



IEEE PES Working Group on Modern Heuristic Optimization

**2017 PANEL & COMPETITION:**  
**“Evaluating the Performance of Modern Heuristic Optimizers on  
Smart Grid Operation Problems”**

The increasing penetration of renewable energy sources and the new and adaptive patterns of demand side response entail a higher level of variability of the operation of electrical sustainable power systems. In this context, operational problems possess highly complex mathematical properties (e.g. non-convexity, discontinuity, multi-modality, high-dimensionality), which emphasizes the need of advanced optimization solvers in order to find optimal solutions that guarantee efficient and flexible operations.

This panel and competition, to be held at the 2017 IEEE PES General Meeting, introduces two benchmark problems (also denoted as optimization test beds):

**Test bed 1: Stochastic OPF based active-reactive power dispatch.**

Developers: Sergio Rivera (Universidad Nacional de Colombia), Andres Romero (Universidad Nacional de San Juan), José Rueda (Delft University of Technology), Kwang Y. Lee (Baylor University), and István Erlich (University Duisburg-Essen)

Please refer to the following material:

- **02\_test\_bed\_OPF\_2017\_Guidelines.pdf:** Detailed description of the test bed, implementation, and material to be submitted to the following email addresses: [srriverar@unal.edu.co](mailto:srriverar@unal.edu.co), [aromero@iee.unsj.edu.ar](mailto:aromero@iee.unsj.edu.ar) and [j.l.ruedatorres@tudelft.nl](mailto:j.l.ruedatorres@tudelft.nl), by 30th March 2017.

- **02\_test\_bed\_OPF\_2017.zip:** Matlab Codes (for problem evaluation) to be used in your implementation. You only have to work in your algorithm, which can call these codes.

### **Test bed 2: Optimal scheduling of distributed energy resources.**

Developers: Zita Vale, João Soares (Institute of Engineering – Polytechnic of Porto)

Please refer to the following material:

- **03\_test\_bed OSDER\_2017\_Guidelines.pdf:** Detailed description of the test bed, implementation, and material to be submitted to the following email addresses: [joaps@isep.ipp.pt](mailto:joaps@isep.ipp.pt) and [j.l.ruedatorres@tudelft.nl](mailto:j.l.ruedatorres@tudelft.nl), by 30th March 2017.
- **03\_test\_bed OSDER\_2017.zip:** Matlab Codes (for problem evaluation) to be used in your implementation. You only have to work in your algorithm, which can call these codes.

### **Evaluation criterion**

Based on the submitted results (saved as txt files by using the provided codes), a ranking index is established, which accounts for the statistics of the best fitness value  $f_{best}$  obtained for each problem within the specified maximum number of function evaluations in each of the 31 runs considered for the competition. Thus, the success achieved for a single case (also denoted as scenario) is quantified as:

$$\text{Score} = \text{mean}(f_{best})$$

where mean stands for mean value.

The total score is calculated as the sum of the individual scores corresponding to the cases (scenarios) belonging to the above indicated test beds.

The organizers will announce the codes together with a comparative analysis based on the provided results between April-May 2017 at <http://sites.ieee.org/psace-mho/2017-smart-grid-operation-problems-competition-panel/>. **The first three ranked algorithms** will be selected for presentation at the panel, for which only PowerPoint presentations are required.

Please consider that the IEEE PES Working Group on Modern Heuristic Optimization does not provide any financial support to attend the 2017 IEEE PES General Meeting.

All interested participants are encouraged to send an email to [j.l.ruedatorres@tudelft.nl](mailto:j.l.ruedatorres@tudelft.nl) by 30 January 2017, indicating their names, affiliation, and the algorithm to be used.

**Panel Organizers:**

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**Important dates:**

Call for competition: **14 January 2017**

Confirmation of participation: **30 January 2017**

Submission of results and codes: **30 March 2017**

Announcement of best three ranked algorithms: **28 April 2017**

2017 IEEE PES General meeting: **16-20 July 2017**