



February 7, 2017

VIA ELECTRONIC FILING

Mr. Joel H. Peck, Clerk
c/o Document Control Center
State Corporation Commission
Tyler Building – First Floor
1300 East Main Street
Richmond, Virginia 23219

RE: Application of Virginia Electric and Power Company for approval to implement new, and to extend existing, demand-side management programs and for approval of two updated rate adjustment clauses pursuant to § 56-585.1 A 5 of the Code of Virginia

Case No. PUE-2016-00111

Dear Mr. Peck:

Enclosed for filing in the above-captioned proceeding is the **Direct Testimony of Andrew Grigsby**, which is being filed on behalf of the Virginia Energy Efficiency Council. This testimony is being filed electronically on the Commission's Electronic Document Filing system. If you should have any questions regarding this filing, please contact me at (434) 924-4776, or via email at cjaffe@virginia.edu.

Sincerely,

A handwritten signature in black ink, appearing to read "Cale Jaffe", written over a horizontal line.

Cale Jaffe

Assistant Professor of Law, General Faculty
Director, Environmental and Regulatory Law Clinic
University of Virginia School of Law

cc: Parties on Service List
Commission Staff

CERTIFICATE OF SERVICE

I hereby certify that the following have been served with a true and accurate copy of the **Direct Testimony of Andrew Grigsby** by electronic mail and by deposit in the U.S. Mail, first class, postage prepaid:

Vishwa B. Link
Lisa R. Crabtree
Anne Hampton Andrews
McGuireWoods LLP
Gateway Plaza
800 East Canal Street
Richmond, VA 23219

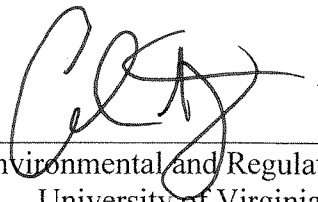
C. Meade Browder, Jr.
Kiva Bland Pierce
Division of Consumer Counsel
Office of the Attorney General
202 North Ninth Street
Richmond, VA 23219

Fred Ochsenhirt
Andrea B. Macgill
Office of General Counsel
State Corporation Commission
P.O. Box 1197
Richmond, VA 23218

William H. Baxter, II
Lisa S. Booth
Dominion Resources Services, Inc.
Law Department, RS-2
120 Tredegar Street
Richmond, VA 23219

William Cleveland
Nathaniel Benforado
Southern Environmental Law Center
201 West Main St., Suite 14
Charlottesville, VA 22902-5065

DATED: February 7, 2017



Cale Jaffe, Environmental and Regulatory Law Clinic
University of Virginia School of Law

1 **WITNESS DIRECT TESTIMONY SUMMARY**

2

3 Witness: Andrew Grigsby

4 Title: Member, Board of Directors - Virginia Energy Efficiency Council

5 Summary:

6 VAEEC Witness Andrew Grigsby provides an analysis of three specific programs at issue in the
7 Company's application:

- 8 • Continuation of the Phase II Residential Heat Pump Upgrade Program;
- 9 • Implementation of the Phase VI Residential Home Energy Assessment Program; and
- 10 • Implementation of the Phase VI Non-Residential Prescriptive Program.

11 Mr. Grigsby bases his testimony on his real-world experience as an energy efficiency consultant
12 working as a participating contractor in utility conservation programs. He offers the perspective
13 of an energy-efficiency installer working in the field.

14

15 The Local Energy Alliance Program ("LEAP"), the non-profit that Mr. Grigsby manages, has
16 completed more than 3000 of the Phase II Home Energy Check-Ups. At the most basic level, the
17 proposed Phase VI programs and the Phase II program continuation allow participating
18 contractors to offer customers smart, cost-effective investments that will reduce electricity bills,
19 among other benefits. These programs help overcome market barriers that have restricted
20 investments in energy efficiency – investments that would provide benefits to all Virginians, not
21 just program participants.

1 **Q. Please describe your background and expertise with respect to energy policy.**

2 A. I joined LEAP in February 2015 and became Executive Director in April 2015. I am a
3 LEED Accredited Professional and a RESNET-certified Home Energy Rater. I am licensed by
4 the Commonwealth of Virginia as a Residential Building Energy Analyst and am the Qualified
5 Individual for LEAP's Class A Contractors License. I earned my Master's Degree in Community
6 and Regional Planning from the University of Texas at Austin and my Bachelor's Degree in
7 Social Theory from Virginia Commonwealth University. Before joining LEAP, I was the
8 founding principal of Commonwealth Sustainability Works, a consulting firm focused on high-
9 performance construction, sustainable land use, and green strategies for business. Prior to that, I
10 worked for the City of Austin, Texas as the manager of the City's Sustainable Communities
11 Initiative where I promoted smart growth, green building, air quality, community engagement,
12 and other programs. Outside of my formal schooling, I have many years of experience in
13 homebuilding and remodeling, conducting home energy audits, and building energy modeling.
14 A copy of my resume is attached to this testimony as Exhibit AG-1.

15

16 **Q. What is the purpose of your testimony in this proceeding?**

17 A. My purpose is to help Virginians obtain more – and more effective – energy efficiency
18 services that deliver: 1) total energy cost savings for customers; 2) grid stabilization and grid
19 security; 3) local economic development; and 4) improvements in environmental quality, public
20 health, and climate change mitigation. Specifically, my testimony provides an analysis of three
21 programs at issue in the Company's application. My perspective is that of an energy-efficiency
22 installer working in the field – a perspective which I believe has not always been well-

1 represented in prior cases but is critical to these discussions. Those three programs I have
2 reviewed are:

- 3 • Continuation of the Phase II Residential Heat Pump Upgrade Program;
- 4 • Implementation of the Phase VI Residential Home Energy Assessment Program; and
- 5 • Implementation of the Phase VI Non-Residential Prescriptive Program.

6

7 **Q. Please briefly describe these three programs.**

8 A. First, the Company proposes to continue the Phase II Residential Heat Pump Upgrade
9 Program, which provides a rebate for residential ratepayers to upgrade to newer, more energy
10 efficient pumps. Heating and cooling systems are the largest energy consumers in the residential
11 home and thus represent an opportunity for significant energy savings. The Company is seeking
12 a two-year extension.

13 Second, the Company has proposed two Phase VI programs, both of which involve
14 bundled programs: one for residential customers and the other for non-residential customers. The
15 Residential Home Energy Assessment Program would provide incentives for owners and
16 occupants of single-family homes to conduct a home energy assessment, and would provide
17 incentives for homeowners and occupants to install a variety of energy saving measures
18 identified in the assessment. The Non-Residential Prescriptive Program would provide
19 incentives to commercial customers otherwise ineligible for the Company's Small Business
20 Improvement Program. The program looks to incentivize the installation of refrigeration
21 evaporator fans, commercial ENERGY STAR appliances, commercial duct testing and sealing
22 and other energy saving measures.

23

1 **II. RESIDENTIAL HEAT PUMP UPGRADE PROGRAM**
2

3 **Q. With respect to continuation of the Phase II Residential Heat Pump Upgrade**
4 **Program, what is your recommendation?**

5 A. I recommend that the Commission approve the extension of this program. The program’s
6 rebate provides a critical nudge to customers to either convert to a heat pump (if the home is
7 otherwise all-electric), replace an aging heat pump sooner, or install a higher-than-minimum
8 efficiency model (for new construction).
9

10 **Q. Do you have experience with completing heat pump upgrades for residential**
11 **customers?**

12 A. I have not directly worked on a heat pump upgrade under the Dominion program, but
13 LEAP does interact with installers who do. LEAP’s building scientists recommend heat pumps
14 for all but the least-insulated homes in Virginia’s moderate climate, and we certainly promote
15 investing in higher-efficiency models.
16

17 **Q. In your experience, why are these heat pump upgrade programs valuable?**

18 A. A new heat pump is a long-term investment. Customers are unlikely to properly account
19 for the savings obtained by more efficient equipment when confronted with greater upfront
20 installation costs. The high-efficiency unit will cost more when initially purchased, of course,
21 but, on average, homeowners will more than recover this cost – with those facing the highest
22 costs for heating and cooling seeing the greatest benefit. By reducing the initial upfront cost, the
23 rebate helps more folks act in their own, the grid’s, and society’s interest to invest a little more

1 now to significantly reduce energy use over the ensuing many years that the higher SEER heat
2 pump will be in service.

3

4 **Q. With respect to continuation of the Phase II Residential Heat Pump Upgrade**
5 **Program, are you aware of any data that quantify the potential savings or analyze how**
6 **quick the payback period might be?**

7 A. Yes. The U.S. Department of Energy has cited a study focused on the Northeast and
8 Mid-Atlantic regions, which found that the annual savings when using an air-source heat pump
9 are around 3,000 kilowatt-hours when compared to electric resistance heaters. That citation is
10 available online here: <https://energy.gov/energysaver/air-source-heat-pumps>.

11 Additionally, a recent analysis by the American Council for an Energy Efficient
12 Economy looked at the payback period when converting homes with electric furnaces to higher
13 efficiency heat pumps. The report “found that installing a new heat pump at the time the existing
14 central air conditioner needs replacement will generally be cost-effective, with the median
15 simple payback period (time for the energy savings to fully pay back the additional cost) being
16 4.7 years.” The analysis is available online here: [http://aceee.org/blog/2016/05/should-we-](http://aceee.org/blog/2016/05/should-we-promote-heat-pumps-save)
17 [promote-heat-pumps-save](http://aceee.org/blog/2016/05/should-we-promote-heat-pumps-save). That is an exceptionally good rate of return.

18

19 **Q. Based on your experience in working with residential ratepayers in the field, would**
20 **there be a problem if the heat pump program is not extended?**

21 A. Yes. The problem would be the missed opportunity to provide an extremely beneficial
22 service. LEAP does not participate in this program, but as a participating contractor with other
23 programs, I can definitively state that it causes confusion, customer loss, and a substantial harm

1 to small businesses when programs are started, cancelled, and re-started after a gap in the
2 program. It hurts contractors to have to hire, lay off, and then attempt to re-hire staff who have
3 moved on to other jobs and opportunities. For that reason, I strongly recommend that the heat
4 pump upgrade program be extended immediately. This will allow for an efficient transition
5 between the original program and the extended program, without any harmful gaps in service.

6

7 **III. RESIDENTIAL HOME ENERGY ASSESSMENT PROGRAM**

8 **Q. What is your recommendation on the Phase VI Residential Home Energy**
9 **Assessment Program?**

10 A. I strongly recommend that the Commission approve this program as quickly as possible.

11

12 **Q. Do you have experience in conducting residential home energy assessments similar**
13 **to what the Company is proposing here?**

14 A. Yes. LEAP performed more than 3000 of the Phase II Home Energy Assessments, and
15 we offered a similar service prior to that program's launch. With LEAP and with my previous
16 firm, Commonwealth Sustainability Works, I personally conducted diagnostic, walk-through,
17 and walk-through with direct install audits of hundreds of buildings, mostly residential.

18

19 **Q. Based on your experience, can you explain why the Company's program is needed**
20 **here?**

21 A. It is needed to overcome market failures. Based on my years in the field, I would argue
22 that energy literacy in Virginia is poor. Because of this, most ratepayers have limited knowledge
23 about energy savings opportunities and, as a result, low motivation to seek savings. When they

1 do act on their own to make efficiency improvements, they often obtain sub-par results because
2 of some combination of misdiagnosis, wrong equipment, and poor installation. I have seen this
3 first-hand through decades of work in the field.

4 While the proposed program is primarily evaluated based on its ability to generate
5 immediate baseload savings from the efficiency measures installed during the assessment, it has
6 many additional benefits that are not represented in the cost-benefit scores (i.e., that don't show
7 up as avoided kilowatt-hours attributed to the program in the Technical Resource Manual). In
8 other words, the program is providing more benefits than can be seen with a traditional cost-
9 benefit analysis.

10

11 **Q. Please describe some of the benefits that the program delivers that might not be**
12 **reflected in the cost-benefit scores.**

13 A. To obtain required data about the home, LEAP's building analysts must access attics,
14 crawlspaces, mechanical rooms, basements, etc. Many times, upon indicating our need to see
15 these places, the resident gives a horrified look: "You're going where? Oh, I don't ever go
16 there." And what do we find? Opportunity. We report back to the resident on low or non-existent
17 insulation, crushed or disconnected ductwork, leaking pipes, leaking water heaters, massive air
18 leaks, and more. The value of having a professional go into your basement with a fresh set of
19 eyes can be immeasurable. When we find disconnected flues or fried wiring it can be a life saver.

20 The Phase II Home Energy Check-Up Program that just expired allowed us to provide
21 that service at minimal cost (from \$0 to \$45) to residents. The proposed Phase VI Home Energy
22 Assessment Program will continue enabling this core service. I can't overstate the value of this

1 aspect of the program. The rebate creates a revenue stream sufficient to get us in the door. That's
2 the magic. All the other benefits – savings, comfort, safety – flow from that.

3

4 **Q. What other benefits might you see from an audit?**

5 A. The proposed Phase VI Home Energy Assessment Program then goes two steps further
6 and adds incentives for a heat pump tune-up and for installation of a super-efficient heat pump
7 water heater. I will address both of these incentives briefly.

8 First, with heat pumps, a professional inspection and basic tune-up is a critical measure
9 for improving equipment efficiency and maximizing equipment life. Still, many homeowners
10 operate under the “if it ain't broke don't fix it” mentality and neglect their equipment for years.
11 They might not even know that they are supposed to have the heat pumps serviced. Many times,
12 I and my staff have discovered fan blades and coils that have gone un-cleaned for years and
13 could barely function. In other words, a heat pump might “whir” when turned on, leading a
14 homeowner to think it is working fine. But what the typical homeowner doesn't see is that his or
15 her neglected equipment is performing at 90, 80, even 70 percent capacity while using the same
16 amount of energy. Further, it stands to reason that the rebate dollars will entice customers who
17 previously could not or would not pay for a basic tune-up – and therefore should obtain out-sized
18 benefits from the service.

19 Turning to the second incentive, heat pump water heaters are remarkably efficient, and
20 though they've been available for more than a decade, are not widely used. They cost quite a bit
21 more than conventional, electric-resistance heaters. They also are taller, and make a little noise
22 when they operate. They look something like a conventional water heater with a window air
23 conditioner on top. And that's basically what they are. Like a heat pump or air conditioner, they

1 use the refrigerant cycle to move heat from one place to another, in this case, from the
2 surrounding room into the water in the tank. They are rated to use as little as one-third of the
3 energy of conventional water heaters. This is significant. It means that, despite their high
4 installation cost, they provide an incredible return on investment.

5 But they're new and different. Contractors aren't pushing them. No plumber is carrying
6 one around on his truck the night before Thanksgiving when your water heater breaks (and that's
7 when it always happens). Most of the time people replace failed water heaters with the cheapest
8 available or whatever their plumber has on his truck. Spending more requires either planning or
9 the motivation of a sizable rebate, such as this program proposes. So I am quite sure that this
10 program will inspire many more Virginians to choose this advanced technology.

11

12 **Q. Can you summarize the overall value you see with the Phase VI Residential Home**
13 **Energy Assessment Program?**

14 A. In my years of practice as an installer, I have long maintained that the best advertisement
15 for efficiency is a successful retrofit project in someone's home. Their testimony to their friends
16 and neighbors about how much they are saving is more effective than anything a contractor or
17 public education program can obtain. Programs that create more good examples in the
18 community – like Dominion's program here – prime the pump. They get these beneficial
19 products and services out into the market, thereby creating mainstream demand. It takes this kind
20 of nudge to get the public and the construction industry engaged in the efficiency improvements
21 that help us all by reducing electricity consumption and reducing the environmental impact of
22 energy production and distribution.

1 In conclusion, the various components of this program go a long way to overcome
2 significant market barriers to highly effective efficiency products and services. The wider they
3 are deployed, the greater the benefits to all Virginians. Executed by a conscientious contractor,
4 this program will deliver benefits to participants and non-participants alike, well beyond the
5 metrics by which it might be formally evaluated.

6

7 **IV. NON-RESIDENTIAL PRESCRIPTIVE PROGRAM**

8 **Q. What is your recommendation on the Non-Residential Prescriptive Program?**

9 A. I also recommend approval of this program.

10

11 **Q. Do you have experience in conducting non-residential efficiency programs similar to**
12 **what the Company is proposing here?**

13 A. Not directly, but I do have familiarity with some of the specific measures, their energy
14 benefits, and contractors' deployment issues.

15

16 **Q. If non-residential customers are already doing some of these activities, can you**
17 **explain why the Company's proposal is needed?**

18 A. Yes. It is needed because non-residential entities are under-investing in these efficiency
19 measures to a degree that Virginia as a whole is adversely affected. Just as in our homes,
20 managers of these buildings are insufficiently motivated to invest in these measures because of a
21 lack of knowledge of the benefits of various measures and a lack of access to quality contractors
22 who can deliver these goods and services in such a way that the full benefits are realized. The
23 financial incentives afforded by the Company's proposal motivate engagement at a level that

1 exceeds the ratepayer investment. The existence of the rebate program draws attention to the
2 issues, creates a marketing opportunity for contractors, and motivates action by ratepayers.

3

4 **Q. Does this conclude your prefiled direct testimony?**

5 A. Yes, it does.

Andrew C. Grigsby

Personal and Professional Goal

to develop and implement policies and projects that guide communities, organizations, and households towards sustainability

Summary of Skills and Knowledge

- broad knowledge of personal, cultural, technological, and natural aspects of sustainability
- special expertise in areas of sustainable community development and design, green building, and residential energy efficiency
- open, collaborative leader
- dynamic public speaker
- expert instructor and facilitator emphasizing mutual learning environments
- master carpenter and woodworker
- extraordinary attention to detail and to the whole system

Professional Experience

Executive Director 2015 to present
Local Energy Alliance Program, Charlottesville, VA www.leap-va.org

- managed the budget, human resources, and strategic planning for a 6+ employee non-profit promoting energy efficiency and renewable energy in Charlottesville and Northern Virginia
- represented LEAP on television, in program workshops, at public meetings, with local, state, and federal government staff, and with other partners
- managed staff activities and contributed materially to LEAP's programs including Solarize campaigns, energy audits, general contracting activities, and community outreach
- negotiated contracts with business partners
- worked with industry partners around the state to promote efficiency and renewables

Sustainability Consultant / Principal 2001 to 2015
Commonwealth Sustainability Works, Richmond, VA www.commonwealthsustainability.com

- founded and managed a sustainability consultancy focused on green building, sustainable land use planning and community development, and green strategies for business
- recommended green building and efficiency designs, techniques, and materials to builders, designers, installers, homeowners, schools, NGOs, local governments, and businesses
- provided policy and program guidance regarding land use, energy efficiency, economic development, and green building to NGOs and state and local government agencies
- provided consultation, facilitation, energy modeling, testing, and inspections in support of green/efficiency certifications for residential and commercial buildings and developments
- performed energy audits of hundreds of houses, apartments, and small businesses
- taught classes and conducted workshops and seminars for businesses, trade organizations, NGOs, state and local agencies, high schools, community colleges, and universities
- developed green technology curriculum, programs, and conferences for community colleges
- provided instruction and testing services for building science certifications

Program Manager 1998 – 2001
City of Austin Sustainable Communities Initiative, Austin, TX

- planned ongoing municipal and regional sustainability efforts, including sustainable purchasing, environmental management systems, and green economic development
- served 16 months as executive director for a regional sustainability indicators project

Andrew C. Grigsby

- developed policy for green building, smart growth, and air quality initiatives
- prepared grant applications
- administered sustainability evaluation tool for capital improvement projects
- delivered presentations to and led workshops for local, state, and national groups
- provided technical assistance to city staff, citizens, and other organizations

Builder/Trainer/Program Facilitator 1993 – 1994

Cradlerock Outdoor Network, Princeton, NJ

- facilitated individual development and team-building programs for corporate, educational, and recreational clients of all ages and abilities
- constructed challenge courses and climbing walls and trained clients to use these facilities

Carpenter and Furniture Maker 1986 – 1998

Various Companies in Virginia, North Carolina, and Texas

- performed most aspects of residential and light industrial construction
- built hand-made, museum-quality furniture
- managed as many as four coworkers

Education

Master of Science in Community and Regional Planning 1999

The University of Texas at Austin

- Planning Student Organization President
- Editor, *Planning Forum* – nationally distributed academic journal

Bachelor of General Studies: Social Theory, *magna cum laude* 1992

Virginia Commonwealth University

Professional Certifications

- LEED Accredited Professional (BD+C) – Green Building Certification Institute
- Home Energy Rater – Residential Energy Services Network
- Certified Instructor – National Center for Construction Education and Research
- Photovoltaic: Entry Level Certificate – North American Board of Certified Energy Professionals

Community Service and Other Affiliations

- Virginia Energy Efficiency Council – Governance Board (exec. committee) – 2012 to present
- Virginia State Building Code – Energy Working Group member – 2007 to present
- Culpeper Concerned Citizens – Board of Directors – 2008 to 2013
- Windmore Foundation for the Arts – Board of Directors (exec. committee) – 2007 to 2012
- SPARK!: Charlottesville Community Design Center's Energy Efficiency Initiative – Advisory Committee member – 2008 to 2009
- Journey Through Hallowed Ground Partnership – Corridor Management Plan Advisory Committee member – 2007-2009
- Rappahannock-Rapidan Regional Planning Commission – Affordable Housing Advisory Group member – 2005-2007
- Central Texas Sustainability Indicators Project – Advisory Board member – 2000-2002