DATA BASE DESCRIPTION AND RESEARCH METHODOLOGY
UDI WORLD ELECTRIC POWER PLANTS DATA BASE

The UDI World Electric Power Plants Data Base (WEPP) is a global inventory of electric power generating units. It contains ownership, location, and engineering design data for power plants of all sizes and technologies operated by regulated utilities, private power companies, and industrial or commercial autoproducers in every country in the world.

The WEPP is maintained and re-issued on a quarterly basis by the UDI Products Group of Platts, the energy information division of The McGraw-Hill Companies, Inc.

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DATA BASE HISTORY AND FORMAT

The first WEPP precursor was a U.S. utility-owned power plant data base started in 1978 at the Atomic Industrial Forum, a trade association based in Washington, DC, with joint funding from the U.S. Department of Energy and the Utility Water Act Group (UWAG), a power company advocacy organization. Overseas power plant data collection began in 1984 and the first international plant directory was published in 1990. The first stand-alone data set with essentially the current structure was published in March 1998.

The WEPP is sold as a flat data file in DBF (dBase III) format. The file can imported into Access or other data-management software by specifying "dBase" as the file type. Due to the size of the complete generating unit file, it will not completely load in older Excel spreadsheets. Separate regional subsets with identical field structures have been created: these can be used directly in all Excel versions.

DATA FILE DIRECTORY

The WEPP data file directory (DFD) is maintained as a separate document. This includes field names, types, lengths, and a brief description of field content.

DATA BASE ORGANIZATION

Information in the WEPP Data Base is included at the company, plant, and unit levels. Company data include the company name, electric type, and business type (see next section). There are three electric types:

U = regulated utility, also includes much of the electric generating capacity owned by national or local government ministries, agencies, and departments

A = autoproducer, an industrial or commercial enterprise generating its own electricity typically without off-site energy sales, although the facility may be grid-connected (autoproducer generators are also known as inside-the-fence or captive power plants)

P = private, independent power plant (IPP), or merchant plant developer, also includes utility-built capacity sold to third parties

Plant location data include the city, state or province, country, geographic area, and subregion. Most territories and other dependencies are treated in the data base as separate countries. For plants in North America, the North American Electric Reliability Council (NERC) region is listed as the sub-region.

Unit data include unit name, operating status, capacity (MWe), year-on-line, primary and alternate fuels, equipment vendors for the boiler (or reactor), turbine and/or engine, and generator/alternator, steam conditions, pollution control equipment, and cooling system

data. Boiler firing configuration or boiler type plus turbine or engine type or model number are provided where known.

Mechanical-drive steam turbines, gas turbines, and reciprocating engines are not included in the WEPP, nor are central heating plants without electricity output, power generating equipment on offshore oil and gas production platforms, and most short-term rental units.

> *Due to the difficulties involved with plant- and unit-level information collection and compilation, data base coverage for wind turbines, diesel and gas engines, photovoltaic (PV) solar systems, fuel cells, and mini- and micro-hydro units is considered representative, but is not exhaustive in many countries (also see below under "Small Plants and Distributed Generation.")*

Reciprocating (IC) engines or gas turbines identified in primary sources as "emergency," "standby," "backup," "temporary," or "black-start" are included where data are available. Status for these machines is generally shown as OPR (operational) even though they typically operate for load very infrequently. Some temporary plants have stayed in service for years.

Residential-scale electric power plants, typically PV or micro wind turbines, are usually not listed although larger-size housing development (housing estate) PV installations are included in aggregate where data are available. Also, most PV systems in remote telecommunications applications are not included.

The WEPP Data Base includes all other known electric power plants with data for deactivated, retired, and cancelled generating units included as available.

UNIT CONFIGURATION AND CODING CONVENTIONS

With some exceptions as noted below, the WEPP Data Base includes information on a generating unit basis whenever possible. A "unit" may be termed a set, block, aggregate, or section in other sources. Unit names in the WEPP are unique.

- ✓ For typical steam-electric plants, a unit is comprised of a steam generator (boiler or reactor), a steam turbine (the prime mover), and a generator. In cases were a series of boilers are connected to a common steam header, the unit designations are applied to the prime movers and the boiler-related data are assigned to the unit records as appropriate. In some instances, a single boiler or reactor drives two identical turbine-generator (T/G) sets. In an analogous situation, two identical steam-electric boilers may drive a single T/G set. In each case, there is a single unit record posted in the data base.

- ✓ For simple-cycle gas turbines, a unit consists of the gas turbine (GT) and generator. Note that *gas turbine* (gaseous fuels) and *combustion turbine* (liquid

fuels) are considered synonymous in the data base. Pairs of gas turbines driving single generators are not identified by a separate UTYPE designation and this machine configuration is considered a single unit.

✓ Combined-cycle units, cogeneration units, and combined heat-and-power (CHP) units typically add a fired or unfired waste heat recovery steam generator (HRSG) behind a gas turbine. The HRSG may in turn drive a steam turbine or may only generate process steam or heat for heating or industrial applications. HRSG supplier is usually not be listed unless there is steam production for a steam-electric turbine-generator set (also see below under “Capacity Rating,” “CHP and Cogeneration,” and “Repowering”).

✓ Combined-cycle units are typically built in configurations abbreviated as 1+1, 2+1, 3+1, 3+2, or 4+1. The 2+1 configuration, for example, includes two GTs each followed by a single HRSG with the two HRSGs supplying one steam T/G set. Gas turbines and steam turbines in combined-cycle are shown with UTYPE of GT/C and ST/C, respectively, and data for each prime mover are listed separately where data are available. Single-shaft combined-cycle units have a gas turbine and a steam set driving the same generator and are given their own abbreviation in the data base (CCSS).

✓ In hydroelectric plants, a unit is considered to be a hydraulic turbine and a generator. If two turbines drive a single generator, this array is considered a single unit.

✓ For internal combustion (IC) units (reciprocating gas and diesel engines), a unit is an engine and a generator/alternator. In many cases, waste-heat is taken off IC engines for district heating or other purposes (cogeneration), and, in a few cases, this is used to generate steam and drive steam-turbines in combined-cycle. Both instances are coded separately. In some cases where large numbers of identical, containerized engines have been installed, these may be listed as a single “unit” with the number of engines indicated.

✓ For micro-turbine plants, the "unit" record consists of same-model gas turbines installed at the same time. If known, the number of machines is indicated in the unit name (for example, MICROTURBINE PLANT GT 1-12).

✓ For wind energy plants, the "unit" record consists of wind turbine generators (WTG) of the same model installed at the same time. If known, the number of machines is indicated in the unit name (for example, WIND PLANT WTG 1-8). There are frequently series of WTGs of different size, design, and ownership installed at the same site and these are usually listed separately (also see below under “Power Producer Names.”).

✓ Photovoltaic (PV) plants and fuel cells (FC) are also not unitized although

installations of different vintage or with different suppliers may be listed separately. The generating capacity of PV power plants is peak electric output (kWp).

POWER PLANT NAMES

Many power plants have both formal and informal names, the former may be a person's name, for example, while the latter is the name of the plant locality. The WEPP usually uses the formal plant name, but may indicate another name in common usage. Where specific unit names are not available, geographic location is most often used to name the plant for inclusion in the data base. To the extent possible, the plant name in the local language is used. Plant names in the WEPP are unique and addition of a location or an operator acronym as part of the plant name is required when there are multiple occurrences of the same plant name.

Plant names in the data base may change in a variety of circumstances: when the operator changes the name, to clarify distinctions between similar plants, to preserve the plant’s unique identification in the data base, or to more closely align nomenclature with primary source documentation

For the designation of individual units at a given power station, power companies may use a unit numbering scheme (1, 2, etc.), an alphabetic scheme (Block A, B, etc.), Roman numerals (I, II, III, and so on), or various combinations of the same. Letters are often used to indicate the development of new unit series at existing sites -- Plant "A1" and "A2" followed by Plant "B1" or such schemes as Plant "One", Plant "Two", Plant "New", Plant-1, Plant-2, etc. Some countries use both a letter designation (indicating a fundamental change in design) and a sequential unit numbering scheme.

Unit numbers in the WEPP are preferentially those assigned by the plant operator to the prime movers or are assigned to the prime movers on a sequential basis. The decision to combine unit records at a particular site may be somewhat arbitrary. In general, physical proximity of plant infrastructure or shared common facilities such as cooling water structures or switchyards suffices to group units of different vintages at the same site. Note that in some cases, units are split into separate sites due to different ownership. Unit-level assignments to plant records can and do change over time.

If precise, unit-level data are not available, but a particular number of units are known to be in service, this is shown as, for example, PLANT NAME 1&2. Plant data are unitized whenever possible with the exceptions noted above.

Absence of a unit designation indicates that it is not known whether the generating capacity shown represents one or more than one individual unit. In some cases, research has established the presence of existing capacity of unspecified configuration to which new equipment has been added. In these instances, the original plant record may be shown as PLANT NAME (A) or PLANT NAME (B) (depending on the vintage of the unspecified block) with the plant extension shown in unitized form PLANT NAME 1,

PLANT NAME 2, etc.

Industrial power plants are often shown with FACTORY, PLANT, MILL, REFINERY, WORKS, etc., as part of the plant name.

By convention, gas turbine unit names in the data base usually include the designation "GT", steam turbines in combined-cycle show "SC" prefixes, diesels show "IC", fuel cells have "FC", photovoltaic systems show "PV", waste-to-energy plants show “WTE,” and wind turbines "WTG". Some hydroelectric plants include “HY” as part of the unit name.

With very rare exceptions, periods and commas are not used in WEPP company or plant names. International lettering is never used.

POWER PRODUCER NAMES

Where possible, the full name of utilities, autoproducers, IPPs, or other plant operators are used. Otherwise, names are abbreviated to fit data base coding conventions.

The decision to list multinational operating companies as one company or as separate companies is made on a case-by-case basis. With the proliferation of overseas investments by large groups, the trend has been towards uniquely identifying subsidiaries or affiliates operating in various countries or regions.

Many wind turbines – particularly in Europe – have been installed by individuals or local associations as part of larger installations. In the WEPP Data Base, these may be “rolled-up” into plant-level operating entities.

In addition to wind turbines, mini- and micro-hydroelectric plants, and diesel engines are often installed by individuals or small private companies of various kinds. If the specific identity of the owner cannot be established, the operating company may be shown as “XXX Hydro Project,” “XYZ Plant,” and so on. Plants with unknown or unassigned operators are shown with operator name “ZZ/UNIDENTIFIED.”

CAPACITY RATINGS

The WEPP capacity value is preferentially gross megawatts electric (MWe). In many cases, no defined value is available so the data base includes whatever value is included in the primary source documentation. Capacity ratings are poorly standardized across the industry, frequently differ from source to source, and can and do change with some frequency.

If re-rating data are available after a unit is modernized or otherwise modified, new capacity values are entered in the data base without making any changes to service year or suppliers (also see below under “Repowering”.)

SERVICE DATES

Unit-specific data obtained from power companies or other primary sources are used to establish the year of commercial operation for individual units.

In cases where only main equipment order dates are available for larger steam-electric and hydraulic units, the data base has a year-in-service date of three years after the order date. For gas turbines, the data base uses a two-year construction duration estimate. For engines and small hydro units, service year is assumed to be order or delivery year.

The year-on-line value in the WEPP data base can change by direct survey or by the use of data from other primary sources obtained after the initial data base record was created. For new projects, or recently-completed projects, the service year is often difficult to establish and “completion” of generating units as shown in the data base may lag actual operation by one or more years.

PLANT RETIREMENTS

One of the most difficult aspects of the research involved in maintaining the WEPP Data Base has to do with the status of older generating units. It is not uncommon for hydroelectric units to run for 70 years or more, basically with the original equipment. Many steam-electric units have run for over 50 years and, depending on loading and other factors, diesel engines and gas turbines can remain operational for many decades.

Changes in power plant operating status are often not publicized and, if announced, the actual situation may remain obscure. For example, the phrases “decommissioned,” “deactivated,” and “shutdown” are used interchangeably by power companies and the trade press alike. Even plants that have been formally retired may come back into operation and it is only when a plant is demolished or the generating equipment scrapped that the facility can be said to be definitively removed from service.

Some older units in the WEPP Data Base are shown with status of UNK (unknown). There is a good likelihood that these units are now offline, but more definitive information is not yet available. There are also many instances where the unit status is shown as OPR or STN and yet the plants are in fact offline, either temporarily or permanently. As with other fields in the data base, when new status information becomes available, the records are updated immediately.

NEW PROJECTS

Traditionally, the construction of large power projects in fully-developed economies was driven by requirements to replace older plants and meet load, thus imparting a cyclical nature to the deployment of new plant as large-capacity units were added in step-wise fashion. In developing countries, the construction of new power plants is generally driven

by rapid increases in load growth, driven by overall economic development, and the availability of funding.

More recently, shifts in the cost and availability of fuel and local or national political policy directives have been added as key drivers for new plant construction and the plant size and technology mix has shifted in many markets. It has become increasingly difficult to establish the boundaries of the sequential construction cycles as larger integrated markets are formed (as in Europe, for example) or as new policy imperatives come to the fore (climate change initiatives being the most prominent at present).

The decision to include new power projects in the WEPP Data Base is important for users and the decision to add a new project to the file is made on a case-by-case basis. Key determinants in approximate order of importance are: 1) order placement for generating equipment or engineering, procurement, and construction (EPC) services, 2) the status of licensing or permitting activities, 3) the availability of fuel or transmission access, and 4) funding. Projects may also be included even if authoritative data is lacking if there are generalized national or regional policies that are driving power plant development.

A topic of interest to many users is the year of expected operation of new generating resources. The number of projects cumulatively proposed for a particular year is always less than the number of projects completed, and this is true irrespective of unit size or technology. Just as many announced projects are never completed, it is often the case that the expected year of operation at the time when a project is announced slips forward in time, although plants are also completed ahead of schedule. There are many data base records where the year-on-line is blank, indicating that no reliable completion estimate is readily available. Schedules naturally firm as permitting is completed, equipment is ordered, and construction starts. This makes data for the near-term (3-5 years) more reliable that data for plants expected online in out-years.

Another factor to consider is plant size and technology. Larger projects have longer lead times, and thermal, nuclear, and hydroelectric plants have longer lead times than plants using technologies allowing for a larger amount of modular fabrication and assembly, such as gas turbines and IC engines. This allows for somewhat more calibration of expected service dates for larger, more complex projects as opposed to small thermal, hydro, or renewable plants.

ABBREVIATIONS FOR VENDORS AND DESIGN DATA

By some measures, electric power is the world’s largest industrial sector. This is reflected in the very large number of companies that supply equipment and services to power companies. Advances in technology and changing policies have likewise resulted in a proliferation of fuels and electric energy production techniques.

Over 25+ years of operation, data base coding and abbreviating conventions have

naturally been modified and necessarily expanded to reflect this industrial diversity and the WEPP List of Abbreviations now has nearly 7,000 entries. The list is reissued each quarter and included with the data base documentation.

To the extent possible, the original vendors are indicated irrespective of whether the companies exist today with that nomenclature. In some cases, predecessor companies are indicated in the List of Abbreviations.

There are numerous instances where the original equipment manufacturer (OEM) is not the actual equipment supplier *per se*, for example where diesel or gas engines and gas turbines are packaged by a third party. This more often tends to be the case with smaller machines. If possible, both OEM and packager are indicated.

Another complication is the fact that many large power generation components are manufactured by a consortium of companies. In an analogous situation, there are often multiple engineering and construction contractors working on large thermal, nuclear, and hydroelectric projects. In both cases, complicated abbreviations may be required to identify the major participants. Note that the actual proportion of material or other resources supplied to a particular project cannot be estimated from any data in the WEPP. Furthermore, the contents of the various supplier data fields can change over time as new information becomes available.

CHP AND COGENERATION

Combined-heat-and-power (CHP) and cogeneration power plants have been built in large numbers around the world. (These terms are essentially synonymous in common usage and CHP is used hereafter.) CHP facilities are difficult to accurately portray in the WEPP Data Base. In part, this has to do with complications associated with the characterization of the fuels used in CHP plants and in part due to complex engineering and energy flow processes associated with CHP applications.

The CHP concept revolves around the additional utilization of recaptured heat energy derived from the combustion of fossil fuels that would otherwise be dissipated to the atmosphere or to condenser cooling water. This so-called waste heat can be used to generate steam and/or heat water, or used as-is for specialized drying or heating applications in industrial processes.

Steam is also often taken off back-pressure and extraction steam turbines for use in CHP applications (UTYPE = ST/S). The steam so removed may be used directly for industrial purposes or for heating. Waste heat is also derived from the exhaust of gas turbines which is passed through an HRSG to generate steam for a steam T/G set (GT/C) or through some other type of heat exchanger for hot water production, absorption chillers, feedwater heating, desalination, or other applications (GT/D, GT/S or GT/T).

The HRSG may include supplementary firing capabilities from its own burners which can generate steam above the quantity otherwise allowed for by the GT exhaust (so called fired HRSGs, BOILTYPE = HRSG/F). In almost all instances, fired HRSGs burn natural gas in which case ALTFUEL = NONE. In some cases, specialized waste gases are used for supplementary firing, in which case ALTFUEL may be another fuel type. Until 2004 or so, the supplier of HRSGs for non-combined cycle, gas-turbine based CHP plants was not included in the WEPP data base. Subsequently, this information has been added on an as-available basis.

Many smaller CHP plants use liquid-fueled or gas-fired internal combustion engines (IC, also termed reciprocating engines). In this case, there is less waste heat available and the heat is of lower quality. Heat is typically recaptured from the engine jackets using heat exchangers which then supply hot water for district heating. Almost all the IC-based CHP plants in the WEPP are coded with UTYPE = IC/H. There are a growing number of engine-based, combined-cycle plants. These have large engines and small T/G sets reflecting the lower quality waste heat available. The waste heat from turbine or engine exhaust can also be used as-is for drying and specialized heating applications.

SPECIAL FUELS AND GENERATING TECHNOLOGIES

One of the most important “special fuels” used for power and heat generation worldwide is municipal sold waste (MSW). Millions of tons of MSW are produced each year consisting of a mix of recyclable, combustible, and inert materials. Processed or unprocessed MSW and similar industrial or commercial wastes are used as fuel for energy production in waste-to-energy (WTE) power and heating plants. The WEPP data base has information for approximately 500 operating WTE generating units with electricity output. WTE plants that supply thermal energy only (as steam or hot water) are not covered in the data base.

WTE power plants are essentially of conventional steam-electric design, but there are some notable differences from standard plants. All new WTE plants in OECD countries must meet particularly comprehensive emission standards and so modern WTE power stations are both technologically complex and very expensive to build and operate. Typically, the back-end emissions control systems are elaborate featuring multiple particulate collectors, various types of dry or wet scrubbers for acid gas control, selective catalytic converters (SCR) or other NOX control devices and, increasingly, activated carbon filtration for mercury controls.

Fuel handling and incineration is also complicated. In many cases, one supplier will build the actual incineration equipment and a second supplier will make the steam generator (boiler). There are many different combustion methodologies used, some on an essentially experimental basis. Mass-burn plants using unprocessed MSW are by far the more common. Refuse-derived fuel (RDF) is processed MSW and offers uniformity in sizing and heat content. For various reasons, RDF plants have not been widely deployed. WTE plants use stoker grates, fluidized beds, fixed and rotating kilns, and other more

exotic combustion techniques.

On the electric side, WTE plants tend to be small in terms of electric output and use low pressure and temperature equipment. T/G sets are of otherwise conventional design.

One other notable feature of WTE plants is the frequent requirement for updates or expansion to the combustion process (organized in “lines”) or other plant elements due to hard usage with corrosive materials and changes in legal requirements. This requires proportionately higher investments than for almost any other type of power generation facility.

Useful waste heat flows (i.e., of sufficient volume to support power generation) may result from exothermic or other industrial processes in the metals, chemicals, or other heavy industries. For electric power production in these instances, the hot gas flows are passed through an HRSG and then used to make steam for a steam T/G set as in the example above. In these cases (relatively few), the only WEPP record is the steam T/G set and the actual “fuel” (that is the actual industrial process resulting in waste heat production) is not listed.

Note that some lower-grade heat sources can be utilized for electricity production using a so-called organic Rankine energy converter (ORC). These use a heat-exchange medium other than water and can be placed at such locations as natural-gas pipeline compressor stations. Such devices are also commonly used for small geothermal installations. Individually, most ORC installations have small electric output, but the devices may be ganged together into larger installations.

After a long hiatus, development has been re-started on solar collector and solar tower facilities for electric power production. These plants use large fields of trough collectors or mirror fields to concentrate solar energy on receptor tubes filled with a working fluid. The high-temperature liquid is then used to generate steam in a heat exchanger unit and in turn, the steam is used in a conventional steam turbine. In most cases, supplementary firing with natural gas is used to maintain even heat flows.

REPOWERING

Main generating equipment and ancillary systems may be reused for the development of new generating capacity at existing power plant sites. Due to the variety of different approaches in use, this activity is difficult to portray accurately in the WEPP Data Base and the unit coding scheme has evolved over time.

For thermal plants, existing steam-electric turbine generator sets may be partially or completely repowered. In partial repowering, one or more new boilers or one or more new gas turbines with one or more HRSGs are installed to drive the steam set. The resulting steam flow may also be added to steam from an existing conventional boiler. In either instance, the steam turbine/generator (T/G) set is essentially unchanged and the

WEPP Data Base record for this machine is left with the existing data for year-on-line and steam conditions.

In full repowering, the existing boiler is removed or disconnected from the rest of the steam-cycle equipment and is replaced by one or more new boilers (such as fluidized-bed equipment) or HRSGs. There are then two possibilities for the existing steam T/G set -- the machine is substantially modified during the repowering development or it remains generally as it was before. If, as is usually the case, there have been substantial mechanical or electrical modifications to the existing machine and auxiliaries, the existing T/G data record is “retired” and a new record is added. Sometimes, the data for the steam set is left as-is and the new boiler data is added to the data base record.

The names of repowered plants may include the phrase “RP” or "REPOWER."

A repowering variant is the use of gas turbine exhaust to provide combustion air or to preheat boiler feedwater for conventional steam-electric units. In these cases, most if not all the additional capacity at the plant site is from the new “topping” gas turbine (GT/T), while the benefit to the steam-electric cycle is generally in increased thermal efficiency from the reduction of parasitic electric or thermal load.

For hydroelectric plant repowering, the same general approach is used. In cases where new mechanical and/or electrical equipment is used in existing civil works, the old unit records are retired and replaced by new records. The names of the new records typically include the phrases "NEW" or "REBUILD". If existing machinery is refurbished but otherwise left largely unchanged, the existing supplier data is maintained as-is and only the unit generating capacity is changed if need-be.

SMALL PLANTS AND DISTRIBUTED GENERATION

For much of its existence, the development of the electric power business has been characterized by the steadily increasing size of deployed generating units, a process continuing to this day with wind turbine generators and more esoteric renewable power generators such as wave generators. In part, this is due to the increasing manufacturing and engineering capability of the industry and in part to perceived economies of scale in power plant construction and operation. Nonetheless, from the beginning of large-scale deployment of new plants and through to the present day, tens of thousands of small thermal and hydroelectric power generators have also been built, particularly in remote locations or for specific industrial or commercial applications. These small facilities are now often termed distributed generation (DG).

Compilation of DG plant data is complicated and time consuming due to their great number and diverse ownership. From the beginning, the WEPP was designed to include information on power plants of any size, but it must be admitted that the true scope of the research for small plants was incompletely appreciated in the early years. The result is that while the data base has a very large number of small units – over 60,000 records are

for facilities under 5 MW – there no way to say what coverage this represents since there is no more complete listing extant.

The expansion and refinement of small plant data in the WEPP is undertaken on a time-available basis. As a general matter, the WEPP commercial customer base is more interested in larger plants, since these facilities spend more in absolute terms on fuel, equipment, and services. That said, it is also true that, in aggregate, small plants are of significant commercial importance, both for their continued capital spending and for the value of their power production in local electrification and diverse commercial activities. Small-plant data in the data base tend to be more complete where they are of more significance, *i.e.*, in smaller countries lacking well-developed centralized power systems.

EQUIPMENT RELOCATION

Not infrequently, IC engines and smaller gas and steam turbines are relocated to different plant sites. In some cases, these new sites are nearby, but in other cases the machinery is sent out of the country. As with repowering, this activity is difficult to track in the data base and the coding scheme has evolved gradually.

For a time, the existing unit records were moved and reattached to their new plant, thereby maintaining the Unit ID numbers (see below). This proved impractical in many instances so the general approach became to retire the existing units and create new records as needed. This also recognizes the fact that relocated machinery is often refurbished to “zero-hours” condition and placed under warranty, thereby becoming new equipment to all intents and purposes.

A NOTE ON CHINA

For some years, the aggregate installed Chinese generating capacity value in the WEPP data base has been well short of the “official” China State Electricity Regulatory Commission (SERC) estimates released on a periodic basis.

The discrepancy cannot be resolved at this time due to the lack of authoritative plant- and unit-level data from China other than that already compiled in the WEPP data base. This means that even if “top-down” data are available from other sources, these data are not usable in the file except for comparative purposes. Further, there does not appear to be any extant plant-and unit-level listing of Chinese generating plants.

There are a number of factors to consider when analyzing the WEPP data for China.

1) Many large Chinese coal-fired plants are built in very short time periods, perhaps 24 months or not much longer. This means that new plants may already be in operation by the time an announcement of government authorization or a construction start is received by UDI.

2) It is known that not all Chinese power plants are formally authorized for construction by responsible central authorities. This makes it likely that numerous large power plants are not recorded for months or even years after completion.

3) English translation of Chinese power plant and power company names is difficult and time consuming and leaves many opportunities for mis-reporting, double-counting, and so on.

4) Joint power plant ownership arrangements are very common in China. These arrangements are complex and change frequently and transactions are often with related companies. In general, an attempt is made to roll-up plants to the largest controlling entity.

UDI continues to work diligently to build and maintain the China power plant data set and plant- and unit-level data are constantly solicited from power companies, suppliers, and others with specialized knowledge of the Chinese power sector.

GEOGRAPHIC INFORMATION

To the extent possible, the formal names or abbreviations for states, provinces, counties, etc., are used according to international standard ISO 3166 and/or usage by the Universal Postal Union. The Statoids website (www.statoids.com) is a comprehensive and useful reference for such geographic data.

As noted, dependencies and territories are usually listed as if they were separate countries. Sub-national political subdivisions are referred to by many names such as state, province, department, canton, prefecture, county, and so on. City, state, and country names are generally anglicized according to common usage.

The geographic information fields are being retroactively populated as research time permits. On occasion, there are wholesale revisions to state or provincial names used in the WEPP Data Base.

POWER PRODUCER BUSINESS TYPES AND CLASSIFICATIONS

The field BUSTYPE includes a primary business classification plus a secondary descriptor. The primary business classifications include COMM, ENERGY, FUELS, GOVT, MFG, SVCS, UTIL OTHER, and UTIL.

The secondary or functional descriptor provides additional details for the power plant operating companies. Under COMM (commercial), for example, are such establishments as greenhouses and hospitals, while MFG (manufacturing) companies include cement and building materials, pulp and paper, metals plants, textiles, and other manufacturing enterprises, ENERGY has coal, oil and gas, and so on. There are approximately 70 different primary plus secondary business combinations represented in the data base.

Note that many utilities that operate in the regulated sphere in their home markets may be IPPs in other countries.

N/A AND NOT APPLICABLE

Throughout the data base, "N/A" is used to indicate "not applicable" in alphanumeric fields. Blanks in alphanumeric fields indicate data are "not available". Blanks in numeric fields may indicate missing data or “not applicable.”

ID NUMBERS

The ID numbers on a company, location, and unit basis are data base counting fields assigned to uniquely identify each entity and do not link to any non-UDI data table or contain any other information. They are fixed once assigned.

DATA SOURCES

Power plant data are obtained from direct surveys, vendor reference lists, power company financial and statistical reports, and the trade and business press. Primary sources such as surveys and materials directly produced by owners, operators, and suppliers are used preferentially:

- ❑ Reliable information on new and existing power plants can often be obtained by direct survey. Unit-specific surveys and queries are sent on a continuing basis to utilities, autoproducers, private-power companies, and suppliers around the world.

- ❑ Annual reports, statistical supplements, web pages, press releases, and other public relations materials provided by power plant operators or equipment and service suppliers are a second primary data source.

- ❑ Experience lists (also termed reference or installation lists) are a third primary data source. Over 300 equipment and service suppliers have provided their lists for use in the WEPP Data Base research and new and updated lists are frequently requested and supplied. Data extracted from the lists are manually cross-checked against existing records in the data base to minimize duplication.

- ❑ Trade and business press sources include clippings from newsletters, newspapers and magazines, papers from professional meetings, and yearbooks and directories. Oftentimes, such references provide only one piece of information for a power plant or generating unit, but these references are usually reliable and timely.

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is gratefully acknowledged.

Any data base corrections or updates are welcome and should be directed to Christopher Bergesen, Editorial Director, UDI Products, in Platts' Washington, DC offices (fax: 202-942-8789; email: udi@platts.com)

LEGAL STATEMENT

The accompanying document entitled ***COPYRIGHT AND DISCLAIMER - UDI WORLD ELECTRIC POWER PLANTS DATA BASE*** is hereby incorporated into this documentation by reference.

The most recent version of any of the WEPP Data Base documentation is always the most authoritative and supersedes all previous versions.

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