

DOCKETED

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CALIFORNIA ENERGY COMMISSION

Results of Invitation to Participate: Solar Inverters

Phase II: Appliance Efficiency Pre-Rulemaking
Appliances & Outreach & Education Office
Efficiency Division

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California Energy Commission: Rosenfeld Hearing Room

July 21, 2017



Agenda

- Purpose
- Respondents to Invitation to Participate
- Information Requested
- Responses Received
- General Comments
- Next Steps



Purpose

- The Energy Commission is gathering information for Phase 2 products for appliance efficiency regulations
- The Invitation to Participate (ITP) is an opportunity for stakeholders to provide information and data that will help shape the Energy Commission's policy regarding Phase 2 appliances



Purpose

- The ITP requested information and data on the following topics:
 - Commercial and Industrial Fans & Blowers
 - General Service Lamps (Expanded Scope)
 - Spray Sprinkler Bodies
 - Tub Spout Diverters
 - Irrigation Controllers
 - Set-Top Boxes
 - Low Power Modes & Power Factor
 - Solar Inverters



Purpose

- During this portion of the workshop, we will discuss the information and data submitted for Solar Inverters



Respondents to Invitation to Participate

- California Investor-Owned Utilities (CA IOUs)



Information Requested

- Product Definition & Scope
- Test Procedures
- Market Characteristics
- Product Lifetime
- Potential Efficiency Regulations



Product Definition & Scope

- Inverter product categories should be micro, string, and central
- Module-level power electronics (MLPE) such as power optimizers should be considered as a product category in the roadmap
 - Have significant share in U.S. residential market segment
 - Can provide distinct functionality



Test Procedures

- Identified three inverter test procedures
 - EN 50530 – Overall Efficiency of Grid Connected Photovoltaic Inverters
 - IEC 61683 – Power Conditioners – Procedure for Measuring Efficiency
 - Sandia/CEC Performance Test Protocol for Evaluating Inverters Used in Grid-Connected Photovoltaic Systems (draft October 2004)



Market Characteristics

- Publicly owned utilities (POUs) are not consistently requiring inverters to comply with UL 1741 SA, as has been required in IOU territories
 - SMUD, yes
 - LADWP, indeterminate
 - Other 43 electric POUs, not fully reviewed



Market Characteristics

- Hawaii requires inverters to comply with UL 1741 SA and additional functionality for remote operation and configuration
- Arizona Public Service and Salt River Project have separate pilot programs to study and better understand smart inverter functionality



Market Characteristics

- California Distributed Generation Statistics (<http://californiadgstats.ca.gov/>) has extensive data for PV systems that have been interconnected in IOU territories
 - Identifies specific inverter and quantity of inverters that were installed at each interconnected PV system
- Small businesses tend to be involved in sales and installation rather than manufacturing



Product Lifetime

- Manufacturer warranties
 - Microinverters, 20 to 25 years
 - String and central inverters, 10 to 12 years



Potential Efficiency Regulations

- Testing and reporting requirements
 - Would fill any data gaps that emerge as the California Solar Initiative phases out
- MPPT efficiency requirements
 - Would provide information on how system configuration and equipment variation impact MPPT efficiency
- Efficiency standards
 - Because of growing PV penetration in California, even a small increase in efficiency would have substantial benefits



Potential Efficiency Regulations

- Limiting self-consumption during non-production hours
 - These losses aren't captured by typical inverter performance metrics
 - These losses may have a disproportionate impact since they occur when CA renewable content is lower (i.e., nighttime)
 - The ENERGY STAR specification for electric vehicle supply equipment might be a model for structuring a requirement on stand-by losses



Other Relevant Activity

- Net Energy Metering (NEM) tariffs continue to evolve and CPUC proceedings should be monitored
- The Smart Inverter Working Group (SIWG) is still active and their efforts will result in additional changes to Rule 21 interconnection requirements in CA IOU territories
 - Phase 1 autonomous functions mandatory in September 2017
 - Phase 2 communication protocols incorporated in Rule 21, effective date is TBD
 - Phase 3 additional advanced inverter functionality continues to be examined, recommendations forthcoming



General Comments

- Are there any other topics stakeholders wish to discuss?



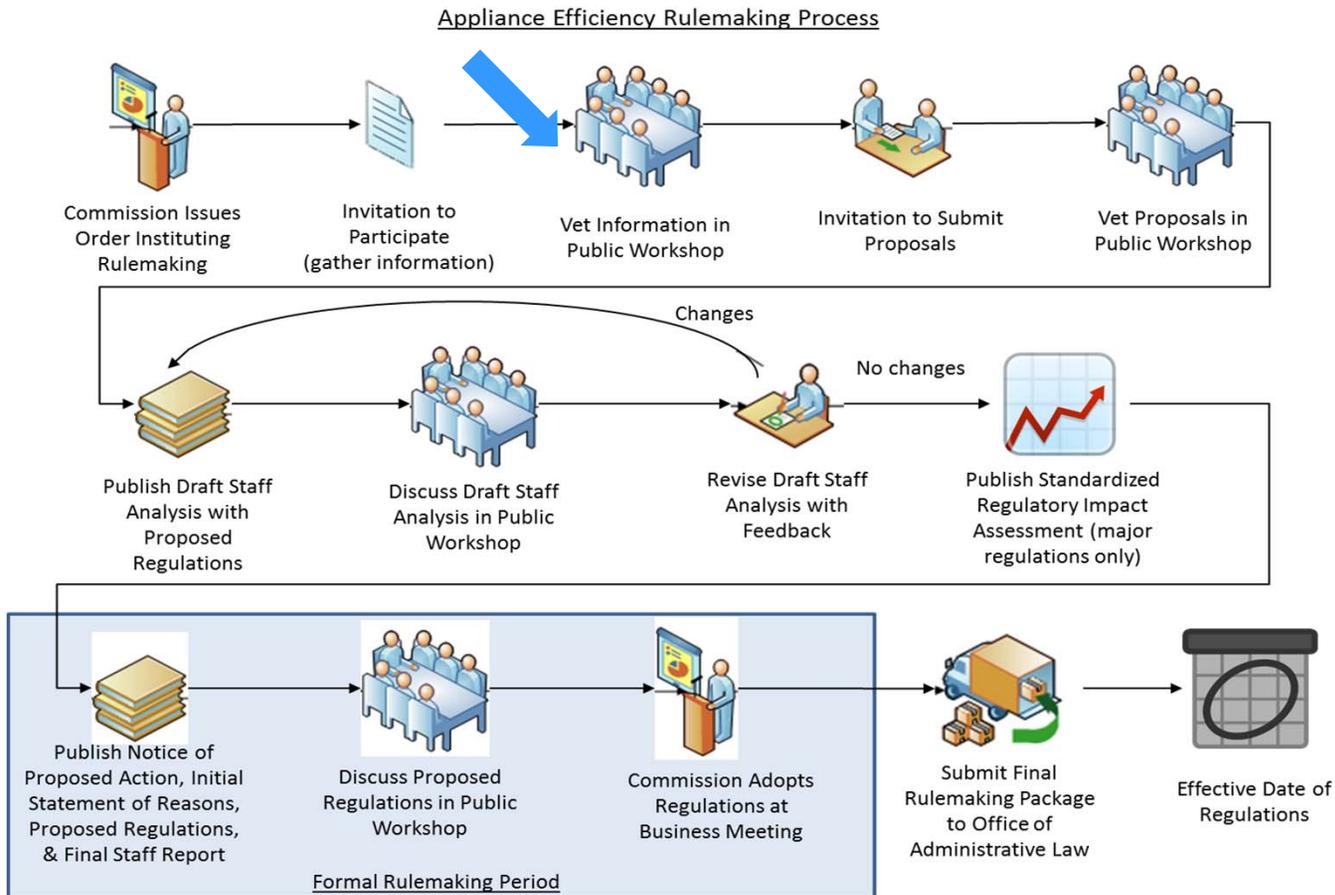
Next Steps

- Following the ITP workshops, the Energy Commission will request proposals for efficiency standards or measures
- Proposal template and guidance is forthcoming.
- Commission staff are available to discuss questions and concerns at any time during the proceeding



Public Participation

1/27/17





Discussion & Comments

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