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Christoph Weber is a Full Professor of Management Sciences and Energy Economics at the University of Duisburg-Essen, Germany. With a background in Mechanical Engineering and a Ph.D. in Economics, his main research interests are in electricity markets, risk and sustainable energy systems, and the use of operations research methods in connection with energy.

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The extensive use of hydraulics and pneumatics to transmit power is due to the fact that properly constructed fluid power systems possess a number of favorable characteristics. They eliminate the need for complicated systems of gears, cams, and levers. Motion can be transmitted without the slack inherent in the use of solid machine parts.

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The ultimate objective of any power system is to deliver electrical energy to the consumer safely, reliably, economically, and with good quality. Operation of the power system requires that proper attention is given to the safety not only of the utility personnel but also of the general public.

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operation of power systems. Part 1 also provides an overview of substation major equipment, explaining the mission, and arrangement of each component. To better understand the importance of electrical substations, let's start with a discussion about the structure of the power systems and their main components. Power System Structure

Major components of the power grid are illustrated in Figure 1 as part of two systems: (1) the bulk energy system consisting of generators and the high-voltage transmission network and (2) the distribution system, which includes the network of local lower-voltage power lines that deliver electricity to our homes and businesses.

(2) (power system device function numbers) A relay that functions when the circuit admittance, impedance, or reactance increases or decreases beyond a predetermined value. (3) A generic term covering those forms of measuring relays in which the response to the input quantities is a

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An electric supply system consists of three principal components viz., the power station, the transmission lines and the distribution system. Electric power is produced at the power stations which are located at favourable places, generally quite away from the consumers.

ing of power plant fundamentals as they relate to electric power system gen-eration. The reasons for using very high voltage power lines compared to low-volt-age power lines are explained in Chapter 3. The fundamental components of x PREFACE fpref.qxd 10/10/2007 4:51 PM Page x

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