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## **Surplus Power Cogeneration in Sugar Industry – K.R.Patil**

### **PREFACE**

India is the largest consumer of sugar and the second largest sugarcane producer in the world. The country has made substantial progress in bagasse based cogeneration. Electricity generation in India is achieved mainly from coal which is a major source of carbon emission. Depletion of fossil fuel sources and increasing import of energy fuels is a matter of great concern. Sugar production is an energy-intensive industry and requires both steam and electricity. Bagasse is a by-product of sugarcane crushing and is used as fuel in the boiler. Bagasse based cogeneration has been in practice since ages to meet steam and power demand. However, supplying surplus electricity to grid has gained momentum in the last decade. This power generation offers several advantages such as energy security as the fuel is readily available at site, fuel diversity, reduced transmission and distribution losses, carbon emission reduction and increased financial viability of sugar mills.

This book is a practical desk reference on surplus power cogeneration for practicing engineers and students of heat and power. In fact, engineers in lower and middle management level will find this volume a reliable source of requisite information and of great assistance because the information available on cogeneration plant and machinery is scattered and piecemeal. This book presents a judicious blend and combination of theoretical and practical knowledge relating to formulation of cogeneration scheme and implementation of project. The book maintains focus on highly evolved technologies for maximizing the export of power. The practical data supported with pertinent profuse calculations on related subject, widen scope for better understanding. Cogeneration of power is a vast multidisciplinary subject encompassing steam generating boiler, steam turbine with alternator, water treatment plant, fuel handling system, electrical power distribution, power interfacing to grid & automation.

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This book covers a large spectrum of various subjects involved in cogeneration project such as

- High pressure steam generators
- Steam turbines with back pressure and condensing route
- Surface condenser for steam
- Cooling tower with water circulating system
- Water treatment plants
- Fuel handling system
- Electrical power distribution and export systems
- Automation and instrumentation

The options for selecting the appropriate type of steam turbine working on back-pressure or condensing route has always remained a debatable issue. This book highlights the achievable technical efficiency in each of these routes. Sugar industry being of a seasonal nature, cogeneration through back pressure route is advantageous. The condensing route may be beneficial only when there is sufficient own raw material available as fuel with sugar mill. The process steam for sugar manufacturing is supplied from cogeneration plant when the mill is in operation. Whereas, in off-season, steam for power generation is fully condensed by losing its latent heat of evaporation in the surface condenser by using external source of cooling water. Thus, the loss of energy makes it to operate at very low efficiency.

The selection of boiler steam and process steam parameters is of utmost importance. Cogeneration, though as an independent identity, cannot be ignored that for manufacture of sugar requires process steam and it is a priority. Finally, the author is confident that his efforts will be rewarded only when this book proves to be helpful and is of interest to any engineer to gain clear understanding of technical aspects in executing cogeneration projects.