Process Integration – Systematic Design Tools for Addressing the Sustainable Development Goals

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Process integration may be formally defined as a holistic approach to design and operation that emphasises the unity of the process. After four decades of development, process integration techniques are now well recognized in addressing various resource conservation problems, ranging from energy to material recovery. The established techniques such as pinch analysis and mathematical programming are now available in various textbooks, encyclopedia and review papers. In the past decade, some of these tools have also been extended to address various problems associated with carbon- and environmental-footprint reduction, covering those for energy planning, power generation sector, as well as the planning of carbon capture, utilization and storage. These are some of the teething problems identified in the United Nation Sustainable Development Goals (SDGs). In this paper, these recent developed techniques will be highlighted. Emphasis will be placed for those tools that combines the strength of both pinch and mathematical techniques, which overcome the limitation when they were used independently.

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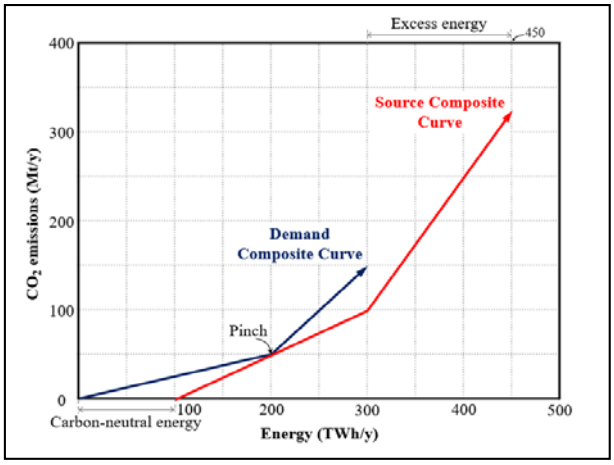

Pinch analysis tools for carbon-constrained energy planning