Plan Overview

A Data Management Plan created using DMPTool

Title: Electric Truck Fleet Management under Limited and Uncertain Charging Infrastructure Availability

Creator: PETROS IOANNOU - ORCID: 0000-0001-6981-0704

Affiliation: University of Southern California (usc.edu)

Principal Investigator: Kanok Boriboonsomsin, Matthew Barth, Petros Ioannou

Data Manager: Kanok Boriboonsomsin, Matthew Barth

Project Administrator: Kanok Boriboonsomsin, Matthew Barth

Template: National Center for Sustainable Transportation - Project Data Management Plan

Project abstract:

California has set aggressive targets and timelines for the sales and adoption of zero-emission trucks in the state. However, developing a charging infrastructure network for medium- and heavy-duty electric trucks is challenging and will take time. In addition, there has also been much debate about whether the electric grid capacity expansion can keep pace with this anticipated mass adoption of EVs. The goal of this research is to simultaneously address the issues of freight decarbonization and supply chain resiliency by designing electric truck fleet management strategies that: 1) consider the limited availability of charging infrastructure for MD/HD EVs, at least in the near future; 2) can respond to the uncertainties associated with electric grid service interruption or disruption; and 3) analyze the requirements and constraints associated with long-haul and short-haul with respect to electric trucks. This collaborative project will bring together researchers from USC who are experts in long-haul trucking operations and researchers from UCR who possess complementary expertise in short-haul trucking (e.g., drayage) operations. The requirements for long-haul and short-haul operations for electric trucks are substantially different when it comes to distance of travel, parking availability, hours of service (HOS), and infrastructure charging, among other things. We feel that it is critical to consider all of these
issues as a single project, where we can explore together the different synergies and tradeoffs encountered between long-haul and short-haul operations. Further, we intend to work together to expand this towards “medium-haul” scenarios as well. It is expected that the results from this research will serve as another “tool” in our toolbox to ease the transition towards full truck electrification.

**Start date:** 01-01-2024

**End date:** 12-31-2024

**Last modified:** 12-18-2023

**Copyright information:**

The above plan creator(s) have agreed that others may use as much of the text of this plan as they would like in their own plans, and customize it as necessary. You do not need to credit the creator(s) as the source of the language used, but using any of the plan's text does not imply that the creator(s) endorse, or have any relationship to, your project or proposal.
Electric Truck Fleet Management under Limited and Uncertain Charging Infrastructure Availability

Data Description

Provide a description of the data that you will be gathering in the course of your project. This could include, but is not limited to, new data you are collecting, or existing datasets (whether from a prior project or an external source). Refer to the NCST Center-wide Data Management Plan for additional examples.

Address the following, as applicable:

1. Name the data, data collection project, or data producing program, if applicable.
2. Describe the data your project will generate in terms of nature and scale (e.g., numerical data, image data, text sequences, video, audio, database, modeling data, source code, etc.).
3. Describe methods for creating the data (e.g., simulated; observed; experimental; software; physical collections; sensors; satellite; enforcement activities; research-generated databases, tables, and/or spreadsheets; instrument-generated digital data output, such as images and video; etc.).
4. Discuss the period of time data will be collected and the frequency of any updates, if applicable.
5. If the project uses existing data, describe the relationship between the data you are collecting and the previously collected data.
6. List potential users of the data.
7. Discuss the potential value that the data will have over the long-term for the NCST and for the public.
8. If you request permission not to make data publicly accessible, explain the rationale for lack of public access. Provide sufficient detail so that reviewers will understand any disclosure risks that may apply.
9. Indicate who will be responsible for managing the data at the project level.

All data to be collected will be from publicly available sources regarding truck battery characteristics, truck data which involve possible routes, parking locations and parking availability data where available, truck demand for long haul. We will be using electric truck characteristics data and models, which are available publicly.

In addition, we will be using the existing dataset cited below, which is available through DRYAD.

- Peng, Dongbo; Wu, Guoyuan; Boriboonsomsin, Kanok (2023). Developing an efficient
We will do simulations using traffic simulators and Matlab. All simulation data will be presented in the form of tables and graphs and will be published in final report and publications.

The tables and figures with presented data will be useful to readers to understand certain aspects of truck electrification, parking and scenarios of lost power and emergencies.

Data Format and Metadata Standards

Your DMP should describe the anticipated formats that your data and related files will use. To the maximum extent practicable, and in accordance with generally accepted practices in your field, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.

Address the following, as applicable:

1. List in what type of format(s) the data will be collected, and indicate if they are open or proprietary.
2. If you are using proprietary data formats, discuss your rationale for using those standards and formats.
3. Describe how versions of the data will be signified and/or controlled.
4. If the file format(s) you are using is(are) not standard to transportation, describe how you will document the alternative you are using.
5. List what documentation you will be creating in order to make the data understandable by other researchers.
6. Indicate the type of metadata schema you are using to describe the data. If the metadata schema is not one that is standard for your field, discuss your rationale for using that schema.
7. Describe how the metadata will be managed and stored during the collection process.
8. Indicate what tools or software is required to read or view the data.
9. Describe the quality control measures you will implement in your project to ensure its accuracy, etc.

No special format of the data. They will be presented in tables and figures.
Policies for Access and Sharing

Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take to protect privacy and confidentiality prior to archiving your data, and any additional concerns (e.g., embargo periods for your data). If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators or other project staff.

If you will not be able to de-identify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality.

Address the following, as applicable:

1. List the roles that your project's data creation team members will have in data management, including any limitations on team member access due to the presence of personal or confidential information.
2. Describe what data will be shared, how data files will be shared, and how others will access them.
   - The data to be shared should, at a minimum, be the data required to reproduce your final results, subject to those restrictions imposed by data quality and the need to protect national/homeland security, individual privacy, and confidentiality.
3. Indicate whether the data contain private or confidential information. If so:
   - Discuss how you will guard against disclosure of identities and/or confidential business information.
   - Describe the processes you will follow to provide informed consent to participants.
   - State the party responsible for protecting the data.
4. Describe if there are any privacy, ethical, or confidentiality concerns due to the sharing of data.
5. If applicable, describe how you will de-identify your data before sharing. If this is not applicable to your project, then:
- Identify what restrictions on access and use you will place on the data.
- Discuss additional steps you will use to protect privacy and confidentiality.

The data generated will be publicly accessible as they will be published in reports and publications. There are no issues of privacy and confidentiality.

Policies for Re-use, Redistribution, Derivatives

Describe who will hold the intellectual property rights for the data created by your project. Describe whether you will transfer those rights to a data archive, if appropriate. Identify whether any copyrights apply to the data, as might be the case when using copyrighted instruments. If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP. Describe any other legal requirements that might need to be addressed.

Address the following, as applicable:

1. Name who has the right to manage the data.
2. Indicate who holds the intellectual property rights to the data.
3. List copyrights to the data, if any. If there are copyrights, indicate who owns them.  
4. Discuss any rights to be transferred to a data archive.  
5. Describe how your data will be licensed for re-use, redistribution, and derivative products.

Not applicable

Plans for Archiving and Preservation

Describe how you intend to archive your data and why you have chosen that particular option. You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability.

Address the following, as applicable:

1. The data must be archived before the research project's DRAFT FINAL REPORT is
delivered to the NCST Program Manager. Discuss how you intend to archive your data and where if not on Dryad (include URL).

2. Indicate the approximate time period between data collection and submission to the archive.

3. The PI of each NCST-funded project should ensure that the data to be archived temporarily at their home institution is stored securely on a designated device (computer, external hard drive, etc.). Identify where data will be stored prior to being deposited to an archive.

4. The PI of each NCST-funded project should ensure that the data collected will be backed up prior to being archived. Describe how back-up, disaster recovery, off-site data storage, and other redundant storage strategies will be used to ensure the data's security and integrity.

5. Describe how data will be protected from accidental or malicious modification or deletion prior to receipt by the archive.

6. If you will not be using Dryad,
   - Discuss your chosen data archive's policies and practices for back-up, disaster recovery, off-site data storage, and other redundant storage strategies to ensure the data's security and integrity for the long-term.
   - Indicate how long your chosen archive will retain the data.
   - Indicate if the chosen archive employs, or allows for the recording of, persistent identifiers linked to the data.
   - Discuss how your chosen data repository meets the criteria outlined in the Guidelines for Evaluating Repositories with the DOT Public Access Plan.

All data to be collected will be from publicly available sources and will be indicated in all of our deliverables. Any generated data from simulations will be presented in tables and figures and presented as part of deliverables as they are generated.

All NCST researchers must have a unique ORCID (Open Researcher and Contributor ID) identification. ORCID.org provides a registry of persistent unique identifiers for researchers and scholars, and automates linkages to research objects such as publications, grants, and patents. Registration is free and takes about 5 minutes. If other researchers are added to a project after its initiation, they are also required to obtain an ORCID.

List all Principal Investigators, Co-PI(s), and key contributors, and their respective ORCIDs.

PI: Petros Ioannou, 0000-0001-6981-0704

Co-PI: Kanok Boriboonsomsin, 0000-0003-2558-5343