

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO**

DOCKET NO. 11I-704EG

---

IN THE MATTER OF THE INVESTIGATION OF ISSUES RELATED TO ELECTRIC AND  
NATURAL GAS VEHICLES IN COLORADO.

---

**ORDER OPENING AN INVESTIGATORY DOCKET**

---

---

Mailed Date: August 31, 2011  
Adopted Date: August 24, 2011

**TABLE OF CONTENTS**

I. BY THE COMMISSION .....1

    A. Summary.....1

    B. Background on Electric Vehicles .....2

    C. Discussion of Electric Vehicles.....4

    D. Discussion of Natural Gas Vehicles .....8

    E. Direction to the Parties .....9

II. ORDER.....10

    A. The Commission Orders That: .....10

    B. ADOPTED IN COMMISSIONERS’ WEEKLY MEETING August 24, 2011.....10

**I. BY THE COMMISSION**

**A. Summary**

1. This Order opens the Commission’s inquiry into issues related to electric and natural gas vehicles in Colorado. Through the questions presented in this Order, we seek input from interested parties to help the Commission develop a set of principles to guide the

development of policies related to electric vehicles (EVs)<sup>1</sup> and natural gas vehicles (NGVs)<sup>2</sup> in Colorado.

2. In part, this docket arises out of Decision No. C11-0406 of the Commission's Smart Grid Investigatory Docket No. 10I-099EG, issued April 19, 2011. In that Decision, the Commission anticipated opening an investigatory docket to examine the potential impacts and regulatory implications of significant EV penetration in the state.

3. Additionally, because of the potential transition of segments of the vehicle fleet to natural gas, and because the Commission regulates natural gas local distribution companies (LDCs), we see a need for greater understanding about the possible role of jurisdictional utilities in the emergence of NGVs and the development of the associated infrastructure. While we present specific questions related to each, we also solicit input from the parties about the comparative benefits and risks of EVs and NGVs.

#### **B. Background on Electric Vehicles**

4. In 2010, the Commission opened Docket No. 10I-099EG to investigate the issues related to smart grid and advanced metering technologies.

5. Public Service Company of Colorado's SmartGridCity™ catalyzed that investigatory docket. However, the Commission expanded the scope of the investigatory docket to include a broader set of issues surrounding smart grid and advanced metering technologies and their potential to affect the performance of Colorado's electric system.

---

<sup>1</sup> Throughout this Order and the subsequent docket, "electric vehicles" or "EVs" shall be used to refer to both plug-in hybrid electric vehicles and battery electric vehicles. We shall not use the term to refer to low-speed electric vehicles (also commonly referred to as neighborhood electric vehicles or NEVs).

<sup>2</sup> "Natural gas vehicles" or "NGVs" shall be used to refer to both compressed natural gas vehicles and liquefied natural gas vehicles.

6. At ¶ 7 of Decision No. C10-0188 in Docket No. 10I-099EG, issued March 3, 2010, the Commission articulated its desire to include EVs in its investigations, stating that the inquiry would include, *inter alia*, examining the effect of smart grid technologies on “[t]he integration of distributed generation, including plug-in electric vehicles.”

7. As part of Docket No. 10I-099EG, the Commission held a series of Commissioner Information Meetings (CIMs). The July 1, 2010 CIM included a focus on the interaction of plug-in hybrid electric vehicles (PHEVs) with the existing electric system, renewable generation, and storage technologies.

8. Commission Decision No. C10-1077, Docket No. 10I-099EG issued October 1, 2010, Order Stating Preliminary Conclusions and Requesting Further Comments, offered the following preliminary observations about PHEVs at ¶ 9:

g. The introduction of PHEVs has the potential to significantly reduce CO<sub>2</sub> from the transportation sector (Tate & Savagian, 2009). Multiple studies indicate PHEVs emit less CO<sub>2</sub> and other pollutants over their entire fuel cycle than both conventional vehicles and hybrid electric vehicles (Sioshansi & Denholm, 2009).

h. PHEVs create revenue opportunities and unique operational challenges for electrical utilities. Much of the integration of these vehicles is dependent upon when consumers charge them. Smart grid may support integration of PHEVs by giving the utilities the ability to influence, either through incentive based demand response or time-based rates, the charging profiles of the vehicles (Hadley, 2006).

9. The Commission noted in Decision No. C11-0406, Order Stating Conclusions and Next Steps, that the record did not provide sufficient information for the Commission to offer recommendations or conclusions regarding appropriate regulatory treatment of EVs.

10. At ¶ 29 of Decision No. C11-0406, the Commission stated: “We acknowledge that, at some future point, a ‘critical mass’ penetration of electric vehicles (EVs) will have a significant and potentially adverse impact upon the electric grid, particularly regarding peak demand.”

**C. Discussion of Electric Vehicles**

11. While the Commission acknowledges that Colorado does not yet have a significant number of electric vehicles, we believe that it would not be in the public interest to wait for these vehicles to arrive before ensuring that customers will not be adversely impacted.

12. Given the nascent nature of the EV market, the Commission believes that it is premature to determine a particular regulatory approach. We wish to make it clear to parties that we have not prejudged our role in this market, but rather are seeking input to inform us about how this market may emerge. In general, the Commission's goal is to support the broadest reasonable choice for customers consistent with its mission, which includes ensuring the safety and integrity of the electric system. We believe that this approach will encourage entry into the market, promote customer acceptance of the technologies, maintain safe and reliable service, and allow for innovation in multiple market segments.

13. The Commission has an interest in understanding both the near-term and long-term challenges and opportunities associated with EVs. Research suggests that unmanaged load from EV charging has the potential to increase peak demand, alter peak load shapes, and increase demands on the distribution system. By contrast, managing EV charging loads to off-peak times has the potential to flatten load curves and improve system utilization. The charging patterns for EVs, including geographic clustering and timing of the charging load, are potentially significant system issues which merit additional evaluation and consideration.

14. The Commission also wishes to explore the role of electric utilities in promoting or facilitating the EV market. As an example of related activity in another state, in 2009 the California Public Utilities Commission stated:

A utility may conduct system impact assessments; offer preferential PEV rate options to its PEV-owning customers to encourage off-peak PEV charging;

deploy widespread reliable electricity fuel metering (and related residential on-site capital infrastructure, commercial charging infrastructure, public charging infrastructure, upgrade distribution level infrastructure); encourage the use of renewable energy resources for PEV load; and potentially drive down the cost of PEV battery technology through large battery technology purchase orders. Additional roles include PEV customer service to build customer readiness, streamline on-site PEV charging equipment installation, and may include PEV purchase rebate incentives and low-interest bill finance options for infrastructure upgrades on the customer side of the meter.<sup>3</sup>

15. Regarding uptake or adoption of EVs in the Colorado market, the Commission is interested in advancing knowledge regarding the following topics:

- a) What types of significant risks could unmanaged EV load present to the system?
- b) What level of EV penetration could or should be deemed “significant” in the sense of impacting the system? 10,000 vehicles? 500,000 vehicles?
- c) What factors may have the most impact or influence on the rate or speed of EV penetration in Colorado?
- d) Is there a role for utilities in developing the market for EVs in Colorado? If so, what is that role?

16. Research suggests that the rate structures offered to EV customers may influence the impacts of EVs on the system. Traditional flat rate structures are unlikely to discourage customers from charging their vehicles at on-peak times when impacts to the system are highest, power is generally more expensive, and benefits to load factor are lowest.

17. New rate structures may create incentives for off-peak charging, which has the potential to provide system-wide benefits such as reducing the need for capacity expansions, reducing negative distribution system impacts, and avoiding more expensive peak energy.

---

<sup>3</sup> California Public Utilities Commission, Light Duty Vehicle Electrification: Potential Barriers and Opportunities (2009).

18. The Commission solicits input on the following questions related to regulatory options for the various potential EV charging scenarios including residential, master-metered, commercial, and third-party charging service providers:

- a) Without changes in rates or supportive technologies, are Coloradans likely to charge EVs at home? At work? During what hours are they most likely to charge?
- b) Is it appropriate to have an EV-specific rate design? What are the potential regulatory implications of differentiating a rate by end-use?
- c) If it is determined that an EV-specific rate design is appropriate, what is the optimal approach?
- d) Should regulated utilities be required to propose EV tariffs, including time-based tariffs?
- e) If, rather than differentiating an EV-specific rate design, it is determined that time-based rates are appropriate and should be applied more generally across the rate base, what additional considerations (*e.g.*, impacts on medical certificate holders) should the Commission examine?
- f) If time-based rates are utilized, either for EVs or more generally across the rate base, should those rates be optional or mandatory?
- g) In addition to or instead of time-based rates, is direct load control necessary to manage EV charging? If so, what are the costs and technical feasibilities of such controls?
- h) Should utilities be required to develop demand response plans for EVs?
- i) Should EVs be charged using existing meters or should they be sub- or separately metered?
- j) Could/should the rate for charging (*e.g.*, the rate for electricity) be tied to a customer's utility account through a vehicle identification module (VIM)? What are the costs and technical feasibilities of this approach?
- k) Are smart grid technologies (including electric system and vehicle smart grid technologies) essential to reducing the impacts of EVs on the system? At what point(s) in the system would those technologies be most critical and most effective?
- l) In the event that EVs create additional system costs, should those costs be borne by the cost-causer, the entire customer rate base, or some hybrid of the two? What equitable methodologies could be employed to appropriately evaluate cost allocation?

19. Regarding the business models for electric vehicle service equipment (EVSE), the Commission provides the following alternatives and questions. The alternatives and questions provided are intended to facilitate discussion and are not intended to be a comprehensive list. Parties should not infer the Commission's position on business models for EVSE based on the inclusion or exclusion of a particular approach here.

- a) Under one approach, utility companies may own the EVSE and lease the equipment to customers. If utilities provide this service, should they be allowed to recover costs related to the purchase or ownership of EVSE equipment via the rate base? Should the cost of the program be borne by EV customers or spread more generally across the rate base? What additional regulatory considerations might need to be addressed under this approach?
- b) Under another approach, vehicle manufacturers might sell EVSE to customers purchasing an EV. Assuming this is a product/service the automotive industry provides, the electrical utilities may have little role in supplying the equipment for residential charging of EVs.<sup>4</sup> What are the pros and cons of this approach? What additional regulatory considerations might apply?
- c) Under a third approach, third-party providers (existing retail entities or new market entrants) may offer EVSE, which the customer would install and maintain. What are the pros and cons of this approach and what additional regulation – *e.g.*, third-party rate regulation, voltage capability, or installation standards - might be necessary?
- d) Additionally, electrical utilities or third party providers may seek to own public charging infrastructure, including level 3 chargers.<sup>5</sup> Due to the voltage requirements and costs, level 3 charging is likely to be deployed at non-residential sites and to function more like a traditional gas station. What are the regulatory implications of this approach? These might include, but not be limited to: utility rate recovery; whether the Commission should allow third party providers to compete in this market; whether, and to what degree, third party providers may add margin or fees related to the resold electricity or EVSE; and interconnection requirements.

---

<sup>4</sup> This will likely include Level 1 and Level 2 charging equipment.

<sup>5</sup> Standards for level 1 and level 2 charging exist. Standards for level 3 charging are being developed. Level 1 and level 2 use 120 and 240 volt circuits respectively and so may be suitable for placement in both residential and public charging locations. Based on current discussion, level 3 charging will likely be done using a 3-phase, 440 volt DC charger, which would be suitable for locations like hotels, parking garages, or other public locations where fast charging would be desirable and where the electrical equipment can be secured.

**D. Discussion of Natural Gas Vehicles**

20. As a precursor to the discussion regarding NGVs, the Commission wishes to communicate to the parties that the Commission's authority to regulate natural gas fueling stations or retail prices at such stations is constrained by statute. Section 40-1-103(4), C.R.S., states:

For the purposes of articles 1 to 7 of this title, persons selling compressed natural gas or its component parts or by-products to governmental entities or to the public for use as fuel in alternative fuel vehicles shall not be considered to be public utilities. As used in this subsection (4), 'alternative fuel vehicle' means any automobile, truck, motor bus, or other self-propelled device or vessel which is capable of moving itself or being moved from place to place, whether or not it is used in agricultural, commercial, domestic, or industrial operations.

21. However, the Commission retains an interest in the development of the NGV market in Colorado because of the potential inter-relationships between the regulated and non-regulated operations of the natural gas LDCs.

22. The Commission seeks comment on what role regulated LDCs should have on building infrastructure for fueling stations and if there is a role for the Commission to play in facilitating the infrastructure improvements necessary for NGVs.

23. Therefore, the Commission invites interested parties to contribute information to advance the understanding of the market dynamics for NGVs. In a 2010 study,<sup>6</sup> the National Renewable Energy Laboratory explored the business case for compressed natural gas vehicles in certain types of fleets. We seek to expand on this knowledge by considering, with a focus on Colorado, the following questions:

- a) What is the necessary fleet size and distribution to make the market for NGV viable?

---

<sup>6</sup> National Renewable Energy Laboratory, Business Case for Compressed Natural Gas in Municipal Fleets (2010) available at <http://www.afdc.energy.gov/afdc/pdfs/47919.pdf>.

- b) What level of interest have manufacturers expressed in the Colorado market?
- c) What are the economics and environmental performance characteristics of NGVs as compared to EVs and to traditional transportation fuels?
- d) What are the critical economic sensitivities (*i.e.*, cost of gasoline, cost of diesel, cost of natural gas, and cost of electricity) and at what price points does a NGV market attain or lose viability?

**E. Direction to the Parties**

24. The Commission finds it appropriate to initiate an investigation into these issues, to invite interested parties to submit comments, and to establish initial comment dates and procedures. In the future, the Commission may also wish to conduct one or more Commissioner Information Meetings related to the issues articulated in this Order.

25. In a docket such as this investigatory docket, there are no “parties” in the usual sense of applicants, complainants, or interveners. Instead there are “interested persons,” and it is in this sense that we use the term “party” throughout this Docket.

26. In addition to filing comments, we encourage parties to provide materials they believe would be useful in our investigation. These materials may include: studies, academic papers, white papers, technology reports, etc. We ask that parties provide electronic copies of all such materials for inclusion in this Docket via the Commission’s E-Filings website, which may be accessed via: <https://dora.state.co.us/pls/efi/EFI.homepage>.

27. The Commission Staff (Staff), as part of this investigation, will survey existing data and resources relevant to the questions posed above. This docket will be a repository for relevant documents obtained as part of Staff’s survey of the impacts of EVs and NGVs on Colorado’s power sector.

**II. ORDER**

**A. The Commission Orders That:**

1. An investigatory docket is opened to accept comments, investigate technologies, and inform policy development related to electric vehicles and natural gas vehicles for Commission-regulated electrical and natural gas utilities, consistent with the discussion above.

2. Parties are requested to submit their written comments and materials on or before September 25, 2011, using the guidelines discussed in Section I.E.

3. This Order is effective on its Mailed Date.

**B. ADOPTED IN COMMISSIONERS' WEEKLY MEETING  
August 24, 2011.**

(S E A L)



ATTEST: A TRUE COPY

Doug Dean,  
Director

THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF COLORADO

JOSHUA EPEL

---

JAMES K. TARPEY

---

MATT BAKER

---

Commissioners