Q. Please state your name and business address.
A. My name is Troy Devries and my business address is 4 Irving Place, New York, New York 10003.

Q. By whom are you employed and in what capacity?
A. I am employed by Consolidated Edison Company of New York, Inc. (“Con Edison” or the “Company”) as the Director of Research and Development (“R&D”).

Q. Please describe your educational background.

Q. Please describe your work experience.
A. I have been employed by Con Edison since 1990 and have held various engineering and managerial positions in Electric Construction, Emergency Operations, Engineering, and Research and Development.

Q. Please generally describe your current responsibilities.
A. As the Director of Research and Development, I am responsible for developing products to enhance the
safety, productivity, and operations for Con Edison. I oversee eleven engineers dedicated to R&D project management that undertakes R&D to benefit the Company’s electric, gas, and steam business units plus several administrative personnel. I guide their development and manage the overall R&D budget.

Q. What is the purpose of your testimony?
A. My testimony explains the forecasted level of electric R&D expenditures of $10.54 million, excluding Company labor, for the twelve months ending on December 31, 2014 (“Rate Year”) and discusses our research program areas on page 6, past successes on page 11, and several major projects being undertaken in the Rate Year on page 16. My testimony presents details of R&D expenditure levels for the Rate Year and also the two following twelve-month periods - the twelve months ending December 31, 2015 (“Rate Year 2” or “RY 2”) and the twelve months ending December 31, 2016 (“Rate Year 3” or “RY 3”).

Q. Is Con Edison projecting R&D expenditures for the Rate Year, RY2, and RY3 above the level of expenditures in the twelve months ending June 30, 2012 (“Historic Year”)?
A. No. The proposed R&D expenditure level for the Rate Year, RY2, and RY3 of $10.54 million for electric R&D projects is the same level of expenditure as in the Historic Year.

Q. Was a document, entitled “CONSOLIDATED EDISON COMPANY OF NEW YORK ELECTRIC RESEARCH & DEVELOPMENT PROGRAMS,” EXHIBIT ___ (TD-1), prepared under your direction and supervision?

A. Yes, it was.

MARK FOR IDENTIFICATION EXHIBIT ___ (TD-1)

Q. Please explain the reasons for maintaining this level of expenditures.

A. R&D’s mission is to be an agent of change that drives timely innovation of technological solutions addressing strategic and operational needs. As described below, we seek to serve the operational and medium-term (three to five years) research for the electric business unit, as well as address both longer-term (beyond five years) strategic needs and enterprise risk issues of the entire corporation. R&D does this by identifying, developing, demonstrating, and providing such tools as advanced equipment, hardware, and software methodologies to
Company operations that allow for long-term sustainability.

Q. Why does Con Edison need to continue to develop and demonstrate new technologies?

A. Con Edison has long maintained an R&D program. Both the nature of the Company’s service area, with its significant population density, and other system characteristics, such as high-load density, large underground secondary network systems, and the demand for continued high or even higher reliability present the Company with technical challenges that are unique in the industry. As such, in order to meet the Company’s future needs while at the same time controlling costs, maintaining reliability, enhancing safety, and sustaining the environment, the Company needs to undertake the development and demonstration of new technologies.

Q. What is the purpose of Con Edison’s electric R&D program?

A. The purpose of Con Edison’s electric R&D program is to continue developing and demonstrating new processes/methods and cutting-edge power delivery
technologies that will improve the Company’s electric system operating and business practices. The program is a combination of research undertaken collaboratively with others as well as projects developed and conducted internally. The program is continually refined to recognize new challenges to Company operations, to better define our new needs, and to evaluate past successes and/or failures.

Q. Why must the Company itself undertake R&D?

A. It has been the Company’s experience that manufacturers are not willing to unilaterally undertake technology development on the unique problems that, while having specific importance to the Company, do not have broader market potential that are immediately compelling to manufacturers. Thus, in order to stimulate these endeavors, the Company has found that it needs to fund research, often through full-scale demonstrations, in collaboration with partners where possible, to prove feasibility for concepts of value to the Company and its customers. As discussed below, Project Hydra and the Transportable Energy Storage System project, which are
discussed later in my testimony, are two examples of such efforts.

Q. Please describe the Company’s collaborative research efforts.

A. For projects where the Company shares a common interest with the industry, the Company works with various utilities, industry, government, academics, and private organizations such as the Electric Power Research Institute ("EPRI"), New York State Energy Research and Development Authority ("NYSERDA"), The Center for Energy Advancement through Technological Innovation ("CEATI"), and the National Electric Energy Testing, Research & Applications Center ("NEETRAC").

Q. Please describe the Company’s internal program.

A. Con Edison’s internal R&D program primarily focuses on problems that are unique to the Company’s system with its very high densities of energy consumption and underground delivery systems. This program also focuses on the development of selected products that the Company may need to deploy in a timeframe that is earlier than that required by others in our industry.
Q. Please explain how Con Edison’s R&D portfolio is established and managed.

A. The process of selecting R&D projects depends heavily on the experience of the Company’s professional staff both in R&D and within the Company’s electric business unit. The goal is to match the needs of the Company’s operations to opportunities for solutions using advanced technology. In all cases, the first step is to determine whether the project meets the New York State Public Service Commission’s definition of R&D. An analysis of candidate projects is then made, with potential advantages being reviewed against financial resources required for successful development. The probability of achieving success in a reasonable time is also considered. Finally, the benefits of conducting the project are detailed. This general approach facilitates a comparison of various candidate technologies and aids in project selection and prioritization.

Q. How often is the portfolio reviewed?

A. On an annual basis an analysis of candidate projects, both those already authorized and new conceptual ideas,
is developed and prioritized in conjunction with our operating organizations. We seek to work on projects that have combinations of attributes for cost, probability for success, and potential benefit in providing service to customers that make them attractive candidates. Gas and Steam R&D activities, the programs and budgets for which are concurrently being developed, are reviewed to avoid possible duplications and to identify potential synergies. Emphasis is placed on projects that show near and mid-term benefits, as well as long-term programmatic issues that directly impact the Company. This list is then reviewed with senior management against available financial resources.

Q. How does the Company consider the benefits of the projects?

A. A review of the benefits of candidate projects is an integral part of the review process and project selection. A cost benefit analysis is prepared for each individual project when seeking funding authorization. These analyses range from qualitative reviews for small projects to detailed quantitative cost benefit analyses for larger projects.
Q. Please describe how internal projects research is conducted as part of the current plan.

A. The internal electric research program is broken down into five main research areas: transmission, distribution, system operations, substations, and customer operations:

1. The Transmission R&D program is directed toward reducing costs, improving the reliability, upgrading the capacity, extending the life, and reducing the environmental impact of Con Edison’s underground and overhead transmission systems. R&D activities in the transmission arena include: development of techniques and equipment to expedite detection and location of dielectric fluid leaks in high-pressure, fluid-filled cables; examination of the present and expected performance of 138-kV and 345-kV cable systems; and implementation of state-of-the-art hardware and software to reduce O&M costs associated with transmission.

2. The Distribution R&D program focuses on developing, demonstrating, and assisting in the early deployment of new technologies that will improve safety, system
reliability, and integrity, as well as reducing O&M costs of construction, maintenance, and operation of the distribution systems. R&D activities in the area of distribution include: contact voltage detection and mitigation; real-time fault location system for primary and secondary distribution feeders; exploring partial discharge detection as a diagnostic for incipient failures and other anomalies in distribution cable, joints, and transformers; and developing low-cost sensors.

3. The System Operation R&D program is directed at automating manual processes that provide advanced analytic tools as well as integrating and exchanging data among a variety of different monitoring and control systems. The program focuses on areas that have the greatest potential for impact on reducing costs, improving safety, and enhancing reliability.

4. The Substation R&D program focuses on reducing the O&M costs of substation equipment and extending the useful life of installed equipment. R&D projects in this area include the demonstration of advanced monitors to assess, both on-line and in real time,
the condition of power transformers, load tap
changers, and circuit breakers.

5. The Customer Operations research focuses on pro-
active programs that allow for greater customer
participation in demand response programs and
increase productivity of Company call centers while
improving customer satisfaction. R&D activities
include demonstrations of business intelligence
technologies in the call centers and Customer
Operations.

Q. Have there been successful R&D projects through the
years?
A. Yes. The Company has a long history of successful R&D
project completions.

Q. Are all R&D projects successful?
A. No. Because of the nature of R&D, some projects do not
result in a successful product. To address that
challenge, most projects are conducted in phases to
reduce the risk that would be otherwise associated with
over committing in advance to work that reveals itself
to be unfruitful at some point during the course of the
project. However, the Company can never be sure of the final outcome for any project.

Q. Please describe some recent successful projects conducted under the current program.

A. Recent successful electric R&D projects conducted in 2011, as reported in the 2012 annual report to the Commission, include the following:

1. The Company developed a Thermostat-Enabled Smart Outlet for Window Room Air Conditioners ("RAC") that permits a RAC to be remotely turned on or off either on command or in response to an ambient room temperature sensor. Results of a pilot test show that the average demand reduction achieved on peak days was 75W per AC unit. The Company is in the process of quantifying costs associated with peak demand avoidance.

2. The Visual Maintenance Prioritization project was completed, providing a product that combines seven separate maintenance databases and displays work on a geographic map allowing
work to be planned and prioritized in a more
optimal way (for example, by scheduling all
maintenance work required at a structure to be
completed during one visit rather than
multiple visits).

3. Joint movement is a key degradation mechanism
shortening the life of our underground pipe-
type cable systems. The objective of the
"Underground Transmission Feeders Assessment
Demonstration Using Betatron X-ray Source"
project was to demonstrate the ability to
detect this movement for a stop joint on 345
kV high-pressure fluid-filled feeders. The
results of the demonstration show that cable
movement, which is not detected using regular
x-ray equipment, can be detected using an
extra-high-power x-ray machine. The Company
plans to further refine the technique and use
it to identify feeders with joints that
exhibit moderate to severe movement and are in
jeopardy of failure. This information will
then be incorporated into the Company’s
assessment of transmission assets as input to
the Electric Long Range Plan.

4. A 24-Hour Modeling Advance Visualization Tool
was developed to provide a visual display, in
a “heat map” fashion, of the loading on all
transformers, primary feeders, and secondary
mains. The tool, which has zoom-in capability
and animation replay, also displays how loads
move and shift within a network during a 24-
hour period. As the user zooms in, additional
details, such as kVA and load flow over 24
hours, is provided for individual assets
(transformers, nearby transformers, etc.).
The heat map shows intensity as well as the
sheer number of overloads. This visualization
tool assists engineers in identifying hot
spots of concern on the Company’s distribution
system, thereby minimizing future outages as
demands on the system become more complex (for
example, with the introduction of more
distributed generation ("DG") and electric vehicles).

5. The "Characterization of Arcing Fault Signature" project demonstrated that arcing faults can be detected in networks based on analysis of electrical waveforms. Observed manhole events have been correlated to arcing signatures detected by dedicated data recorders. In a few cases, due to this deployment, secondary network faults were found based on arcing detected, leading to their repair and potentially reducing manhole events.

6. Prototype Primary Injection Test Equipment, which tests high impedance equipment off-line, was designed, developed, and tested. Off-line testing identifies any wiring error or design deficiencies. Repairs are completed off-line and verified by retesting. This equipment eliminates the risks of trip-outs for the circuit, if undetected phase unbalance occurs.
This equipment has been used in at least six substations and two steam stations to date.

7. Contact voltage mitigation remains a challenge for Con Edison. In 2011, with EPRI, the contact voltage team completed and deployed a Hand Held E-Field Detector into the field. This device is reducing the amount of time required for field crews to locate, isolate, and clear energized objects.

Q. Please describe the ongoing electric R&D projects.

A. Some major projects being undertaken during the rate year include:

1. The Superconducting Cable Demonstration Project Hydra, which is based on an agreement between the Department of Homeland Security and American Superconductor under their “Resilient Grid Project.” This project will demonstrate a new type of superconducting cable with fault current limiting capability that would enable network-to-network interconnections and more effective sharing of
assets between substations to improve the resiliency and reliability of the New York City grid.

2. Characterization of Secondary Network Arcing Fault Signatures and Arc Fault Detection in Network Protection Relays Project is a follow-up effort to the Characterization of Arcing Fault Signature, discussed earlier. This effort is to modify existing network protector relays, within several transformer vaults, with algorithms to recognize arcing faults. These algorithms will be evaluated for correlation to actual arc faulting events and the feasibility of using a network protector relay for arc fault detection and location will be evaluated.

3. The Company is actively involved in the development of Solid State Fault Current Limiters for system fault current mitigation, area substation duty relief, area substation up-rating in existing footprint, and to
support DG. This program involves a modular step-by-step development, at increasing voltage levels, to assure limited cost exposure.

4. The Transportable Energy Storage System ("TESS") is the Company’s project, in conjunction with Electrovaya and NYSERDA, to develop and demonstrate lithium ion battery technology. The TESS system will be housed in a custom-built 40-foot trailer. The system will be composed of a battery energy storage system, a power conversion system ("PCS"), which includes transformers and manual disconnects, and an integrated thermal management system that will serve both the battery energy storage system and PCS units. The system would provide 800 kWhr of storage capacity. The energy storage system will have a modular rack-mount design so that the capacity can be increased in the future by replacing modules with higher capacity
variations as lithium ion battery technology further advances. The project scope includes developing the technical specifications and requirements documents, developing a test plan and operational specifications, field installation of the unit on a secondary distribution system, and monitoring the performance, characteristics, and benefits for a period of 18 months. The system will be programmed to discharge at a fixed rate during the peak hours and would recharge during non-peak hours.

Q. What are the changes to the base program going forward from the Historical Year?

A. While the funding level will remain the same and the general focus and program area emphasis will be the same, some specific projects undertaken in the Historic Year have been completed, some others are scheduled for completion soon, other new projects are getting started, and still other project concepts are being or will likely be developed for probable future funding.
authorization and work initiation based on new needs identified by Company operating organizations. In other words, the natures of projects can, and do, change throughout the rate year and funds are reallocated among projects to reflect this inherent nature of R&D.

Q. Is the Rate Year’s funding level the total cost to develop and demonstrate these projects?

A. No. Many of the projects are multi-year and the amount only represents what will be spent during the Rate Year. In addition, these are estimates of Con Edison’s share of the costs. In many cases, these represent only a portion of the total costs, with the rest being made up by co-funding, which we expect will be provided by government, industry partners, or other collaborative partners. Should this expected funding not materialize as projected, we may need to adjust development schedules accordingly and shift the funding to different projects.

Q. Does the Company’s forecasted level of R&D expenditures reflect capitalization credits?

A. No.
Q. Has DPS Staff proposed in prior cases that the Company’s electric R&D forecast be adjusted to reflect such credits?

A. Yes. Staff has argued that it had to be assumed that some of the R&D projects will be successful or the Company would not be spending valuable resources on them. Staff recommended an adjustment to the Company’s R&D expense based on reflecting a level of expected credits on a going-forward basis. However, as discussed below, the Company believes there is no basis for adjusting the forecast in this proceeding.

Q. Did R&D receive any capitalization credits in the Historic Year that lowered R&D’s level of expenditures during the historic year?

A. No. R&D did not receive any credits from the other operating departments for capitalization of products of past R&D during the Historic Year. In fact, electric R&D has not received any capitalization credits since November 2006.

Q. Please explain the capitalization credit process.

A. An R&D project is considered successful when the operating organization accepts the actual hardware or
software into commercial use and deems it to be “used and useful.” If that occurs, R&D submits documentation of the associated costs along with a written statement from the operating organization to CECONY Plant Accounting, which makes the decision as to whether or not to capitalize the equipment.

Q. What costs are capitalized?
A. Only the costs associated with the hardware or software that goes into commercial, productive use are considered for capitalization. Accordingly, the entire cost of an R&D project is never capitalized.

Q. Are all successful R&D products capitalized?
A. No. Most of the results of R&D projects are prototypes that do not go into commercial, productive use but rather become the model underlying specifications and purchase orders for new equipment by various Company operating departments from third-party manufacturers. While these prototypes are an important part of the R&D process, they are not constructed in a way that is durable enough to place them into commercial operation. Therefore, the associated costs of development and
earlier prototype units remain as operating expenses within the R&D department.

Q. Do you believe that applying a capitalization credit to R&D’s forecasted expenditures is appropriate?

A. No, I do not, for the reasons I have explained. Moreover, even assuming Staff’s proposed approach is adopted, there is no basis for making such an adjustment in this proceeding because the Company has not had any capitalized projects for Electric R&D for the last six years and there is therefore no reasonable basis for assuming capitalization during the rate year.

Q. Does this conclude your testimony?

A. Yes, it does.