CHAPTER 1

Introduction

1.1 BACKGROUND

The Western Area Power Administration (Western) delivers reliable, cost-based hydroelectric power and related services within the central and Western United States (U.S.). Western is one of four power marketing administrations within the U.S. Department of Energy (DOE), whose role is to market and transmit electricity from multi-use water projects. Western's transmission system carries electricity from powerplants operated by the U.S. Bureau of Reclamation (Reclamation), U.S. Army Corps of Engineers (USACE), and the International Boundary and Water Commission (IBWC).

Western's service area covers 1.3 million square miles, and its wholesale power customers provide service to millions of consumers in 15 Western states. Western operates and maintains more than 16,800 miles of transmission lines from its four regional offices in Billings, Montana; Phoenix, Arizona; Loveland, Colorado; and Folsom, California. Western markets power from these regions and its Colorado River Storage Project Management Center in Salt Lake City, Utah. The Sacramento area is within Western's Sierra Nevada Region (SNR).

The SNR maintains and operates numerous substations and more than 1,200 miles of transmission lines. These transmission lines are interconnected to other Sacramento area utility transmission lines, including those owned and operated by the Sacramento Municipal Utility District (SMUD). By law Western first markets power that is in excess of the Federal project requirements to preference customers, such as Federal and state agencies, Native American tribes, electric cooperatives, municipal utilities, public utility districts, irrigation districts, and water districts.

The Electrical Power System

Electrical power systems consist of four primary elements: generation, transmission systems, distribution systems, and load. Generators convert fuel (for example, water, natural gas, nuclear, wind, sun, or coal) into electricity. The transmission system carries the electricity from the generators to the distribution systems, using high-voltage transmission lines. Transmission systems comprise a complex network across several neighboring states, which allow generators to serve loads hundreds of miles away. Distribution systems deliver electricity to retail customers. The system load is the sum of all power-consuming devices (such as household appliances, lights, air conditioners, industrial loads, etc.) plus system losses. Figure 1-1 illustrates a typical electrical power system.

Voltage

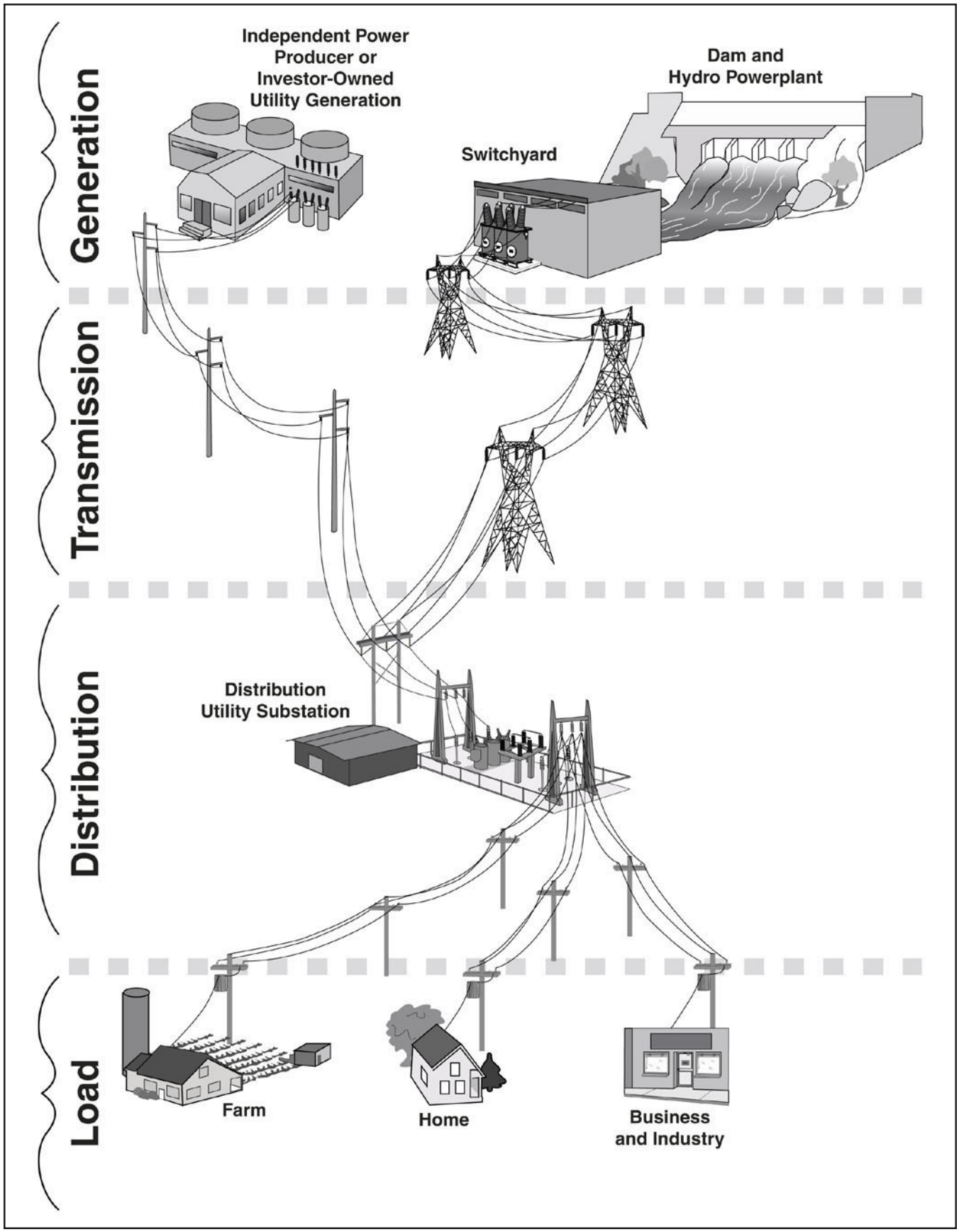
Voltage is the force that causes charged particles to move. The operation of a transmission line is similar to the flow of water through a hose. A generator develops voltage to put into the transmission line similar to the way a water pump develops water pressure to put into the hose. Voltage, like water pressure, is "a force." The transmission line or hose serves as the conduit for delivery of the resource to the user. The size of the transmission line conductor (wire) or the hose is the limiting factor in the delivery system regardless of the force applied. The length of the transmission line may also affect the amount of electricity that can flow through it. Electrical losses in a transmission line occur because some of the electricity's energy escapes in the form of heat. Longer transmission lines will generally have more losses. Likewise, the water pressure at the end of the garden-hose would be considerably less than the pressure directly at the faucet.

Load

Load is the amount of electric power delivered or required at any specified point or points on a system. Load primarily originates at the energy-consuming equipment of the customers (for example, lights, heating and cooling systems, and electrical devices).

Voltage Sag

Voltage is influenced by load. As load decreases, voltage tends to increase at the load. Conversely, as load increases, voltage tends to decrease at the load. When load exceeds generated power or transmission capacity, voltage "sag" occurs. As it sags, voltage can be compensated by adding generation (adjusting turbines and gates to increase production) using capacitors, adjusting transformer taps to "fine tune" voltage levels, or creative dispatching (rerouting electricity). Ideally, these measures quickly restore voltage to normal levels; however, load shedding or rotating blackouts may be necessary in some cases to avoid system wide collapse.



Source: Original May 2002
Note: Depiction of transmission is illustrated as single circuit

Figure 1-1. Diagram of a Typical Electrical Power System.

Western sells wholesale electricity to more than 70 customers in central and northern California and Nevada as part of the Central Valley Project (CVP) and the Washoe Project. Much of that power is allocated and delivered to five large customers: SMUD, Silicon Valley Power, and the cities of Redding, Roseville, and Palo Alto.

Western has prepared this Sacramento Area Voltage Support (SVS) Draft Environmental Impact Statement (EIS) in compliance with Federal laws, regulations and guidelines, principally the *National Environmental Policy Act* (NEPA), the Council on Environmental Quality (CEQ), *Regulations for Implementing the Procedural Provisions of NEPA* (40 CFR Parts1500-1508), the DOE NEPA Implementing Procedures (10 CFR Part 1021), and other applicable regulations.

1.2 VOLTAGE SUPPORT

Voltage support consists of elements of the electrical power system that help sustain or keep the electrical system operating to meet the long-term load demand. These elements include additional generation (new power sources—especially those at or near the load), increased transmission capacity, and improved system equipment.

Population growth and land development in the Sacramento area have steadily increased load demand for electric power. The increased demand has reduced the security and reliability of the interconnected transmission system. Security refers to the ability of the electric system to withstand sudden disturbances, such as electric short circuits or unanticipated loss of system elements such as a substation. Reliability is the assessment of the frequency, duration, and magnitude of interruptions for a given power system. The power system security and reliability problems became evident to California residents as rolling blackouts hit the state in 2001. Although a lack of generation was the major cause, increased demand on the interconnected electrical transmission system played a part in blackouts. Increased transmission capacity, therefore, must be part of any long-term solution.

Power system studies conducted by the Sacramento Area Transmission Planning Group (SATPG) and the River City Transmission Group (RCTG) concluded that transmission additions in the Sacramento area are necessary to alleviate voltage sag and ensure power system reliability. Results of the first phase of the SATPG study indicated that construction of a new 230,000-volt (230 kilovolt [kV]) circuit could provide short-term (3 to 5 years) system support to the region (SATPG 2000). The study concluded that long-term solutions (greater than 5 years) for area transmission security must also be developed. These solutions must include options to construct additional local generation or 500-kV transmission lines. Conclusions from the RCTG draft report also supported the need for additional transmission infrastructure to meet load growth and to provide for future generation (RCTG 2002-Draft). Appendix A presents the alternatives development for the SVS EIS.

This Draft EIS analyzes environmental impacts of the Proposal Action and alternatives identified for improvement of electric system reliability and voltage support for the Sacramento area. Findings from this Draft EIS will provide a basis for decisions on whether to proceed and, if so, how to proceed. Western would implement appropriate solutions under its *Reclamation Law* authority.

1.3 PUBLIC INVOLVEMENT

Public involvement is a vital part of the decision-making process for this SVS EIS. Western developed a public involvement program to provide multiple opportunities for comment during the SVS EIS process of public scoping, alternative formulation, alternative evaluation, and decision-making. The program is intended to guide Western through a collaborative, systematic, decision-making process with four primary purposes:

- Share information with the interested public.
- Gather information from the public.
- Identify public concerns and issues.
- Develop and maintain credibility.

The public participation process was designed to heighten public awareness and to encourage open communication throughout the development of the SVS EIS. The process was designed for flexibility and responsiveness to the issues and needs of the public, Western's customers, and public agencies. Appendix B provides a detailed description of the public involvement process.

1.3.1 SCOPING

During the period of September 12, 2000 through September 21, 2000, Western's SNR conducted a series of four scoping meetings in Lodi, Marysville, and Folsom, California. Public scoping comments were collected from August 8 through October 2, 2000. Appendix B includes a summary of the scoping comments.

1.3.2 Public Workshops and Hearings

Western held two public workshops (March and September 2001) to address public comments on the selection of alternatives under consideration. Western plans to hold three public hearings after the U.S. Environmental Protection Agency (EPA) publishes the Notice of Availability (NOA) for the Draft SVS EIS. The public hearings are scheduled to be held prior to the conclusion of the 45-day public comment period.