

Note: There are several requests for technical information related to interconnection requirements. Please refer to Appendix C of the SOI and HECO's proposed Rule 19 establishing tariff provisions for Interconnection and Transmission Upgrades ([link to copy](#)). As noted on page 3 of HECO's letter to the Commission dated April 17, 2007 ([link to copy](#)), by which HECO submitted its proposed Rule 19 tariff for Commission approval, the Commission found that "in general, the HECO Utilities' plan to limit interconnection requirements studies to proposals that make the "short list" of bids, together with their proposed multi-step process for performing interconnection requirements studies, appear reasonable and consistent with the Framework, subject to review by the independent observer." Decision and Order No. 23121 ("D&O 23121"), filed December 8, 2006 in Docket No. 03-0372. The proposed Rule 19 tariff provisions incorporate the planned multi-step process that the Commission has generally found to be reasonable.

In Section B of the proposed tariff, information is provided on the Interconnection Study Process for Competitive Bidding. Section B.1 describes the type of information that will be made available to all potential bidders in the RFP package. This information will include general and regional system information with high level guidance relating to the Company's existing transmission infrastructure. The RFP will also include applicable transmission planning criteria that will be used in the determination of interconnection requirements and potential Transmission System impacts.

Section B.2 of the proposed tariff describes the process for Interested Parties to submit information requests if such party requires clarification or additional technical or operational information pertaining to the Company's system. While this SOI has been issued in advance of the RFP, Interested Parties may submit requests for additional technical or operational information, with the appropriate justification, to HECO via the HECO Generation Bidding website. Any such requests should be accompanied by an explanation as to the unique nature of the Interested Party's position which necessitates receipt of such information in advance of the Draft RFP and should be focused on specific areas of potential interconnection (as opposed to a system wide request). Any such requests received will be reviewed by the HECO Generation Bidding Division and Interested Parties will be advised of HECO's response via the Generation Bidding website. If the requested information is approved for release and made available to the requestor, it will also be made available to other Interested Parties upon request upon receipt of an executed Non-Disclosure Agreement ([link to copy](#)) and submittal of a Notice of Interest ([link to copy](#)).

Please note that the proposed tariff was submitted to the Commission and has not yet been approved.

- 1 Q. Please provide descriptions of interconnection request documents. Please provide a list and format of technical information that needs to accompany an interconnection request.
 - A. The technical information requested in a typical interconnection requirements study ("IRS") will depend on the specific bid proposal (i.e., technology proposed, protection schemes, etc.) on the short list. The following are typical examples of the information that may be requested, but are not limited to:
 - Single-Line Diagram(s) and Protective Relay List & Trip Schedule for generation and interconnection facilities:
 - A plan map of the facilities.
 - Characteristics of power transformers including the generator step-up transformers
 - Characteristics of circuit breakers and fault-clearing fuses and switching devices, including the generator breakers.
 - Details of the protective relaying and related devices such as PTs and CTs.
 - Characteristics and PSS/E models for the proposed generators, the excitation systems, and governors.

- 2 Q. Please provide a description of the overall interconnection process from studies through commissioning and initial operation of a facility.
- A. Please refer to Appendix C of the SOI and HECO's proposed Rule 19 establishing tariff provisions for Interconnection and Transmission Upgrades ([link to copy](#)). In Sections B and C of the proposed tariff, information is provided respectively on the Interconnection Study Process, and the Interconnection Cost and System Upgrade Cost Allocation for Competitive Bidding. Generally, the requirements relative to the interconnection process through commissioning and initial operation of a facility (e.g. the requirement for an acceptance test for the interconnection facilities) is addressed in the power purchase agreement or the interconnection agreement, if there is a separate interconnection agreement. Please note that the proposed tariff was submitted to the Commission and has not yet been approved.
- 3 Q. Please provide a description of studies to be performed by HECO (or contractors for HECO) that would be required.
- A. Please refer to Appendix C of the SOI and HECO's proposed Rule 19 establishing tariff provisions for Interconnection and Transmission Upgrades ([link to copy](#)). In Sections B and C of the proposed tariff, information is provided respectively on the Interconnection Study Process, and the Interconnection Cost and System Upgrade Cost Allocation for Competitive Bidding. Please note that the proposed tariff was submitted to the Commission and has not yet been approved.
- 4 Q. Please provide the form of study agreement(s) and interconnection agreement as applicable.
- A. Please refer to HECO's proposed Rule 19 establishing tariff provisions for Interconnection and Transmission Upgrades ([link to copy](#)). Section B.5 of the proposed tariff provides information on conducting a full IRS. It is anticipated that the form of agreement to conduct an IRS will be made available at the appropriate time to those bidders whose bid has made the short list, or as otherwise specified in the planned RFP. Section C.5 of the proposed tariff provides information on standards and interconnection agreements. Please note that the proposed tariff was submitted to the Commission and has not yet been approved.
- 5 Q. What is the Company's preferred analysis software (PSS/E, PSLF, other) and model data format?
- A. While subject to change in the future, HECO presently uses PSS/E for its load flow and dynamic simulations.
- 6 Q. Please provide information on loads for significant substations and/or load zones.
- A. Please refer to Section C of the HECO SOI.
- 7 Q. Please advise if there are any special operational practices such as changing transmission network topology due to specific generation dispatches.
- A. Presently, the transmission system is not normally reconfigured due to specific generation dispatches. At times, generation in specific areas may need to be limited due to transmission constraints, such as during forced or maintenance outages of some transmission lines or related facilities.
- 8 Q. Please provide a description of the Intermittent Generation Assessment Protocol within the Hawaii Energy Roadmap that HECO is developing with the Hawaii Natural Energy Institute and a copy of any memoranda or reports describing any findings, conclusions or results so far.
- A. This information was provided by Mr. Terry Surles of HNEI to the HECO IRP-4 Advisory Group at their October 17, 2007 meeting. A copy of Mr. Surles presentation is available on the HECO IRP website ([link to site](#)). See "Hawaii Energy Roadmap – Electrical System Analysis"

- 9 Q. Please provide a description of the HECO Renewable Energy Infrastructure Program.
- A. Please see Exhibit B of the attached Stipulation and Joint RPS Framework filed on October 12, 2007 in Docket No. 2007-0008. ([link to copy](#))
- 10 Q. Please identify system frequency and design variations (also underfrequency load shedding steps as applicable).
- A. The nominal system frequency is 60.0 Hz and the normal system frequency variation due to normal load or generation changes is in the +/- 0.02 Hz range. Generally, system frequency variations greater than this amount are considered system anomalies, typically due to either the loss of load when a distribution or sub-transmission circuit trips open or when a generation unit trips offline.
- Information regarding HECO's underfrequency load shedding scheme was provided by HECO to the HECO IRP-4 Advisory Group on October 17, 2007. A summary of that information is provided in the presentation to the HECO IRP-4 Advisory Group available on the HECO IRP website ([link to site](#)). See "Background", page 21 of 33.
- HECO's underfrequency load shed scheme, which is subject to periodic review and analysis, is under review at present and therefore is subject to change without further notice.
- 11 Q. Please provide the typical or mandated reserve requirements for spinning and quick-start reserves (% of system load, time-to-start, ramp rate).
- A. Please refer to information provided by HECO to the HECO IRP-4 Advisory Group on October 17, 2007. A copy of the presentation is available on the HECO IRP website ([link to site](#)). See "Expanding Variability Limits", page 16 of 18.
- 12 Q. Please provide the typical overhead line structure configurations and right-of-way widths on the existing Oahu transmission network.
- A. Please refer to Attachment 1 ([link to copy](#)) for typical overhead line structure configurations. For typical right-of-way ("ROW") widths for transmission lines, it varies depending on the physical configuration of the poles or structures, span lengths between the poles or structures, terrain, alignment, access/maintenance requirements, and horizontal clearance requirements. For Oahu, typical overhead ROW widths in rural or mountainous areas vary between 50' to 100'. Within urban areas, ROW widths are typically located within the existing State or City ROW widths.
- 13 Q. Please provide the typical underground line configurations (i.e. pipe type cable, additional pipe cable system cooling/pumping facilities, solid dielectric installations, etc.) on the existing Oahu transmission network.
- A. Please refer to Attachment 1 ([link to copy](#)) for typical underground transmission line configurations.
- 14 Q. The SOI states at page 4 that "To not foreclose the ability of the HECO system to take on more renewable energy later, relatively strict operating performance standards will be required from those non-firm renewable resources presently being sought both through the ongoing IPP negotiations and the planned RFP." Please provide those "operating performance standards" that will be required, such as maximum ramp rates up and down, maximum voltage variations, maximum power fluctuation rates, generator under- and overfrequency ride-through, under- and overvoltage ride-through, and reactive power control.
- A. As indicated on page 4 of the SOI, "Analyses to determine the required attributes of the renewable energy resources and necessary standards of performance are in progress." HECO is currently still in the process of developing these performance standards and intends to provide this information in the Draft RFP.
- 15 Q. The SOI acknowledges on page 6 that additional regulating reserves can help account for additional intermittent wind resources and eligible renewable resources includes

biofuels (page 7), but states on page 7 that HECO is “not seeking to contract for firm capacity in this RFP.” Can a bidder propose to provide additional regulating reserves to help HECO accept more than 100 MW of wind resources (but still within its state-mandated renewable resource target) as part of an alternative proposal, especially if HECO is already currently negotiating to purchase up to 60 MW of grandfathered IPP wind resources?

- A. HECO will take this question into consideration in the scoping of the Draft RFP. Note also that page 4 of the SOI states that HECO is currently negotiating to purchase up to 60 MW of renewable energy from grandfathered proposals. HECO did not represent that all 60 MW is comprised of wind energy resources.
- 16 Q. The SOI states on page 8 that “increments of generation that are too large will trigger a need for improvements to the existing transmission system infrastructure which will undoubtedly result in extensive lead times for permitting and construction of new transmission lines.” Since HECO has invited alternate bids that exceed 100 MW, please provide guidance on locations in the HECO grid where injection of over 100 MW of intermittent wind power is less likely to lead to significant new transmission upgrades requiring extensive lead times.
- A. Please refer to Section C of the SOI for information on transmission constraints associated with likely areas of interconnection. More detailed analyses would be conducted during the IRS process.