2017 Draft Plan Update

November 2016

Clean Fuels Program

Technology Advancement Office

Leading the way to zero and near-zero emission technologies

Federal/State Actions

- GHG reduction legislation
  - SB 32 signed by Governor 8/25/16 requiring GHGs 40% below 1990 levels by 2030
  - Governor's 2015 Executive Order B-30-15 still requires 80% below 1990 levels by 2050
- EPA/NHTSA finalizing standards to improve fuel efficiency of MDVs/HDVs for MY 2018 and beyond

Federal/State Actions (cont'd)

- Sustainable Freight Action Plan
  - Improve freight system efficiency 25% by 2030
  - Deploy over 100,000 ZEVs and maximize near-zero technology by 2020
- U.S., Mexico & Canada to pursue 50% clean energy generation by 2025

South Coast Plans & Policies

- 2016 AQMP – NAAQS
  - 2008 8-hr Ozone – 75 ppb
- The Game Changer
- FY 2016-17 Goals & Objectives

2016 Plan
Key Proposed Projects

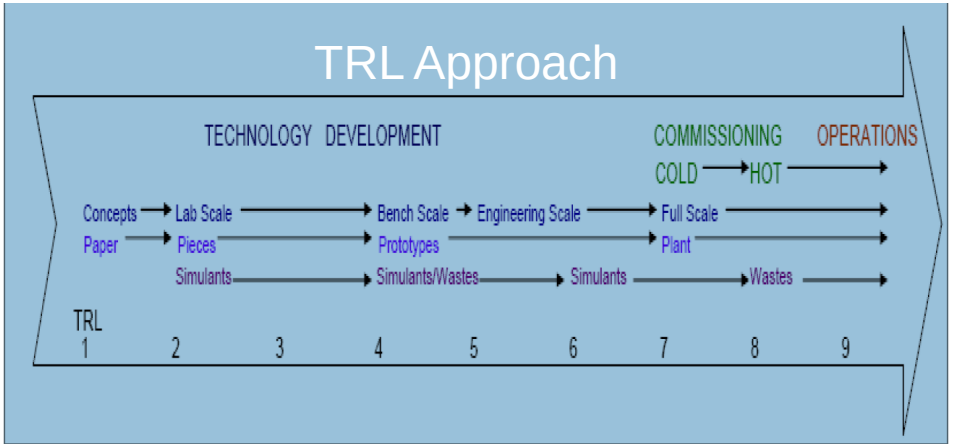
- ZECT II technology
- Medium-duty fuel cell truck development
- Fuel Cell Transit Buses
- Further evaluation of biogas production and use, including DME
- Partnering with NREL on fleet and technology matching analysis
- Development & demonstration of advanced NG engines and zero-emission technologies for high HP applications

Projects not funded in 2016 may be considered for funding in future years

Draft 2017 Plan Update
(Key Technical Areas)

- Focus priorities on zero and near-zero emissions goods movement technologies
- Near-zero emission engine systems
- Maintain focus on hybrid, plug-in, electric-drive technologies and infrastructure
- Continue to prepare for hydrogen vehicle deployments
- Maintain other areas of emphasis

Technology Readiness



Project Ranking – Factors & Sub-Factors

1. Environment and Health

- Criteria Pollutant Emission Reduction
- Co-benefits of GHS & Petroleum Reduction
- Health Benefits

2. Technology Maturity & Compatibility

- Infrastructure Constructability
- Technology Readiness
- Near-Term Implementation/Duty Cycle Fulfillment Capability
- Operational Compatibility

3. Cost

- Relative Costs & Economic Sustainability
- Incentives Available

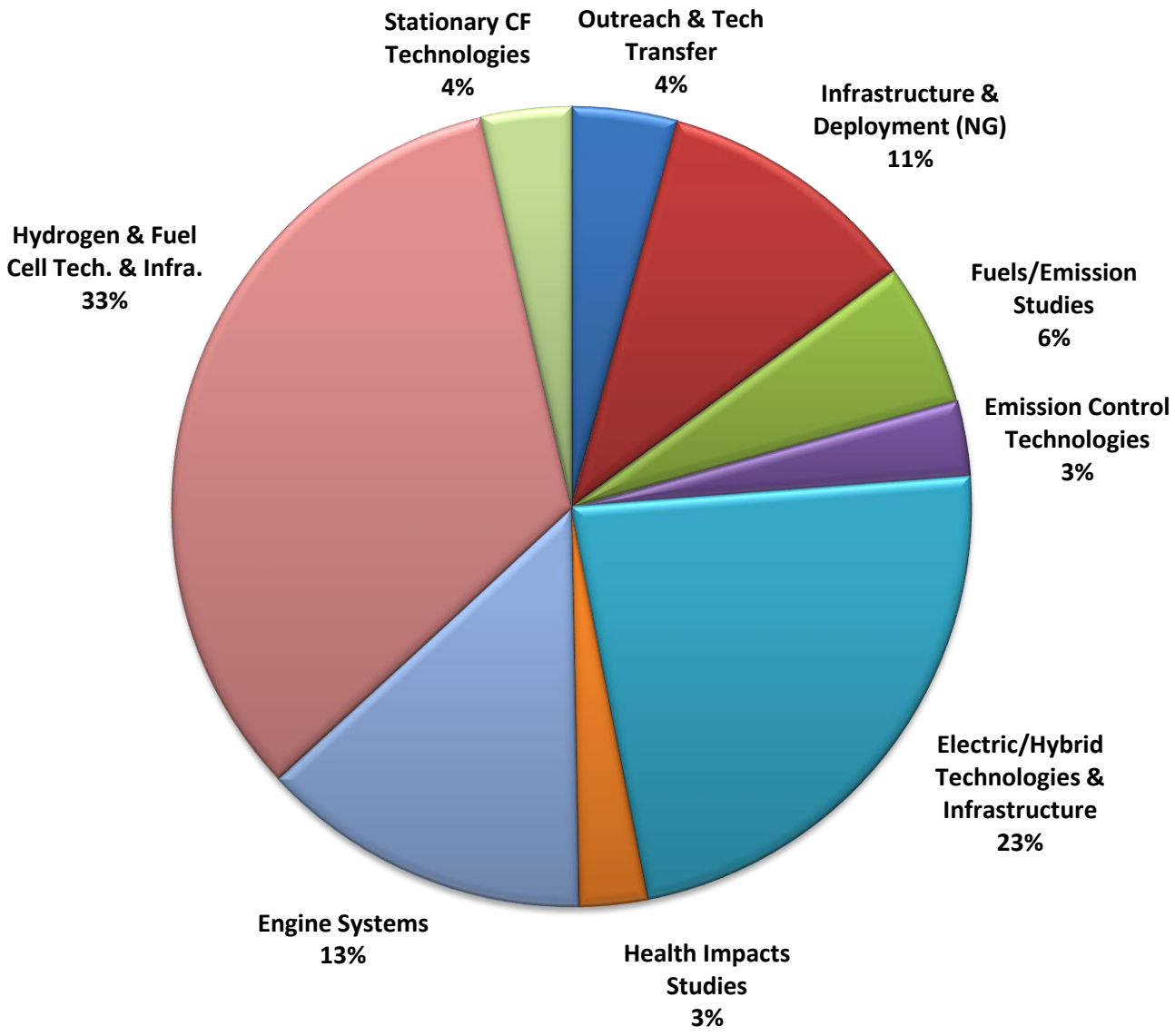
"Consumer Reports" type approach:

● Excellent ◓ Good ○ Satisfactory ◒ Poor ● Unacceptable

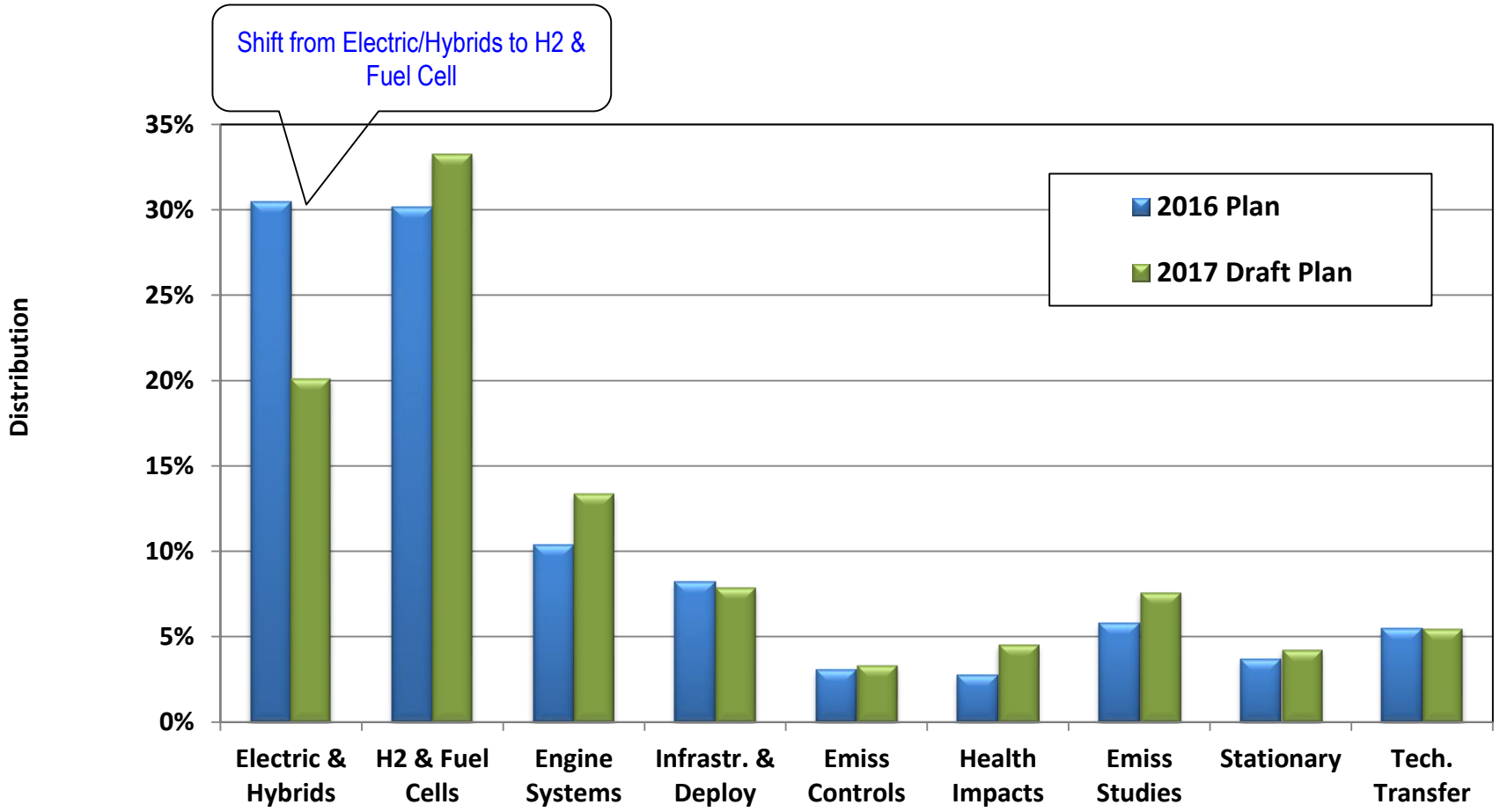
Technologies & Proposed Solutions	Environment & Health			Technology Maturity & Compatibility				Cost	
	Emissions Reduction	GHG/Pet Reduction	Health Benefits	Infra Const.	Tech. Readi.	Near-Term Implemen./ Duty Cycle Fulfillment Capability	Oper. Comp.	Rel. Cost & Econ. Sustain.	Incentives Available
Electric/Hybrid Technologies & Infrastructure									
Plug-In Hybrid Heavy-Duty Trucks with AER	◓	◯	◓	●	◯	◓	◓	◒	●
Heavy-Duty Zero-Emission Trucks	●	◓	●	◓	◒	◒	◯	●	●
Medium-Duty Trucks	◓	◓	●	◓	◯	◒	◒	◒	●
Medium- and Heavy-Duty Buses	●	◓	●	◓	◯	◒	◯	◒	●
Light-Duty Vehicles	◓	◓	●	◓	◓	◓	◓	◒	◒
Infrastructure	-	-	-	◓	◓	◓	◓	◯	◒
Hydrogen & Fuel Cell Technologies & Infra.									
Heavy-Duty Trucks	●	◓	◓	◯	◒	◒	◒	●	●
Heavy-Duty Buses	●	◓	◓	◯	◒	◒	◒	●	●
Off-road – Locomotive/Marine	●	◓	◓	◯	◒	◒	◒	●	●
Light-Duty Vehicles	●	◓	◓	◯	◓	◯	◯	◯	◒
Infra. – Production, Dispensing, Certification	-	-	-	◯	◯	◒	◒	●	◒
Engine Systems									
Ultra-Low emissions Natural Gas Heavy-Duty Engines	◓	◓	◓	●	◓	◓	●	◓	◯
Alternative Fuel Medium- and Heavy-Duty Vehicles	◓	◓	◓	●	◓	◓	●	◓	◯
Off-Road Applications	◓	◓	◓	●	◓	◓	●	◓	◯
Fueling Infrastructure & Deployment									
Production of RNG– Biowaste/Feedstock	◓	●	◓	●	◓	◓	◓	◯	◯
Synthesis Gas to Renewable Natural Gas	◓	●	◓	●	◓	◓	◓	◯	◯
Expansion of Infra/Stations/Equip/RNG Transition	◓	◓	◓	●	◓	◓	◓	◓	◯
Stationary Clean Fuel Technologies									
Low-Emission Stationary & Control Technologies	◓	◓	◓	◓	◯	◯	◓	◯	◯
Renewable Fuels for Stationary Technologies	◯	●	◓	◓	◯	◯	◯	◯	◯
Vehicle-to-Grid or Vehicle-to-Building/Storage	●	●	◓	◯	◯	◒	◯	◯	◒
Emission Control Technologies									
Alternative/Renewable Liquid Fuels	◒	◓	◓	◓	◯	◯	●	◒	◯
Advanced Aftertreatment Technologies	◓	◯	◓	◯	◯	◓	◓	◓	◯
Lower-Emitting Lubricant Technologies	◯	◯	●	▌-	◓	◓▌	◓▌	●▌	◯

● Excellent ◓ Good ◯ Satisfactory ◒ Poor ● Unacceptable

Proposed 2017 Plan Distribution



Plan Update Comparison



Proposed Distribution

	2016 Plan	Draft 2017 Plan
Electric & Hybrids & Infra	30%	23%
H2 & Fuel Cells & Infra	30%	33%
Engine Systems	10%	13%
Infrastructure & Deployment (NG)	8%	11%
Emissions Controls	3%	3%
Health Impacts	3%	3%
Fuels & Emissions Studies	6%	6%
Stationary CF Tech	4%	4%
Technology Transfer	6%	4%
	100%	100%

Feedback

- On proposed distribution
- Other issues impacting 2017 Plan