BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company (U338E) for Approval of its 2013 Rate Design Window Proposals.	Application 13-12-015 (Filed December 24, 2013)

PREPARED DIRECT TESTIMONY OF CHARLES MONK ON BEHALF OF THE CALIFORNIA SOLAR ENERGY INDUSTRIES ASSOCIATION

Brad Heavner
Policy Director
California Solar Energy Industries Assoc.
555 Fifth St. #300-S
Santa Rosa, California 95404
Telephone: (415) 328-2683
Email: brad@calseia.org

June 30, 2014

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company (U338E) for Approval of its 2013 Rate Design Window Proposals	Application 13-12-015 (Filed December 24, 2013)

PREPARED DIRECT TESTIMONY OF CHARLES MONK ON BEHALF OF THE CALIFORNIA SOLAR ENERGY INDUSTRIES ASSOCIATION

Q **Please state your name, occupation and business address.**

A My name is Charles Monk. I am Executive Vice President and Co-Founder of TerraVerde Renewable Partners. TerraVerde Renewable Partners develops renewable energy facilities and provides comprehensive energy management services for local, state and federal governments, school districts, and non-profit building and property owners. The business address is 1100 Larkspur Landing Circle, Suite 155, Larkspur, CA 94939.

Q Please describe your professional background.

A I have been working on solar energy project development and finance for commercial and institutional customers for the past eight years. I helped expand the business of MuniMae, a real estate asset management company, into the renewable energy field. We were one of the first companies to develop power purchase agreements for on-site renewable energy systems, and I helped refine the PPA model during that critical period of expansion. The company grew to manage 60 MW of solar power facilities.

I later worked with Fotowatio, a Spanish renewable energy developer, in its early development. The company now manages 148 MW of solar power facilities in Spain and Italy.

In 2010 I helped launch TerraVerde Renewable Partners, a company that specializes in reducing energy consumption and installing on-site generation for public sector customers. We have completed work at 73 sites through investments totaling $76 million. I manage the financial analysis team, using California rate structures and regulatory frameworks to create opportunities for schools and other public entities to install solar systems and do energy efficiency upgrades.

Q **On whose behalf are you testifying in this proceeding?**

A This testimony is presented on behalf of the California Solar Energy Industries Association (CALSEIA). CALSEIA is a 501(C)(6) not-for-profit solar industry trade association with more than 200 company members involved in the solar energy business in California.[1] CALSEIA is an active participant in a number of Commission proceedings addressing state policy and electric utility rates. Changes to electricity rates have direct economic impacts on the current and prospective customers of CALSEIA's member companies and may help or hinder the companies' ability to market solar energy products. TerraVerde Renewable Partners is a member of this industry trade association.

Q What is CALSEIA's interest in this proceeding?

A Many CALSEIA member companies provide commercial customers in the Southern California Edison (SCE) service territory with solar systems to meet parts of their energy needs. The rates available to those customers are a key determinant in their ability to make prudent investments in solar electric generating equipment. The currently available rate tariffs do not enable such investments for many customers that seek solar energy solutions.

Q What is the purpose of your testimony?

A CALSEIA recommends that the Commission direct SCE to make Option R tariffs available to new customers. I present case studies to demonstrate the difference in project economics between customers taking service under Option A and Option R. It is my intention to offer a customer-focused perspective. I do not wish to duplicate information on marginal costs and ratemaking principles from the utility perspective, though I recognize their importance in the proceeding. Instead, I draw on my own experience and the experience of other CALSEIA members who have a solid understanding of what it takes for utility customers to make

[1] CALSEIA's member companies are listed at: http://calseia.org/find-a-solar-energy-expert/

investments in solar systems. The state has large goals for clean energy development, and we need customers to be convinced of the financial merits of investing in solar to meet those goals.

Q What was your experience presenting solar opportunities to customers before Option R was closed to new customers?

A Under Option R, in approximately one out of three cases, installation of solar generation facilities was viewed as a prudent investment. Without Option R, that ratio has risen to approximately one in ten.

Q How do the differences between Option A and Option R affect solar customers?

A The key difference is the different facilities related demand charge rates. Although solar is very good at reducing the amount of energy consumed by a customer, it is not very good at reducing peak demand for reasons explained below. By recovering a large portion of its costs in demand charges, Southern California Edison's Option A rates are biased against solar. Option R alleviates this bias, allowing the utility to recover more of its costs through energy charges and enabling customers to invest in self-generation.

Facilities related demand charges in Option R are 30% lower than in Option A for the most common SCE general service rate schedules, as shown in Table 1.

Table 1. Facilities Related Demand Charges in SCE Tariffs ($/kW)

Tariff	Option A	Option R
GS-2	$12.71	$8.88
GS-3	$15.77	$10.99
TOU-8	$14.99	$10.47

Q What types of commercial customers are able to make prudent investments in solar systems under SCE's Option A tariffs and what types are not?

A Systems with high energy output compared with installed cost can overcome the anti-solar bias of demand charges. Any rooftop system has to be on an unobstructed roof that is large enough to handle the energy demand. Larger buildings tend to consume more energy, and available roof space is often not sufficient to offset demand using standard efficiency panels and easily configured racking systems. High efficiency panels are more expensive. Complex configurations cost more money to design and install. Electrical rooms sometimes need to be modified to accommodate system components. Complex systems require more work to get through the interconnection process. If the building has a large roof with respect to its energy demand and no complicating factors, it can be inexpensive enough to install a solar system that Option A will work. However, if the available tariffs limit solar installations to those perfect situations, there will be a lot of good solar sites that have to continue getting all of their power from the grid because investments in on-site generation do not make sense.

Another type of installation that can make sense under Option A is a very large open field situated right next to a building with high electricity demand, but the system has to be large enough to offset the added cost of hiring a subcontractor to install the ground-mounted racking.

More often, customers want to install solar on shade structures over the parking lot. Most customers don't have a large empty field next to their buildings or perfect roofs, and many want to use the parking lot for a solar installation. But these systems are mostly out of the question if demand charges are too high. Shade structures are more expensive than the cheapest ground-mounted racking systems. Unless the customer's on-site generation is able to reduce its utility bill significantly it will not be able to recover that added cost. I talk to a lot of customers who want to solarize their parking lots, but when I run the numbers under Option A it rarely works. Many of those sites would be viable for solar installations under Option R.

I work with many school systems to explore options for installing solar, and school sites have the added challenge of requiring the approval of the Division of State Architects (DSA). In the best of circumstances this is simply a separate permitting review that adds a small amount of cost, but quite often DSA is more stringent than local permitting authorities and significant additional engineering and administrative work is necessary. This makes it all the more important for a school to have ideal installation conditions for it to work under Option A.

Those are physical site characteristics that can be enabling or limiting. Also important are the characteristics of a customer's load profile, most importantly with respect to load factor – the ratio of average load to maximum load for a customer. Customers with high load factors have an easier time making solar project economics work than customers with low load factors. If a customer's electricity consumption curve is smooth, follows a regular bell shape, and is consistent day to day, the average load will be closer to the maximum load and it will have a higher load factor. If a customer's load curve is "spiky" or jagged, or is variable throughout the month, the maximum load will be more distant from the average and it will have a lower load factor.

In sum, it is certainly true that customers with excellent physical locations and high load factors are able to make prudent investments in solar under Option A, but that is a very limited universe. To meet aggressive state goals for clean energy development, we need to create an environment in which a wider range of customers has viable opportunities to invest in solar energy systems.

Q Please provide an example.

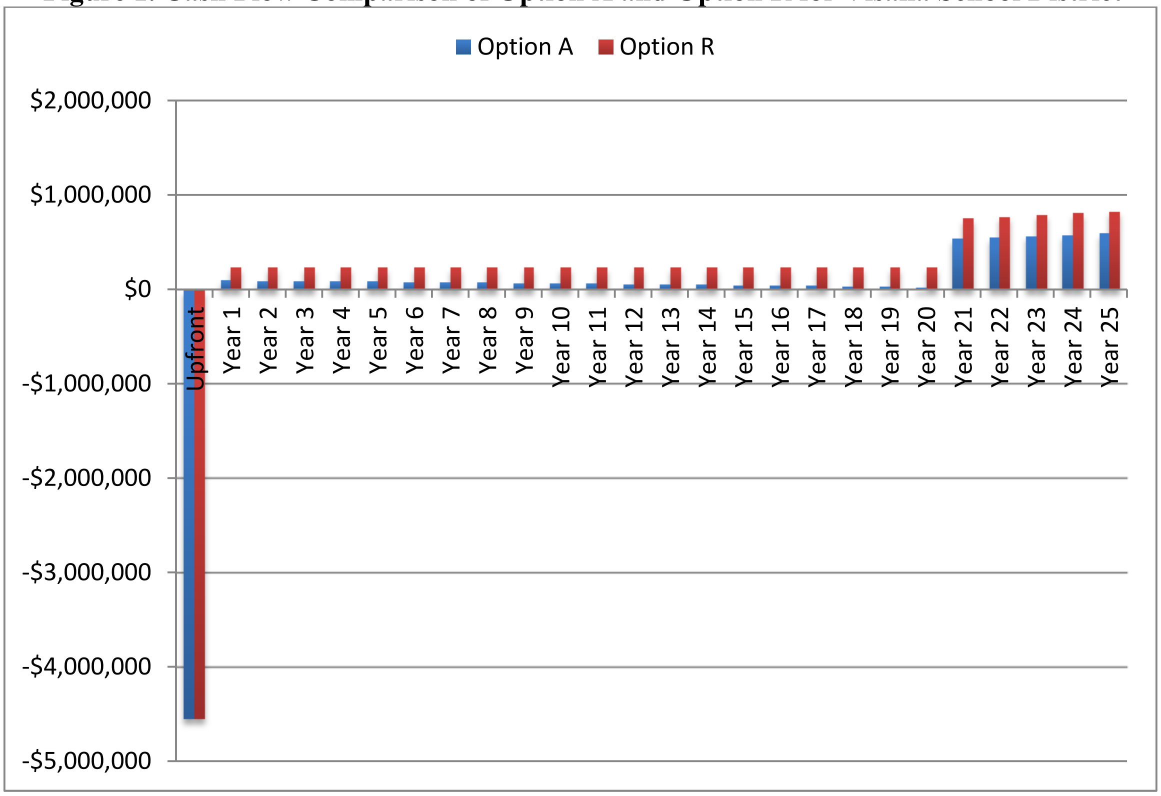
A We have worked with the Visalia Unified School District on a number of projects and they would like to do more. This is a large school district in SCE territory in the Central Valley. Approximately 70% of the students are from low-income families. The leadership of the school understands the value of investing in energy infrastructure as a way to free up money to better serve its students.

We have identified sites throughout the school district that would be good locations for solar installations, for a combined capacity of 2.94 MW. The district would need to finance 60% of the cost since the total project cost would be beyond a level of equity they could invest in the project. Under Option R, it would be 19.1 years to simple payback for the project. Under Option A, it would be 25.7 years, a 35% increase in the payback period.

School systems are often able to accept longer payback periods because they are using capital funds to create savings in operating costs that can be put to other uses. School districts we have done projects with report that they are using the improved cash flow to hire special needs teachers and provide basic classroom materials. One says they would not have a music program without the solar investment.

However, even though they benefit by reducing operating costs, the simple payback period has to be comfortably less than a conservative estimate of the expected system life. In this example, that is not the case for Option A. I would not advise a client to go forward with the project under Option A.

Figure 1. Cash Flow Comparison of Option A and Option R for Visalia School District



Q Do differences of this magnitude really impact the number of customers that are able to invest in solar?

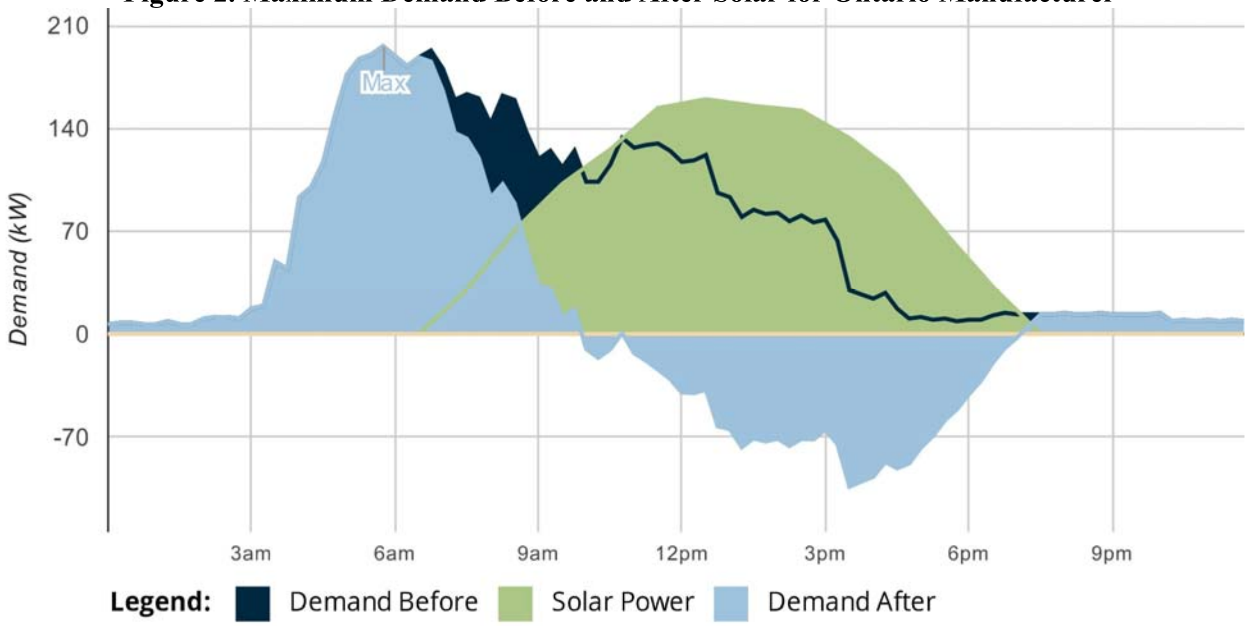
A Absolutely. The margins are slim in solar economics. Good projects barely make sense financially. It doesn't take much to change an economically advantageous project into an economically disadvantageous one. Increasing the payback period by 35% would cause many customers to decline the investment.

Q Do you have an example of a private-sector customer?

A Yes. Another CALSEIA member company installed a 219 kW solar system for a manufacturer in Ontario in 2013. Due to delays in application review and inspections, the system was not interconnected until November 2013 and therefore was not able to become an Option R customer before SCE reached the Option R cap in October 2013. They are generating more electricity than they are using in the summer months, yet are still paying monthly bills of more than $3,000 due to demand charges.

This company's daily peak demand occurs between 5:00 am and 7:00 am as workers start their shifts and turn on equipment. They are normally done with production by early afternoon. You can see in Figure 2 that solar is not reducing this customer's peak demand and that the peak demand occurs in the early morning. Most months for this customer have similar demand profiles, but this graph is from the maximum demand day in July and therefore shows that the negative demand in the afternoon and early evening is benefitting the grid during summer when total system demand is high.

Figure 2. Maximum Demand Before and After Solar for Ontario Manufacturer



The utility bills this customer pays are not reasonable. At the system peak demand times that drive much of the utility's costs, this customer is alleviating strain on the system by producing excess generation and supplying other customers on the local circuit with electricity. The customer pays high bills even though the electricity it consumes is mostly consumed at times of low demand on the system.

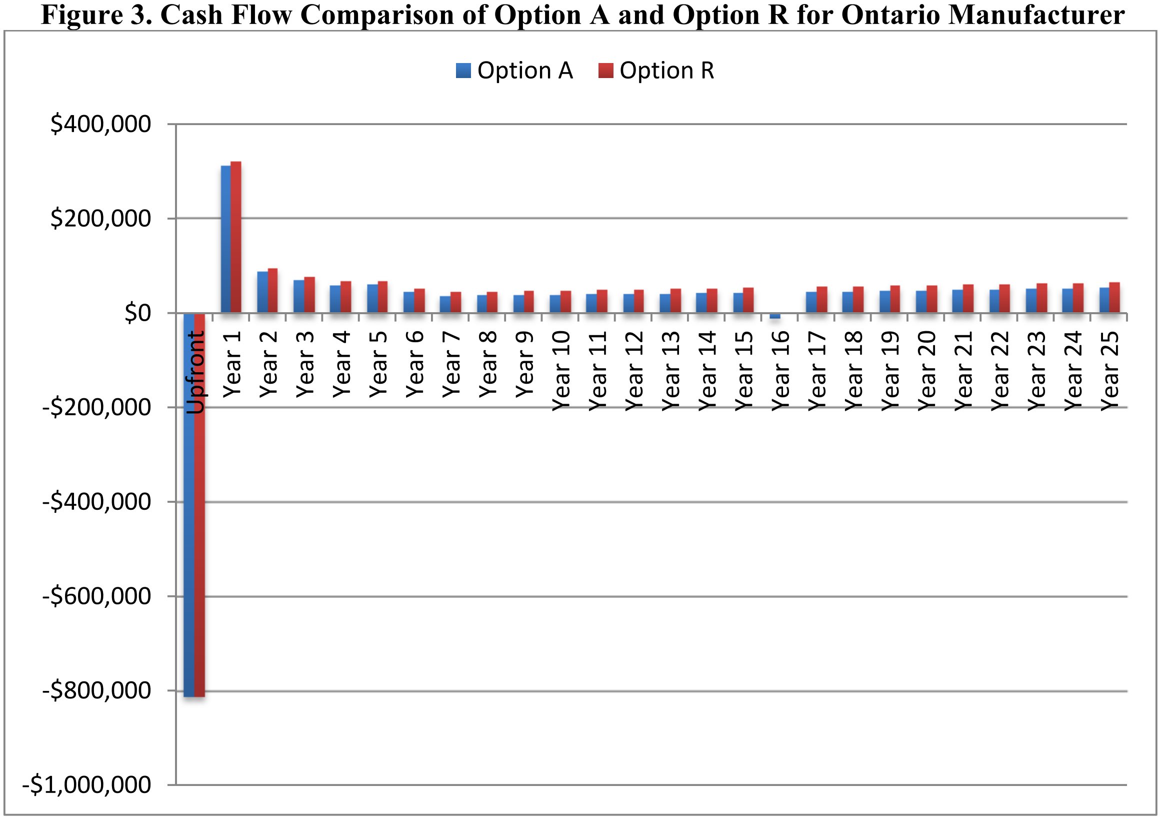
Q What is the financial outlook for this customer's solar investment?

A The customer is not experiencing the return on investment that it expected. The 20-year Internal Rate of Return (IRR) is 6.0% under Option A, and the time period to recoup its initial investment is 10.5 years. The company's energy manager has said that he never would have recommended the investment with those numbers. A small company does not want to tie up money for ten years before it gets back to even and begins to realize savings.

If this customer were able to take service under Option R, it would have a 20-year IRR of 8.3% and a simple payback period of 8.7 years. That is still a long period of time and many customers will not agree to an 8.7-year payback, but it is good enough that some customers that favor energy cost stability and environmental stewardship may be willing to make the investment.

Figure 3 shows that the annual financial savings are small in comparison to the upfront investment under both Option A and Option R, but the savings are greater under Option R. The difference in annual savings will change many projects from being uneconomic to being acceptable for customers.

Figure 3. Cash Flow Comparison of Option A and Option R for Ontario Manufacturer



Q How much do solar systems impact demand charges?

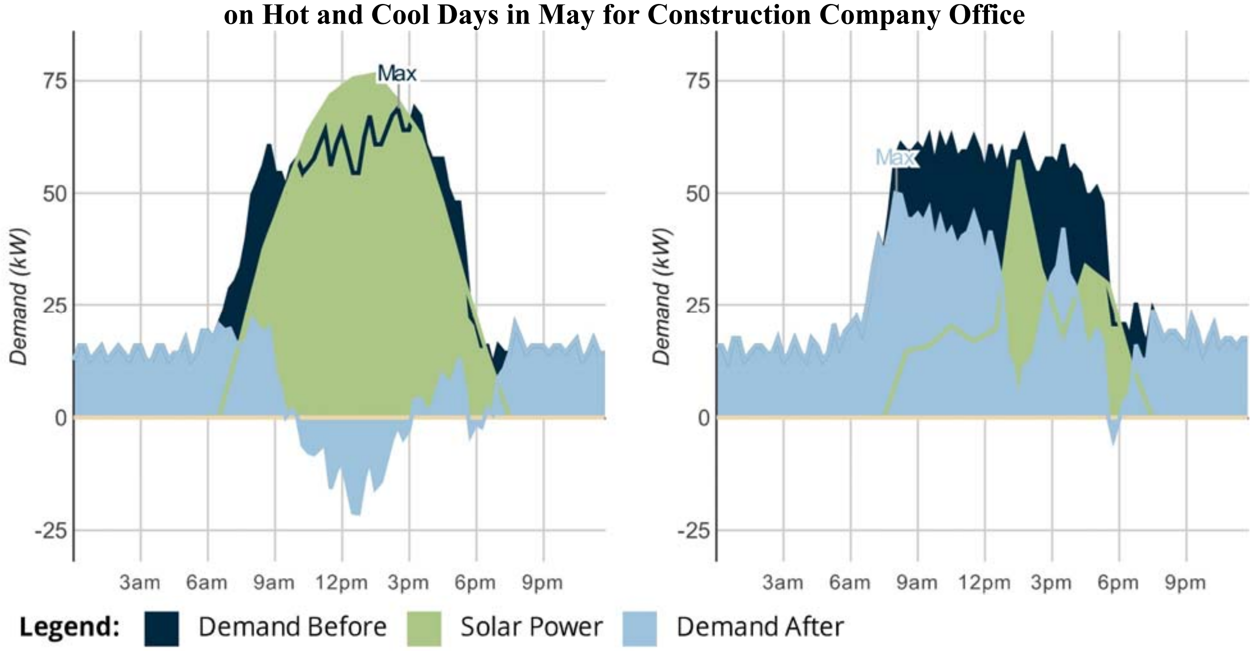
A Not very much, but that's not because solar systems aren't reducing stress on the grid. It's because demand charges are a poor way to reflect stress on the grid.

Figure 4 shows the demand curve of a construction company's office in SCE service territory. This customer considered a 100 kW system in January 2014 but declined the investment because the economics were not good enough under Option A.

Demand charges would unreasonably penalize this customer if it had installed the solar system under a rate structure with high demand charges. On hot, sunny days when the electricity system may be constrained, solar production is high and the customer would be drawing only one-third as much electricity from the grid as it is without solar. The solar system would be reducing net demand when the system needs customers to reduce demand. On the following day the weather is cloudy, so solar production is low and the customer needs more electricity from the grid. Because of the cloudy weather the system is very unlikely to be constrained, yet the customer would pay high demand charges based on that day's usage.

A solar customer's monthly demand charge is based on cloudy days even though the system likely has excess capacity on those days. A solar customer is benefitting the electricity system on the sunny days when the system was likely to be constrained, but those days do not determine the demand charges that the customer pays.

Figure 4. Actual Demand and Projected Solar Production on Hot and Cool Days in May for Construction Company Office



Q How are these demand curves calculated?

A The projections of solar system production were performed using PVWATTS, an open-source tool developed by the National Renewable Energy Laboratory. The tool analyzed 29 years of hourly solar radiation and meteorological elements to determine the "typical meteorological month" for each month in each zip code. Using inputs of the solar system characteristics, it models the daily production of that solar system in that location.

We then loaded the customers' actual electricity demand data into Energy Toolbase, a subscription service widely used by the solar industry to measure project economics. Energy Toolbase compares that demand with the production data from PVWATTS to determine customer costs before and after installing a solar system.

Q Are these load profiles typical?

A I did not attempt an analysis of the relative frequency of different types of load profiles, but I can say that TerraVerde Renewable Partners and other project developers commonly work with customers with load profiles that are similar to those presented in these examples.

Q What trends do you see among potential commercial solar customers in SCE territory?

A Unfortunately, when bad stories happen they circulate in the business community. People hear about experiences like that of the Ontario manufacturer mentioned above. Many customers have had frustrating experiences with interconnection and regulations that are applied inconsistently. The fact that a solar-friendly commercial rate exists but is not available for people who want to switch to it does not go unnoticed. People know that the net metering rules are up in the air. I know several school systems that have thrown up their hands lately because it is not worth their time to deal with all of the headaches of going solar. In many cases we cannot present numbers that are strong enough to overcome this growing trepidation about investing in solar.

If the state is going to meet its bold goals for clean energy development, it has to create a value proposition for customers that overcomes the negative effects of regulatory uncertainty.

Q Does that conclude your testimony?

A Yes, it does.