Zero-Emission Technologies

- **Laura Cortez**, Community Organizer, East Yard Communities for Environmental Justice
- **Veronica Eady**, Assistant Executive Officer for Environmental Justice, California Air Resources Board
- **Adrian Martinez**, Staff Attorney, Earthjustice
- **Katie Sloan**, Principal Manager – Innovation, Development, & Controls, Customer Service Southern California Edison
- **Sean Hecht (moderator)**, Co-Executive Director, UCLA Law Emmett Institute
TOWARD ZERO-EMISSION FREIGHT AT SOUTHERN CALIFORNIA'S PORTS
PROSPECTS, PITFALLS & POLICY NEEDS

A UCLA LAW / BERKELEY LAW CONFERENCE
SPONSORED BY BANK OF AMERICA

June 8, 2018
UCLA Covel Commons