Green and Efficient Energy Applications of Genetic and Evolutionary Computation GreenGEC 2013

We would like to express our great pleasure in welcoming you to the GECCO Workshop on Green and Efficient Energy Applications of Genetic and Evolutionary Computation (GreenGEC Workshop'13), held in conjunction with the GECCO 2013 International Conference.

A main characteristic of the studies in the area of green and energy-efficient applications is the strong connection with real-world environments and constraints. As such, there is only little place for errors and leading edge algorithms alone can be used. The potential impact and outcomes are also of foremost importance. Global increases in living standards, diminishing natural resources and environmental concerns place energy amongst the most important global issues today. On the consumer side, there is an increasing need for more efficient, smart, uses of energy, be it in large-scale computing systems and data warehouses, in homes or in office buildings. On the producer side, there is a push toward the use of sustainable, green, energy sources, which often come in the form of less reliable sources such as wind energy. In addition, future energy systems are often envisioned to be "smart", consisting of massive amounts of small generators, such as solar panels, located at consumers, effectively turning consumers into potential producers whenever they have a surplus of energy. The management, control and planning of, and efficient use of energy in (future) energy systems brings about many important challenges.

Energy systems are not only real-world systems, they are also one of the most important foundations of the modern world. Especially with the upcoming required changes to make more efficient use of energy and to shift towards a global use of sustainable, green energy sources, there are many challenges in mathematics and computer science. Real-world challenges, such as those arising in (future) energy systems, are typically highly complex because of the many aspects to be considered that are often disregarded in theoretical research such as dynamic changes, uncertainty and multiple objectives. In many situations therefore, problem-specific algorithms are infeasible or impractical. Instead, flexible and powerful approaches such as evolutionary algorithms (EAs) can often provide viable solutions. Typical real-world challenges that are addressed by EAs are of the optimization type. This covers the use of EAs to optimize issues ranging from energy consumption (e.g. scheduling, memory/storage management, communication protocols, smart sensors, etc.) to the planning and design of energy systems at many levels, ranging from small printed circuit boards to entire transmission networks.

The aim of this workshop is to bring together researchers interested in addressing challenging issues related to the use of evolutionary computation for applications in (future) energy systems. With respect to these considerations, we would like to end by thanking the authors for their contributions.

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