Evaluation of Parasitic Load Consumption for a Concentrated Solar Power (CSP) Plant

Relebohile John Ramorakane

Thesis presented in partial fulfilment of the requirements for the degree of Master of Engineering (Mechanical) in the Faculty of Engineering at Stellenbosch University

Supervisor: Professor Frank Dinter

November 2015

Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Date: .....

Abstract

With the continuous development of power plants and desire to build alternative, effective and efficient power plants, Concentrated Solar Power (CSP) plants (and more specifically the Parabolic Trough CSP Plants) have proven to be one of the alternative energy resources for the future. Therefore more emphasis is being put on improving this power plant technology. One of the main challenges facing the management of these power plants is to improve their efficiency by optimising the parasitic load, which is one of the major causes of the plants' reduced overall efficiency.

This project is therefore aimed at evaluating the parasitic load consumption on Andasol 3 Power Plant, which is a 50 MW Parabolic Trough Power Plant with 7.5 hours of thermal storage.

The respective power plant's dossier and power production and consumption data were used as basis for the evaluation. The findings were very interesting and in some cases the findings confirmed what is said in the relevant literature. A number of new findings/observations were also made. These are significant differences in terms of parasitic load consumption during different seasons of the year and times of the day. It was determined that the ratio of parasitic load consumption to generated energy is higher in winter than in summer. It was further found that the parasitic load consumption is greater during the day as opposed to the night. It was determined that the total power plant parasitic load consumption is about 12% in summer and between 16% and 24% in winter. In an effort to improve the power plant's efficiency, a couple of measures to reduce the parasitic load consumption were recommended, and an alternative and cheaper source of parasitic load feeding resources during the day (when the parasitic load consumption is highest) was proposed/recommended.

Acknowledgements

I would like to express my sincere thanks to the Andasol III Power Plant management and more specifically Mr Leopoldo Martinez (Andasol III Power Plant Site Director) for affording us an opportunity to conduct this study on their power plant, and for all the support he has afforded us throughout this project.

A special thanks also goes to my supervisor, Professor Frank Dinter for his unequivocal support in this project and all his eye opening ideas and comments.

I would like to convey my sincere gratitude and thanks to my Employer (Lesedi Nuclear Services) for their undivided support throughout the duration of my studies (for this Mater of Engineering Programme).

I would like to convey my special gratitude to my late parents ‘Mamohapi and Hlolo Ramorakane for instilling in me the importance of education and all the support and guidance they have afforded me; may their souls rest in peace.

Special thanks to my friend, Realeboha Lehobo, for encouraging and persuading me to embark on this Masters of Engineering Programme.

I would like to convey my sincere thanks to my special wife, ‘Manthabiseng Ramorakane for all the undivided support she has always given to me during my studies and in life in general; and to our precious twins, Katleho and Kabelo Ramorakane for having to endure the pain of an absent father, as a result of my studies.

Finally, I would like to thank the almighty God, for putting the pieces together to make everything possible.

Table of Contents

List of Appendices

List of Figures

List of Tables

Abbreviations and Acronyms

CRS:	Central Receiver System
CSP:	Concentrated Solar Power
DNI:	Direct Normal Irradiation, in W/m^2
HTF:	Heat Transfer Fluid
HVAC:	Heating, Ventilation and Air Conditioning
LCOE:	Levelized Cost of Electricity
LFR:	Linear Fresnel Reflectors
NPSH:	Net Positive Suction Head
PV:	Photovoltaic
PTSC:	Parabolic Trough Solar Collector
STP:	Solar Tower Power
TES:	Thermal Energy Storage
VFD:	Variable Frequency Drive

Glossary of Terms

Analysis:	Breaking-down a complex/detailed problem or information into simpler/smaller portions that can be better evaluated
Andasol 3:	Andasol 3 Power Plant
Consumers:	Parasitic load consuming equipment
Energy:	Capacity to do work or total amount of work done, in MWh
Evaluation:	Study and interpretation of data and information in order to come up with a significant output
Differential parasitics:	The difference between the total (overall) parasitic load to the 'selected parasitics'
Grid:	Network of electrical transmission and/or distribution lines
In-house load:	Power plant's systems/equipment electrical consumption
Power:	The rate of doing work or energy per unit time, in MW
Selected parasitics:	A group of selected (main) parasitic load consumers
Total parasitic load:	The overall power plant's parasitic load consumption

1 Introduction

1.1 Project Background

At present there are continuous developments of concentrated solar power (CSP) plants, all in a quest to further develop more efficient CSP plants. The parasitic load of the power plants has been identified as one of the major contributors to the inefficiency of these plants. It is therefore vital to determine and optimise this parasitic load in order to improve the efficiency of the existing plants and/or to develop better CSP plants in the future (Jain, 2013).
From the design stage, the determination of the parasitic load (which is sometimes referred to as in-house load) is one of the important factors that is evaluated in order to determine the dispatchable electric output of the power plant, and hence the profitability and viability of the power plant.

CSP plants, and more specifically the Parabolic Trough type, have lately been considered as the pioneers of the solar power industry because of various reasons which will be discussed in further detail in §2.4.
As the tariff for electricity generated using CSP plants is much higher than the tariff for electricity generated by conventional plants, CSP plants developers at times opt to use electricity from the local grid to satisfy their in-house load requirements during non-operational hours. This study therefore contributes to the importance of knowing the parasitic load of a CSP plant, and that in some cases alternative in-house load power sources might be considered.

1.2 Aims and Objectives of the Project

This project is aimed at providing an evaluation of the parasitic load consumption of CSP plants, with specific focus on the newly developed Andasol 3 Parabolic Trough Solar Power Plant with a thermal storage system for further electricity production without sunshine (DNI).

Then once the applicable parasitic load usage has been corroborated, alternative methods to reduce these loads will be explored, and where feasible, new

improved parasitic equipment (or sub-system) designs or new operational strategies will be suggested.

1.3 Structure of the Report

In order to fully address the requirements of this project, this report has been structured as follows:

- Firstly an overview of the different types of CSP plants is provided and the applicable parasitic loads introduced, and then a thorough literature survey of parasitic load consumption in parabolic trough CSP plants is outlined
- Then the evaluation and analysis of the parasitic load consumption of the Andasol 3 power plant using real measured power plant data is discussed
- Thereafter the findings of the evaluations and analysis are discussed
- Then based on the findings, different ways of minimising the parasitic load by either employing energy efficiency strategies or other innovative methods, are discussed
- Finally conclusions are drawn and recommendations made.

2 Literature Review

In this chapter the background information necessary for a comprehensive understanding of this report and hence Concentrated Solar Power (CSP) Plants in general, is provided. Furthermore, the conveyed background information is focused on the power consumption required during the operation of CSP plants.

There are three main types of CSP plant technologies used throughout the world, but more emphasis will be placed on the parabolic trough type of CSP plants, as this project is aimed at investigating the parasitic load requirements for Andasol-3 CSP plant which uses the parabolic trough technology.

This literature review is therefore broken down into four main sections. The first section will provide an overview of what the parasitic load in CSP plants entails; it is also in this section that the parasitic load impact due to different technologies of condenser cooling systems is studied. Then in subsequent sections the three different technologies of CSP plants, with more emphasis on the typical parasitic loads applicable to these technologies and hence their differences, will be discussed.

After reading this literature review, the reader should have a basic understanding of what is meant by the term parasitic load; what the main parasitic loads associated with CSP plants are; the impact of the employed condenser cooling technology on the total parasitic load; and finally the main technologies of the CSP plants commonly employed as commercial power plants.

2.1 Description of Parasitic Load

Even though Power Stations are built to generate electricity to be despatched to different users at a cost, they also use equipment that requires energy in order to operate, and this energy is predominantly in the form of electrical power; therefore it is evident that for a power station to be economically viable, it has to generate enough electrical power to service its internal processes in addition to the electricity that is despatched to customers. Therefore, the electrical energy

required to service the internal processes of the power station, is normally referred to as parasitic load.

Parasitic load (also referred to as the in-house load) can therefore simply be described as the load consumed by the different categories of the power station's processes, systems and subsystems that are required to keep the power plant running. In CSP power stations, this includes power usage by the main users like the Heat Transfer Fluid (HTF) pumps, and basic users like computers and lights etc. It has been determined that the total parasitic load consumption of a Solar Tower Power plant is roughly 10% of the gross annual electricity (Jain, 2013), and it is also indicated that the Solar Collectors Assembly (SCA) tracking systems are also important parasitic load consumers in Parabolic Trough Solar Power Plants (Jain, 2013).

Apart from the heat transfer fluid pumps which draw about 3.8% to 5.9% of the gross generated energy (Sargent & Lundy LLC Consulting Group, 2003), one of the main parasitic load requirements depends on the type of condenser cooling system/method employed. There are three main types of cooling methods that can be employed. These are described below.

2.1.1 The Wet Cooling System

There are three cooling methods and these include the once-through water cooling method where water is drawn/pumped from a water source e.g. a lake, river or the sea, used to cool the condenser and then discharged into the same source (at a higher temperature). This method is therefore suitable for locations where there is plenty of water. The plants that employ this method tend to be more efficient, and their efficiency is not much affected by change in environmental temperatures, their electrical usage is normally minimal and amounts to about 0.5% of the plant's generated energy (Gauche, 2013). A typical schematic of a once through cooling system is shown in Figure 2-1.

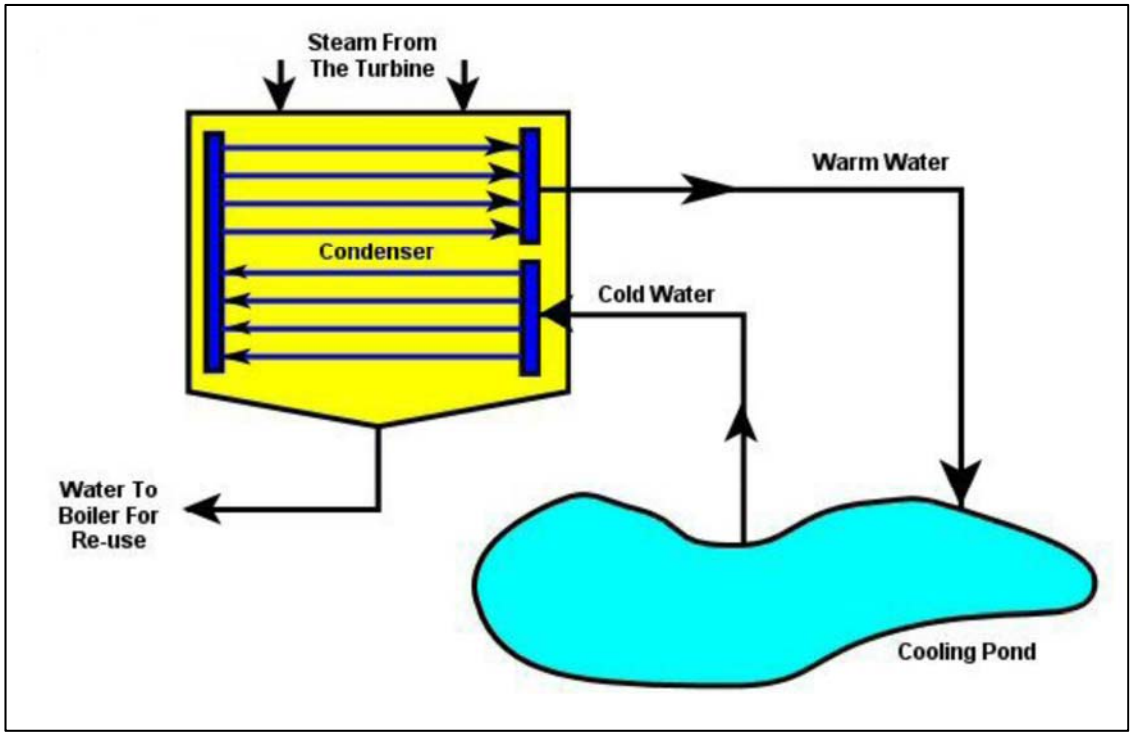

Figure 2-1: Schematic of typical once through cooling method

Then there is the evaporative water cooling method where the hot water is pumped from the condenser to cooling towers where it is then sprayed. The natural draught through the cooling tower absorbs the heat from the sprayed water (and hence evaporates with a fraction of this water) and dumps it into the atmosphere. The energy requirements for this cooling method are fairly high. About 1% of the plant's generated energy is drawn through pumping (Gauche, 2013). This method consumes a significant amount of water through direct evaporation from the cooling towers; it has been determined that about 470 gal/MWh (1779 litres/MWh) of water are consumed through the power station's wet-type cooling methods (U.S. Department of Energy, 2001). 2.5% of the total used water is evaporated (P. Torcellini, 2003) and therefore the choice of this cooling method is also dependent on the availability of water. Figure 2-2 below depicts a typical schematic of the evaporative cooling method.

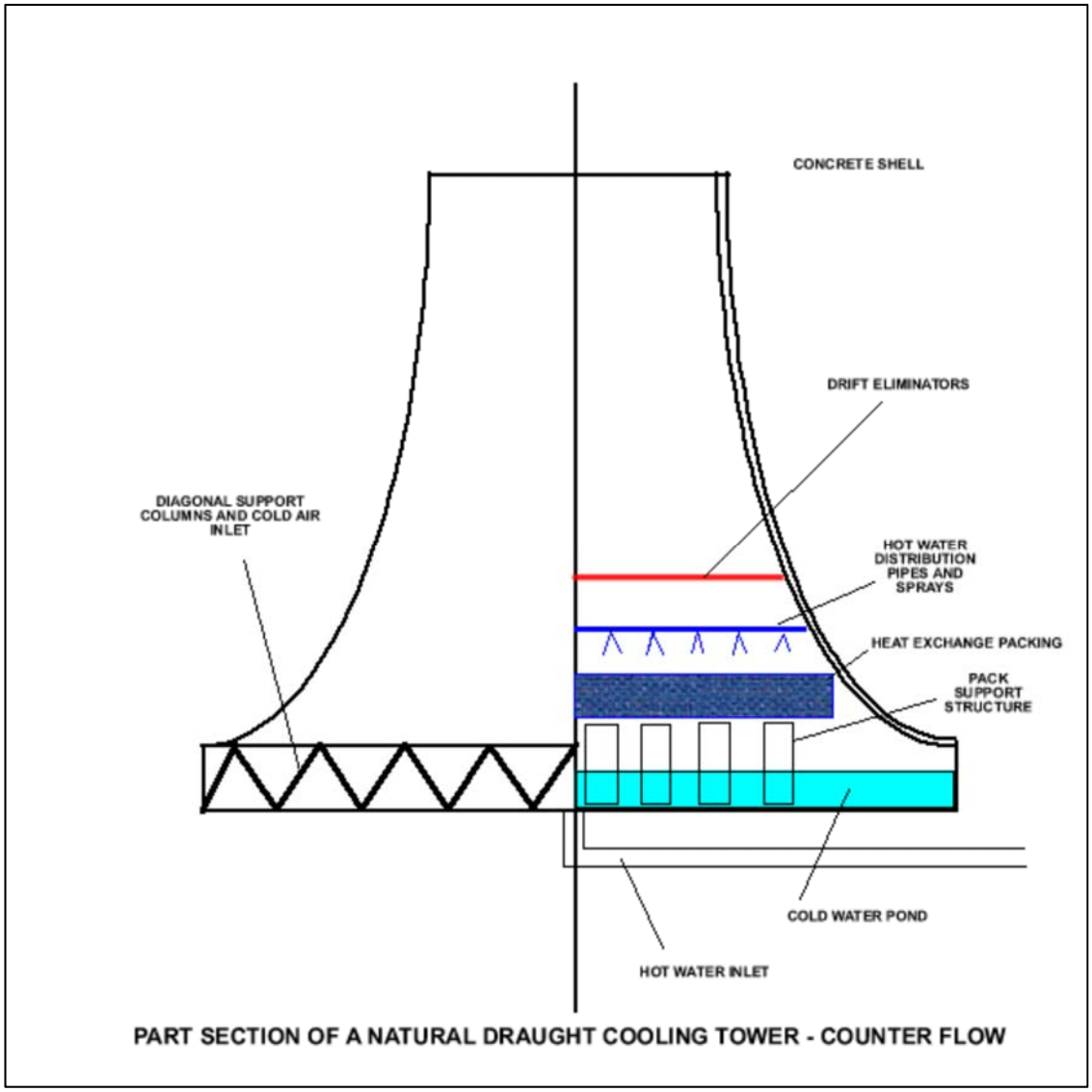

Figure 2-2: Schematic of typical evaporative cooling method

The last type of wet cooling method is similar to the above method i.e. hot water is pumped from the condenser to the cooling tower and back again to the cooling tower (in a continuous cycle), but in addition to this, draught fans are used to cool the water in the cooling towers. This additional equipment (draught fans) consumes electrical energy, so this method obviously consumes more energy than its counterpart. About 2% of the plant's generated energy is consumed (Gauche, 2013). Figure 2-3 is a schematic of an induced draught wet type tower.

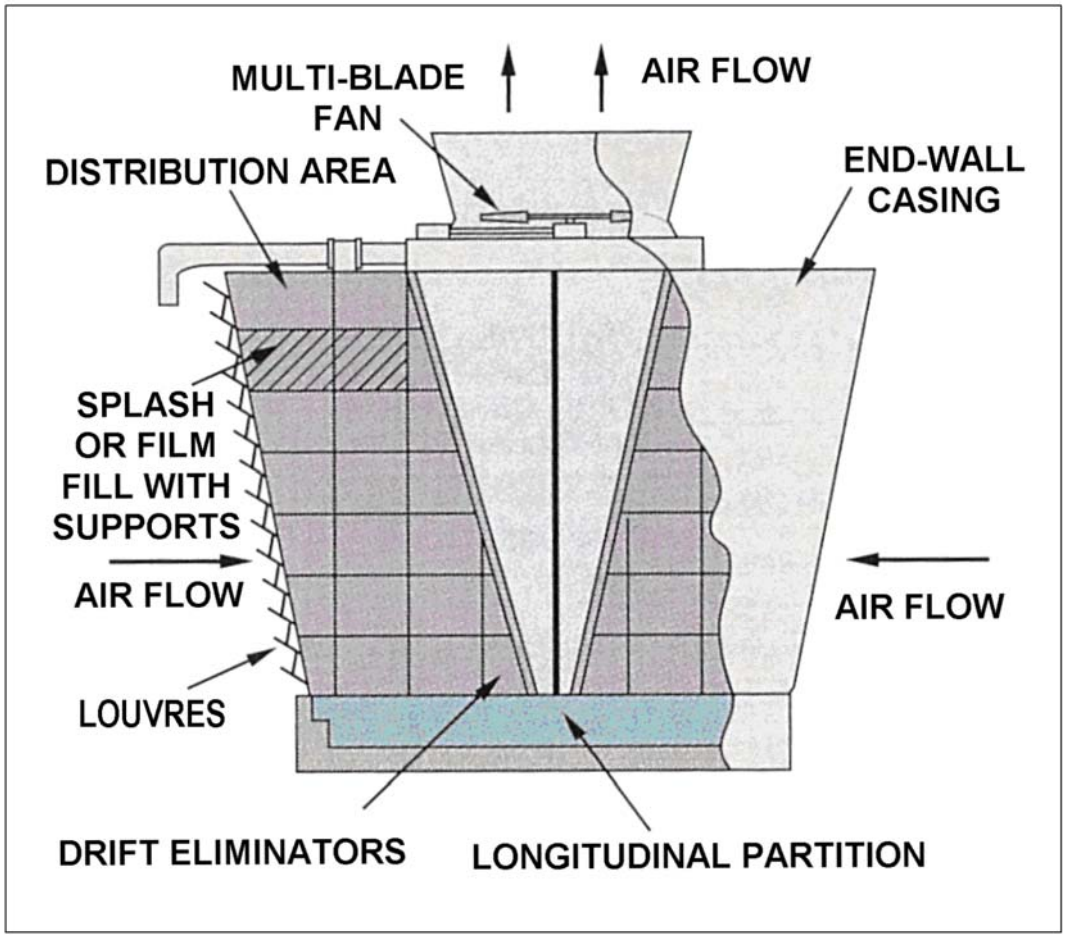

Figure 2-3: Schematic of a cell type induced draught cooling tower (Integrated Pollution Prevention and Control (IPPC), 2001)

2.1.2 Dry Cooling System

The dry cooling system uses the ambient air to cool the steam condensate from the turbine; this cooling can be achieved by either natural draught through the cooling towers or by induced/forced draught using fans. This method uses a minimal amount of water as there is no water lost through evaporation. However its cooling efficiency is not as good as that of the wet cooling methods, and the resultant condensate temperature is normally higher than the ambient temperature by up to about 50 degrees Fahrenheit (about 10 °C) (U.S. Department of Energy, 2001). Hence its cooling effect is dependent on the ambient temperature and thus plant efficiency is lost during hot days and in hot climates. The annual production of Parabolic Trough Power Plants that employ

this cooling method is roughly 5% lower than the annual output of plants that employ wet cooling systems (U.S. Department of Energy, 2001). However the employment of this cooling method is recommended for areas where water is scarce or where there are limitations on its use (e.g. as a result of local legislation).

The main disadvantage of this method is that capital costs are normally very high. The cooling system's electrical consumption is also relatively high (in systems that employ draught fans). The power/energy consumption of this type of cooling system is about 5% of the generated power (Gauche, 2013). The power is mainly consumed by the draught fans, as shown in Figure 2-4.

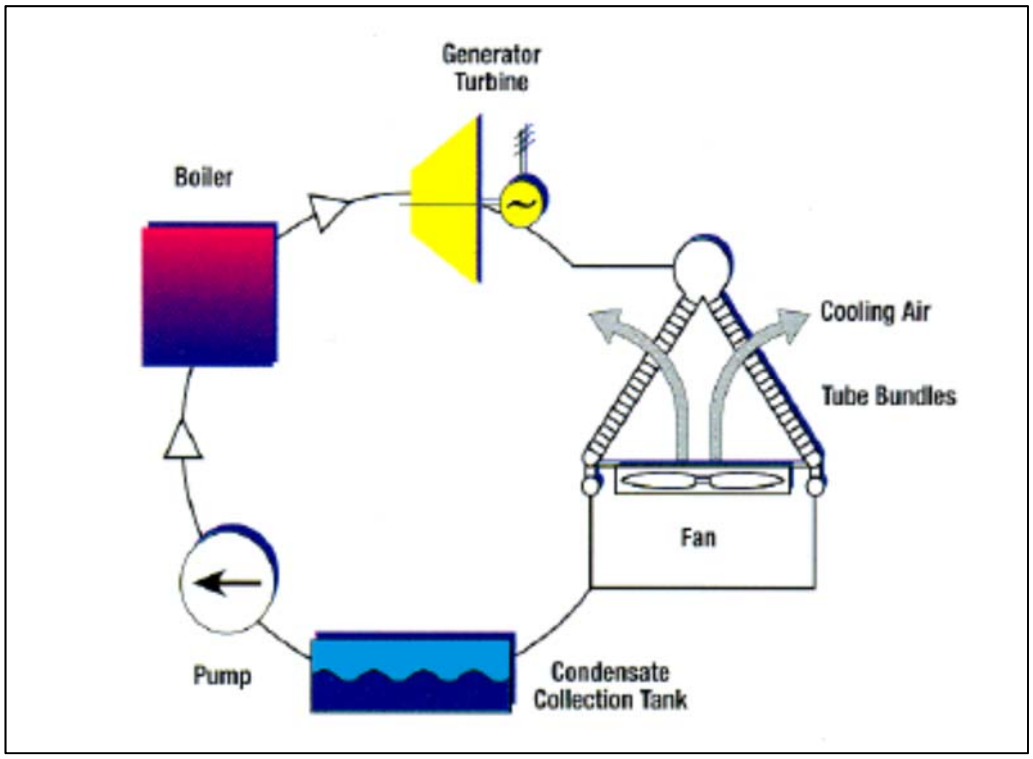

Figure 2-4: Schematic of Typical Dry Cooling Method

2.1.3 Hybrid Wet/Dry Cooling System

The hybrid Wet/Dry Cooling System is, as its name suggests, a combination of the wet and dry type cooling systems, which are basically amalgamated in order in order to achieve a trade-off with regard to the pros and corns of the two main types of cooling system. Some of the reasons why this method is selected is for either vapour plume reduction (as per legislation), where the reduction is necessary so as not to decrease aviation visibility and "to avoid winter icing on nearby roads" (U.S. Department of Energy, 2001) etc. or to minimise water usage.

Due to the fact that CSP plants are normally located in remote, dry places, the main reason why this kind of cooling system is employed in CSP plants is to reduce water consumption relative to wet cooled power plants while concurrently improving the power plant's cooling efficiency and hence its energy production, relative to dry cooled power plants (U.S. Department of Energy, 2001). The hybrid can be employed in different ways. The wet and dry cooling units can either be connected in series, or they can be connected in parallel as per Figure 2-5 below. During normal environmental temperatures i.e. when the weather is not very hot, only the dry cooling system is employed, and on relatively hot days, some of the steam is conveyed to the wet cooling system (which is normally more efficient than the dry cooling system).

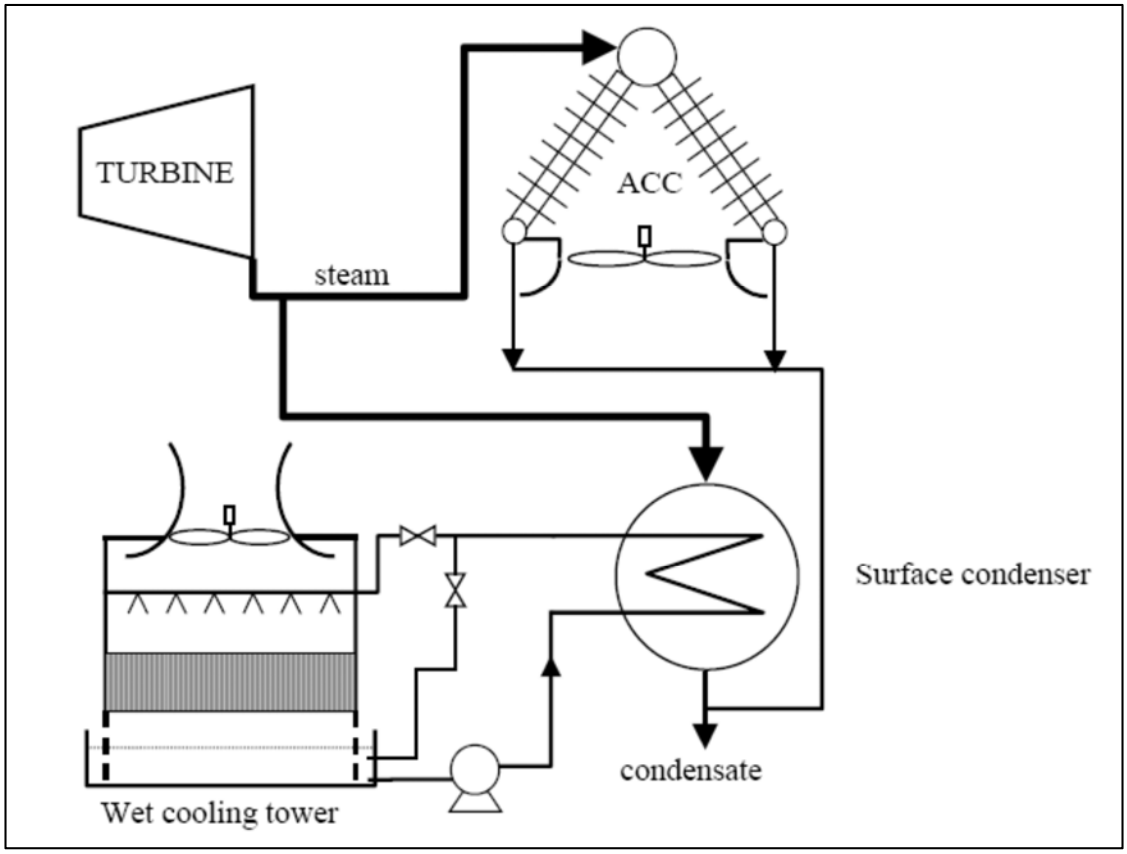

Figure 2-5: Schematic of a hybrid wet/dry parallel cooling system (U.S. Department of Energy, 2001)

The capital cost for this type on installation falls between the cost of a wet-type cooling system and the cost of a dry cooled system (the latter is the more expensive) (U.S. Department of Energy, 2001).

2.2 Central Receiver System (CRS) or Solar Tower Power (STP) Plant

The CRS/STP Plant is a type of CSP plant which consists of a number of reflectors/mirrors termed heliostats, which surround the solar tower, and these heliostats are employed to concentrate solar energy on the elevated central receiver at the top of the tower (it thus employs the point focus system, whereby solar energy is concentrated to a point on the receiver). The concentrated solar power is then used to heat the heat transfer fluid, which is then used to heat water to produce steam, which subsequently propels the generator-coupled turbine, which ultimately runs the generator to produce electricity. For this

technology of CSP plants, dual tracking of the sunlight is employed in order to maintain the concentrated solar radiation shone to the receiver, and therefore dual tracking axes are incorporated in the heliostats.

Two main types of receivers are available for this technology; the first type is the cavity receiver type while the second one is the external receiver. The main difference between these two types of receivers is that the aperture in the external receiver type evolves around the entire circumference of the receiver, while in the cavity type, the aperture only covers a section of the receiver circumference. This is dictated by the size of the opening of the tower. There are advantages and disadvantages associated with both types. The main advantage of the cavity type receiver is that it results in fewer thermal losses, as the receiver is imbedded within the walls of the tower, while the disadvantage is the smaller aperture and hence smaller solar radiation acceptance. On the other hand the external type receiver is prone to more thermal losses while its solar radiation acceptance is larger. Furthermore, with the external type receiver, heliostats can be spread all around the tower and hence in that case more energy can be reflected to the receiver.

Figure 2-6 portrays the typical arrangement of a solar tower power plant and a high level depiction of some of the main applicable parasitic load users can be deduced.

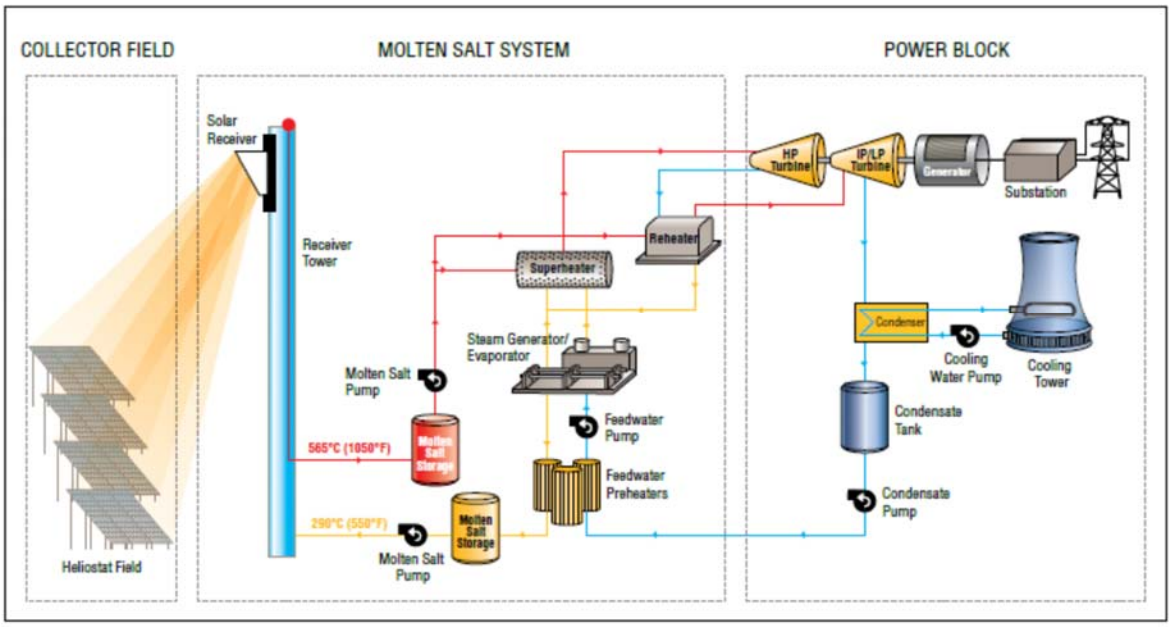

Figure 2-6: Flow Diagram for a Solar Power Plant (Flowserve, 2014)

2.3 The Linear Fresnel Reflector (LRF) Power Plant

The Linear Fresnel Reflector technology, like the parabolic trough technology employs the linear focus principle where the sun's rays are concentrated to the linear receivers/collectors (conveying condensate/steam) by systematically tilting primary mirror segments which are installed near the ground. These mirrors together with the receiver tubes, are lined-up along the South-North axis, where they can then be gradually tilted during the course of the day to maintain the focus of the sun rays on the focal length of collector tubes, which subsequently produces steam from the condensate which ultimately propels the turbine which in-turn rotates the generator in order to generate electricity. In order to reflect-back the solar radiation that misses the collector tubes, there is a second set of mirrors positioned above the collector tubes and facing down.

In this design, the reflecting mirrors can either be flat or slightly curved.

NB: The receiver tubes can just be metallic tubes coated with a selective absorber coating to keep absorption losses to the minimum (FIZ Karlsruhe, 2013)].

Due to their simple nature, LRF plants are much cheaper than other solar power plants but they are less effective.

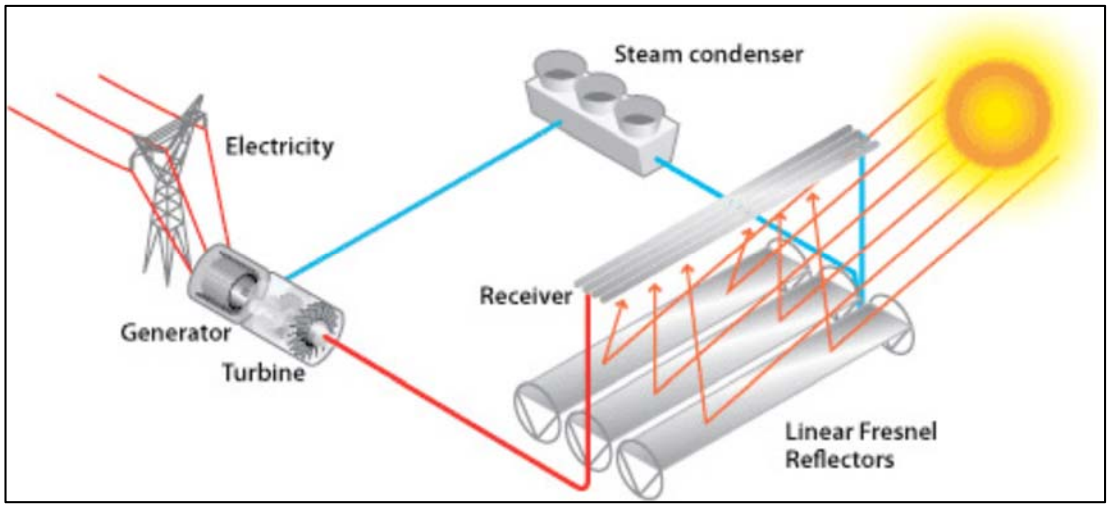

Figure 2-7: Flow Diagram for the Linear Fresnel Power Plant

2.4 Parabolic Trough Solar Collector (PTSC) Power Plant

Parabolic Trough Solar Collector Plants consist of an array of parallel reflectors/troughs, which are curved into a parabolic shape in one dimension; these curved surfaces linearly concentrate the solar irradiation to the receiver tube (along the focal length) which then heats the heat transfer fluid, which subsequently heats the water, which in-turn produces the steam which ultimately rotates the generator. Since the parabolic trough systems concentrate the solar irradiation lineally along the receiver tubes, only one axis tracking is normally employed. This is achieved by systematically rotating the reflectors along the South-North axis from East to West daily to align with the incident solar rays, so that as much solar irradiation as possible is absorbed during the course of the day.

Like in the technologies described above, in order to ensure a continuous supply of power even when the sun is out, thermal storage devices are normally employed to store excess energy that was absorbed during the day, and this is achieved by storing the thermal energy in tanks containing materials with high thermal conductivity.

Figure 2-8 depicts a process flow diagram of the ordinary PTSC Plant in which a thermal storage system is incorporated. Also shown in this flow diagram is the main equipment associated with this technology of CSP plant.

Currently there is on-going research to better the efficiency of these plants. One of the promising research outcomes entails solar direct steam generation technology where instead of the traditional application where the concentrated solar irradiation heats the heat transfer fluid in the receiver tubes, the thermal energy directly heats the condensate and thereby directly converts it to steam. In this case the efficiency of the applicable power plant is greatly improved due to reduced thermal losses between the heat transfer fluid and the condensate/steam. However there are a number of challenges associated with this technology which will have to be resolved before the technology is put into practice, some of these challenges include the fact that receiver tubes and the associated piping to the turbine must be capable of handling high pressures of about 100 bar required for operating the turbine. Other main challenges include controllability challenge associated with two phase flows in the receivers/tubes and the resultant thermal stresses that may occur in piping (FIZ Karlsruhe, 2013).

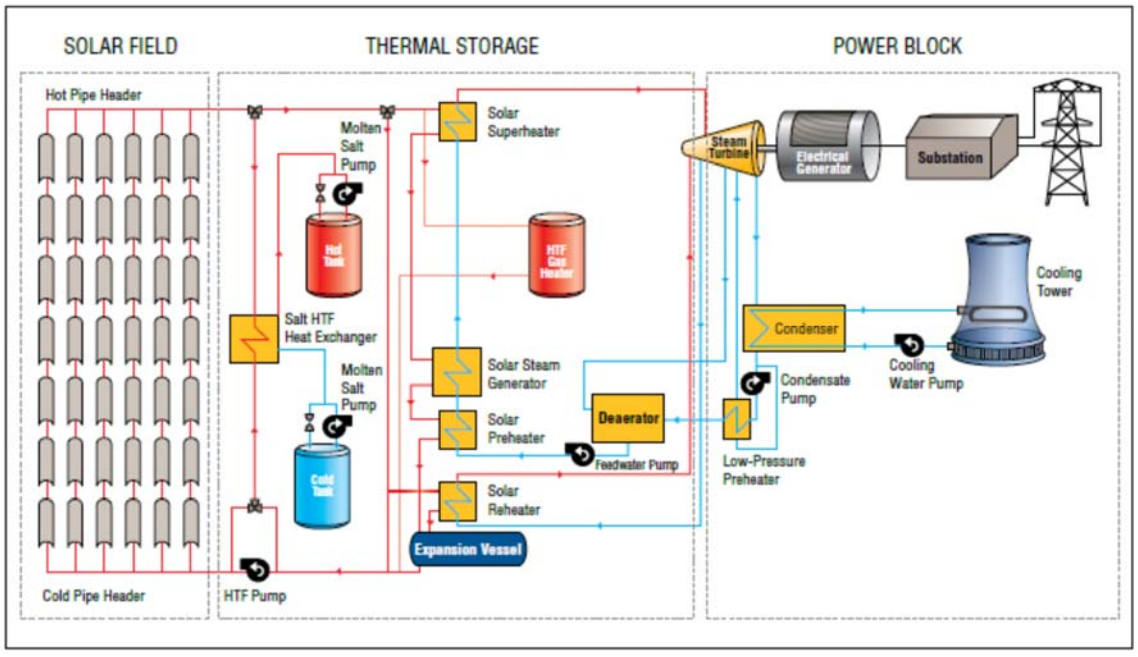

Figure 2-8: Flow Diagram for a Parabolic Trough Power Plant (Flowserve, 2014)

3 Method of Investigation

The approach to the investigations was initiated by conducting a thorough literature review with regard to the parasitic load consumption of CSP plants and other thermal energy power plants. While performing this review, not much applicable literature was discovered, expect literature about the parasitic load consumption of different technologies for the cooling systems of thermal power plants in general. This literature is important as the findings can be compared to the parasitic load of the cooling system at Andasol 3 power plant.

After the literature was studied, a study of Andasol 3 power plant's specific design was undertaken using the power plant's specific dossier. Details of the power plant's specific system design and how the different features interact with each other were investigated, all in a quest to gain a clear understanding of the power plant's operation and the different processes involved. In this study, the focus of the investigation was on the parasitic load consumption of the main equipment of the applicable systems and the frequency of application/employment of such equipment. During this study it was decided which parasitic load users are applicable during the normal operation of the plant as some parasitic load consumers e.g. heat tracing on pipes are only in operation when the power plant is idle, maybe as a result of insufficient solar irradiation. Such loads are excluded from the current scope of evaluation as they do not specifically affect the dispatched power or the efficiency of the power plant.

After studying Andasol 3 power plant's specific design, an evaluation of the power plant's power consumption was conducted, using data from the specific power plant. Then an evaluation of the overall power plant's power consumption was performed followed by an evaluation on the selected main consumers.

4 Design information on Andasol 3 Power Plant

NB: *The following information was strategically deduced from the Andasol 3 Power Plant's documentation* (UTE ANDASOL III, 2011) *without compromising some confidential details. External sources were utilised in some cases.*

The Andasol 3 Power Plant is a Parabolic Trough Solar Collector type of power plant with a nominal generated output of 49.9 MWe. The plant is located in Aldeire, which is in Granada Province in Spain, and the site location coordinates are 37°13′ 42.7″ North, 3°4′ 6.73″ West.

Like many other Parabolic Trough Solar Collector (PTSC) power plants, this plant comprises of four main systems, which are described in the following sections. Specific details of the parasitic load requirements of these systems will be outlined, and where necessary, the specific load/power requirements of systems and/or subsystems will be provided.

4.1 Solar Field

The Solar Field basically incorporates an array of solar collector loops which are connected in parallel via insulated pipes that convey the heat transfer fluid. There are 156 loops in total, and each loop consists of 4 Solar Collector Assemblies (SCAs**).** Each SCA incorporates 12 Solar Collector Elements (SCEs) (all connected in series); therefore there are 624 SCEs in total, with an equivalent total aperture of 510120 m^2 (NREL, 2013). Each SCA is equipped with a hydraulic drive which consists of two hydraulic cylinders which are used to rotate the SCA in order to track the sun. This hydraulic drive is located in the middle of the SCA on the drive pylon which is also equipped with the relevant hydraulic power unit. A typical arrangement of the SCA is shown in Figure 4-1.

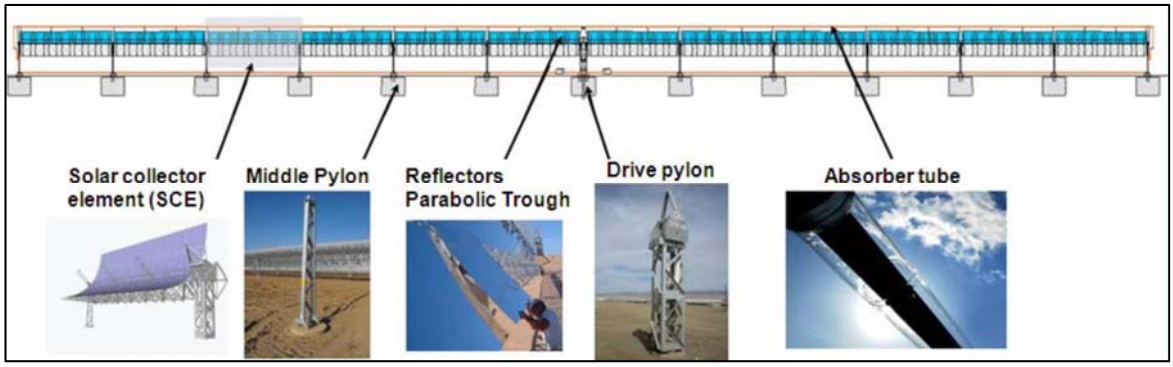

Figure 4-1: Solar Collector Assembly (UTE ANDASOL III, 2011)

The main parasitic load required to drive the SCEs is the electrical power required to drive the hydraulic power units' pumps' motors. The hydraulic power units are basically as many as the number of SCAs (thus there are 624 hydraulic power units in total).

4.2 Heat Transfer Fluid (HTF) System

The Heat Transfer Fluid system's main function is to convey the heat energy absorbed from the Solar Field to the power block where it is converted to electrical energy after a couple of energy conversion processes. The temperature of the HTF (in which Andasol 3 uses Thermal Oil), typically varies between 300 °C and 400 °C. After absorbing heat from the Solar Field, the temperature will be around 400 °C and after relinquishing some of that heat to the Power Block (through heat exchangers), it will head back to the Solar Field at temperatures of around 300 °C. This heat transportation to the Power Block is performed through two parallel 50% trains.

This system in itself comprises of the following seven subsystems, which collaboratively contribute to conveying, preserving and managing the condition of the HTF.

4.2.1 The Pumping System

This subsystem is one of the main power consumers in CSP Plants (in general), where the applicable main HTF pumps' motors power ratings can range between 0.7MW and 2MW (Renovetec, 2010). At Andasol 3, there are 4 X 33% duty cycle

HTF pumps, which are the ones that are normally employed to circulate the HTF between the Solar Field and the Power Block in order to convey the absorbed heat energy to the Power Block. These pumps are also equipped with variable frequency drives (VFD) to vary the pumps' speed. They also employ the hydraulic high pressure sealing system, where one hydraulic sealing skid serves two pumps (hence there are two skids), and these skids comprise a pump, a water-cooled heat exchanger and a reservoir that is equipped with an immersion heater.

4.2.2 Expansion and Overflow Tanks System

The expansion and Overflow System as the name indicates, serves the function of accommodating the expanded HTF and the HTF fluid overflow during the HTF heating process (which normally occurs during the day when the sun's heat energy is being absorbed by the HCEs).

Owing to the fact that when heated, the volume of HTF inside the HTF piping expands more than the piping conveying it, the HTF fluid is saturated with thermal energy from the solar field during the day. The HTF volume increases quite significantly and hence employs undesirable pressure to the piping system and therefore automatically controlled loop balancing valves take action and bypass some of the HTF to the expansion tank/vessel, and the expansion tank consequently becomes full. The redundant volume is conveyed to the overflow tanks. At night (when the outside environment temperatures have dropped) or during periods of low temperatures (which could occur for any reason), the HTF fluid consequently contracts and therefore the stored HTF from the expansion tanks and overflow tanks also contracts.

At Andasol 3, there is one expansion tank which is installed in an elevated position in order to provide NPSH to the main HTF pumps, and there are also two overflow tanks which are meant to contain the HTF overflow from the main expansion tank (one after another).

The parasitic load users associated with this subsystem mainly consist of relatively small pumps that are used for pumping the HTF into/from the applicable tanks and a couple of electrical actuated valves.

4.2.3 The Nitrogen System

The nitrogen system on the other hand mainly serves the function of preventing the degradation of the HTF by acting as a blanketing medium during stages when oxygen and other unwanted gases may potentially ingress the HTF system; it also serves to ensure that the HTF is always maintained at a pressure above its vapour pressure in order to avoid probable explosions.

This system therefore complements the expansion and overflow tanks system by providing controlled proportions of nitrogen gas as a blanketing medium to the latter tanks during various transient stages of HTF volume in these tanks, which occur as a result of changing HTF temperatures.

This system also provides blanketing gas to the sealing system of the main HTF pumps, and several other amenities where nitrogen blanketing is required.

The system itself consists of the receiver vessel and the applicable distribution piping, an evaporator, a pressure regulating valve and some applicable instrumentation. The power consumption (parasitic load consumption) in this system is relatively low; the main electrical supply panel is rated at 30 kW.

4.2.4 The Reclamation and Ullage System

This subsystem plays the role of removing the impurities from the HTF and/or cleaning the circulating HTF. Some of the impurities that are removed are distillates from the hydrocarbons with low boiling points and those with high boiling points. According to Renovetec (2010), about 1% to 2% of the HTF is annually removed from HTF System (and hence gets replaced by make-up volume) as a result of this process.

The system consists of flash tanks, storage tanks, the interconnecting piping, heaters, coolers, pumps and the applicable instrumentation.

This system achieves its function by evaporating the HTF in the flash tank, which is achieved by the reduction of the HTF fluid pressure, which subsequently results in fractional components of the HTF mixture with low boiling points being separated from the main fluid and hence released as vapours through the top of the flash tank for further processing. These vapours may also include the moisture (which is removed as steam). The vented gases are then cooled (and hence condensed) and then collected in the Ullage drain vessel and returned into the HTF circuit, while the residual gases are released to atmosphere. The residual sludge (with a higher boiling point) that remains in the reclamation flash tank, is then drained (via gravity) into separate tanks where it is either disposed or re-processed.

Therefore, the main parasitic load consumers in this system are the heaters, coolers and the transfer pumps, of which the ullage discharge pump is the biggest consumer with a rated power consumption of 14 kW.

4.2.5 HTF Heaters System

Since common HTF freezes at temperatures around 12°C (Renovetec, 2010), measures have to be taken to prevent the HTF from reaching temperatures where the HTF piping may clog and hence result in costly maintenance costs. The HTF heaters are therefore used for HTF freeze protection during periods when there is not enough solar irradiation to heat the HTF, which may be during cloudy days or at night time.

There are a couple of heater types that are employed in different applications within the HTF circuit in order to prevent freezing. The main heater employed is the main HTF heater which uses automatic controlled burners where the air/fuel supply volumes are controlled in order maintain a certain pre-set temperature (which is set by the operator); this heater works in conjunction with the freeze protection pump (there is another one on standby) which circulates the heated

HTF through the applicable loop. The same main heat transfer heater may alternatively be employed for charging the TES, or even to generate power through the power block. For piping sections with smaller pipe diameters and dead legs (stagnant piping sections e.g. drains and by-pass lines), thermofluid/steam jacketed piping and/or electrical elements (resistors) heat tracing is used.

The electrical power usage for the main HTF heater mainly comes from the combustion air blower fans, which are rated at 75 kW each. There are two of these fans which operate on a 2 X 100% duty basis.

4.3 Thermal Energy Storage (TES) System

The Thermal Energy System is normally required to store excess thermal energy captured during the day and this stored energy can be used during the night or whenever there is no enough solar irradiation e.g. during cloudy days. Alternatively the solar energy can be captured during the day solely in order to be used during the evening/night.

Andasol 3 has a 7.5 hour TES. A two-tank thermal energy storage system is employed and the used storage material/medium is a mixture of molten sodium nitrate salts (60% mass) and potassium nitrate salts (40% mass). The system also incorporates 2 X VFD driven transfer pumps per tank. These are meant to transfer molten salt from the hot or cold tank respectively based on whether the TES is being charged or discharged. For the TES to be charged, cold liquid salt is pumped from the cold storage tank to the heat exchanger that transfers thermal energy from the solar field and in turn the energised liquid salt is then transferred to the hot storage tank where it remains until it is needed to charge HTF. During a similar process heated liquid salt from the hot storage pump is pumped to the heat exchanger which then heats the HTF en-route to the power block. The de-energised liquid salt is then conveyed to the cold storage tank.

In addition to the main equipment mentioned above, two storage tanks are incorporated with 75 kW electrical heaters each, in order to heat the liquid salt to prevent it from freezing if the temperature of the salt drops to a certain pre-set temperature.

4.4 Power Block (PB)

The Power Block itself is the system where the thermal energy absorbed from the solar field is converted into kinetic (mechanical) energy and then to electrical energy. This system incorporates the subsystems described below.

In general, this system is a mechanical subsystem with minor electrical and electronic interfaces, wherein the dominant electrical power consumption is through instrumentation and control, in the form of process measurement sensors.

4.4.1 Solar Steam Generator

The Solar Steam Generator is a heat exchanger that is used to transfer thermal energy coming from the solar field via the HTF to the feed water, which in turn is converted to steam which is then employed to propel the turbine.

4.4.2 Steam Turbine

The steam turbine is employed to propel the electrical generator that ultimately generates electricity; this turbine is propelled by the steam generated by the thermal energy from the solar field, through the Solar Steam Generator.

This steam turbine consists of a high pressure (HP) and a low pressure (LP) part.

The steam turbine is also equipped with a bleed system, with which some of the steam is tapped off to preheat the feed water.

4.4.3 Electrical Generator and Gear Unit

The electrical generator is the ultimate equipment which is used to convert the kinetic energy from the turbine to electrical energy through the principle of

electromagnetism where the DC exited rotor produces a rotating magnetic field which then induces electricity through the stator windings. The applicable gear unit is of the double-helical spur gear type, and its function is to transmit power from the turbine to the generator.

The electrical generator used is a synchronous generator which is oil-cooled, and pumping cooling oil through the generator constitutes additional parasitic consumption.

4.4.4 The Rotor Turning Gear

The rotor turning gear is a mechanism that is coupled to the gear unit, and its function is to crank the steam turbines during start-up and shutdown of the turbine-generator train, or sometimes to marginally rotate the rotor to a certain position; this mechanism is disengaged during normal operation.

The mechanism consists of the rotating gear and an electrical motor and thus infrequently contributes to the parasitic load consumption.

4.5 Auxiliary Systems or Balance of Plant (BOP)

Auxiliary systems play an important role in power plants, even though they may not be directly linked to the production of electricity. They consist of standby systems like the Fire Protection/Extinguishing System which is only employed during a fire scenario or during routine system tests. They also include systems which contribute somewhat to electricity production like the Cooling System and the Compressed Air System (for process and control air systems) etc.

A breakdown and brief description of the applicable main auxiliary systems is provided below.

4.5.1 Cooling Systems

Thermal heat from the condenser is conveyed to the cooling tower where it is then cooled, and then afterwards the water is provisionally stored in the concrete

reservoir before it is pumped back to the condenser to cool exhaust steam/condensate from the turbine.

Andasol 3 employs a wet-type cooling system with induced draught where extraction fans move the air vertically up from the (bottom) inlet of the cooling water, against the warm water flowing from the top of the cooling tower.

The power consumption of the system is mainly through the cooling water transfer pumps where 3 x 50% duty pumps are employed. The maximum total consumption of the pumps is about 322 kW. Each of the four cooling tower cell fans draws about 128 kW and during normal operation all four cooling towers cell fans are in operation. The fans can run at either high or low speed.

Also included in the cooling water system is the Chemical Dosing System, which is used to condition the quality of the water to the required standard (for better performance and longer life of the applicable system) by applying a number of different chemicals. There are five sets of 2 X 100% duty pumps in this system; each set of pump is used for dosing a certain type of chemical.

The other applicable subsystem is the Closed Cooling Water system, which is used for cooling different equipment/components around the plant; specific areas where the subsystem is employed include the HTF System and the Steam Turbine System, together with the Turbine itself. This subsystem employs 2 X 100% duty pumps.

4.5.2 Water Treatment System

The Water Treatment System incorporates the storage of the raw water in the four reservoirs/dams constructed on the plant. Later water from these reservoirs is pumped to the primary settling tank for the dosing process. Pumping to the settling tank is performed by vertical electrically powered submersible pumps, where there is one pump per dam.

Water from the settling tank is then pumped (via a 28 kW rated pump/motor) to the filtered water storage tanks (through a set of filters). From the filtered water tanks, the water can then be supplied to different filtered-water users including the Potable Water System and the Demineralised Water System through a number of relatively smaller pumps.

4.5.3 Fire Extinguishing System

The Fire Extinguishing System is designed to provide either water or water-foam mixture to put out fires in different high fire-risk areas around the power plant. Activation of the fire protection system/equipment can either be manual or automatic, in either case the piping system pressure drops and consequently starts the main fire pump, which then pumps water from the filtered-water tank.

The main parasitic load user in this system is the main electrical fire pump, which is normally employed during a fire scenario or for a short period during periodic tests. Should the main electrical fire pump fail to start or stops while still in action, a backup diesel engine-powered pump kicks in. There is also a jockey pump (which is a small flow but high pressure pump) which periodically runs to maintain the main pressure in order to avoid having the main fire pump starting up unnecessarily.

Since this system normally only operates during fire emergencies, its parasitic load consumption is actually insignificant to the plant's parasitic load usage.

4.5.4 Waste Water Treatment System

The function of the waste water system is to clean/treat wastewater from different sources around the plant so that it can be used again. It also includes the collection and processing of rainwater.

The system's main consumer is the homogenization basin feeding pumps, which consumes about 12 kW each. There are two of these pumps which are operated on a 2 X 100% duty cycle principle, and thus their power consumption is relatively low.

4.5.5 Compressed Air System

The compressed air system is used to supply instrument air and service air; the system consists of 2 X 100% duty compressors and 2 X 100% duty air dryers. The feeder to the compressed air system is rated at 40 kW; hence all the applicable consumers consume less than 40 kW.

4.5.6 Heating, Ventilation and Air Conditioning (HVAC) System

The HVAC system provides heating, ventilation and air conditioning requirements to different areas around the plant. The combined power consumption to the entire HVAC system is quite substantial, and can amount to 259 kW with the users employed simultaneously and at full load.

5 Assumptions and Challenges with regard to the Evaluation

5.1 Challenges

In order to perform the analysis, there are some underlying challenges that have to be acknowledged and addressed where possible. These challenges pertain to the fact that it is somewhat impractical to get the parasitic load consumption data of each and every consumer in the power plant. There are in fact some relatively small consumers whose power consumption may be regarded to be negligible (and are therefore not monitored), but the combined consumption of which may be quite substantial. Therefore it is almost impossible to perform a thorough and accurate evaluation of the parasitic load consumption.

It is also quite a challenge to predict the power consumption profiles of most of the consumers in the power plant as most of them depend on multiple variables. An example is the operation of the potable water system pumps and the air conditioning system, their operation depends on the unpredictable usage of water and the unpredictable weather condition. Therefore the parasitic load consumption cannot be accurately predicted or assumed during the design stage, but statistics from similar power plants can be used as reference.

One other challenge that is specific to this study (Andasol 3 parasitic load consumption evaluation) is that in some cases, the provided data was corrupt and hence the applicable sections were modified accordingly by virtue of interpolating within the respective good data.

5.2 Assumptions

Over and above the challenges stated above, some assumptions had to be made when calculating power consumption for some consumers, as in some cases the real power (consumption) from measured data was not available as a result of faulty instruments or the unavailability of the respective consumers' power

consumption instrumentation. Presented below are the details of the assumptions made.

5.2.1 Consumption of Cooling Power Fans

The power consumption of the cooling tower fans was calculated from the applicable power supply's line voltage and phase current, and a certain power factor derived from applicable literature was also used, as no direct power consumption data was available. The power factor for cooling tower fans was assumed to be 0.85 (on full load); this was deduced from Robbie Mcelveen, Bill Martin, Ryan Smith and Baldor Electric (2009).

Also, the power consumption data for fan cells 1 and 2 was not available as a result of defective instruments, and hence line voltage and phase current data for fan cells 3 and 4 were used as inputs for the applicable fan cells power consumption data.

5.2.2 Power Consumption of Thermal Energy Storage Pumps

As in the case of the consumption of the cooling tower fans above, the power consumption of the thermal energy storage pumps was also calculated using the applicable power supply's line voltage and the phase current, together with the assumed power factor of 0.85. The latter power factor was used as it is analogous to that of most of the conventional electrical motors.

6 Parasitic Load Analysis and Evaluation

As was mentioned in the preceding chapters (especially in Chapter 3), the analysis and evaluation of the parasitic load consumption at Andasol 3 power plant was carried out using the raw power consumption data from the applicable power plant. Measured data for the whole year was used. This data was then studied, processed and interpreted in order to determine and evaluate the magnitude and patterns of the parasitic load consumption, and also to evaluate the total parasitic load consumption, while also determining the contribution of the identified main consumers to the overall (total) parasitic load consumption.

In evaluating this data, the annual data for the years 2013 and 2014 was provided, and the data for the year 2013 was chosen rather than that of the year 2014 because of the fact that the 2013 data was of a much better quality.

In order to prepare the raw data and organise it in a format that can be used for evaluations, some calculations had to be done in Microsoft Excel, and small Visual Basic codes were also compiled.

Appendix C depicts graphs pertinent to the parasitic load consumption of the year 2013, also included is the graph of generated power, dispatched power and the parasitic load for the year 2013. And from this (latter) graph it can be seen that from around 9 January to 11 June 2013 (Figure A-1), the plant was not operating as there was a maintenance shutdown. However, the graph also indicates that there was still some parasitic load usage during that period (when the plant is on maintenance shutdown), and this was the load that was imported from the grid to service other in-house demands including the maintenance processes.

From this graph it can be deduced that in normal operation the plant typically produces about 50 MWh, of which about 46 MWh is dispatched to the grid. It should however be noted that in order to service/power some of the essential in-

house equipment, especially during periods when the power plant is un-operational or when it is only generating a small amount of power e.g. as result of low solar irradiation; then in such cases some energy is extracted from the grid as well.

During the analysis, firstly an evaluation of the total parasitic load was conducted, and then the main parasitic load consumers (for cases of normal operation of the plant) were identified. Investigations were also carried out to determine the impact of those identified main consumers. These analyses/evaluations are further discussed below.

6.1 Overall (Total) Parasitic Load Evaluation and Seasonal Impact

The two extreme power production periods within the year 2013 were evaluated, that is the periods when the power production patterns differed significantly due to the relevant meteorological conditions i.e. for summer and winter.

Based on the location of the plant (Andasol 3) which is at a latitude of 37°13′ (as indicated in Chapter 4), the best normal solar irradiation is within the months of June and July, while poorer results are achieved from November to February. (Stine and Geyer, 2001) (See Figure 2.8), and thus evaluations were done in July and November.

The two graphs shown below (Figures 6-1 and 6-2) depict these two extreme cases. Evaluations were done on four days of each respective month. These graphs also portray the Direct Normal Irradiation (DNI) that was experienced during the respective periods. This DNI is an indication of the solar irradiation energy absorbed.

NB: For July 2013, the period from 5 to 8 July (instead 1 to 4 July) was selected, because the power production was highest in that period.

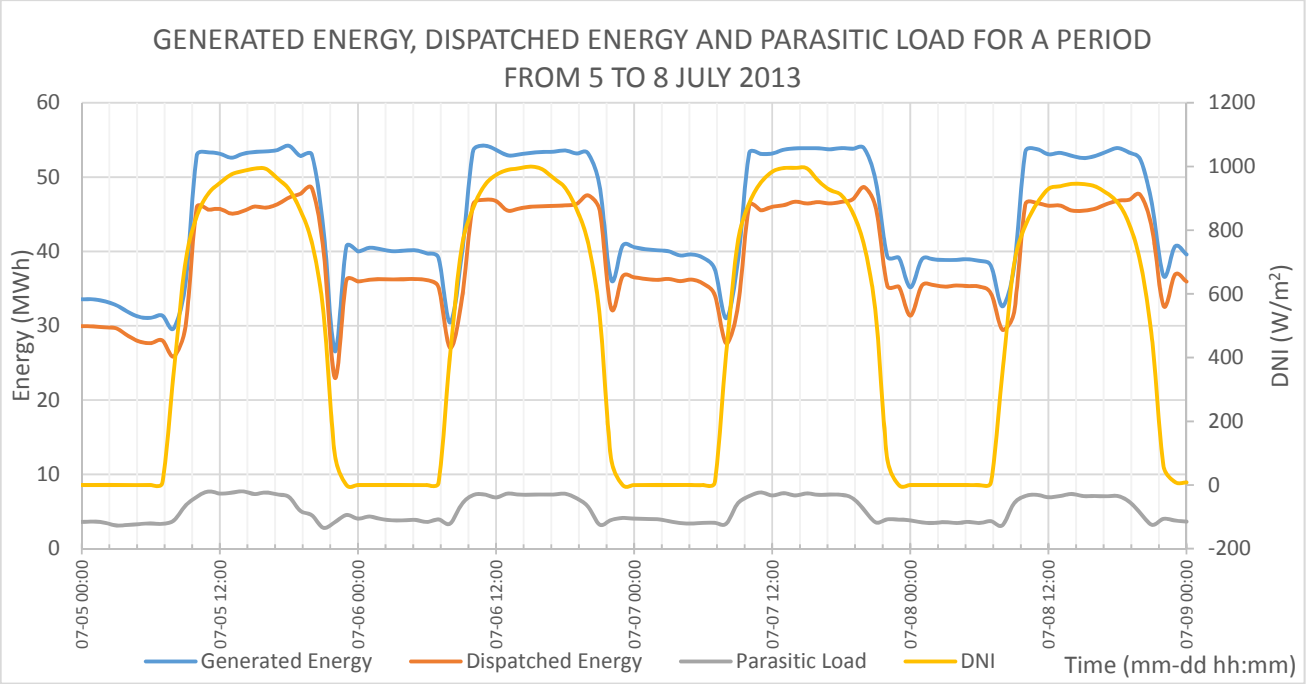

Figure 6-1: Graph of generated energy, dispatched energy & parasitic load for period from 5 to 8 July 2013

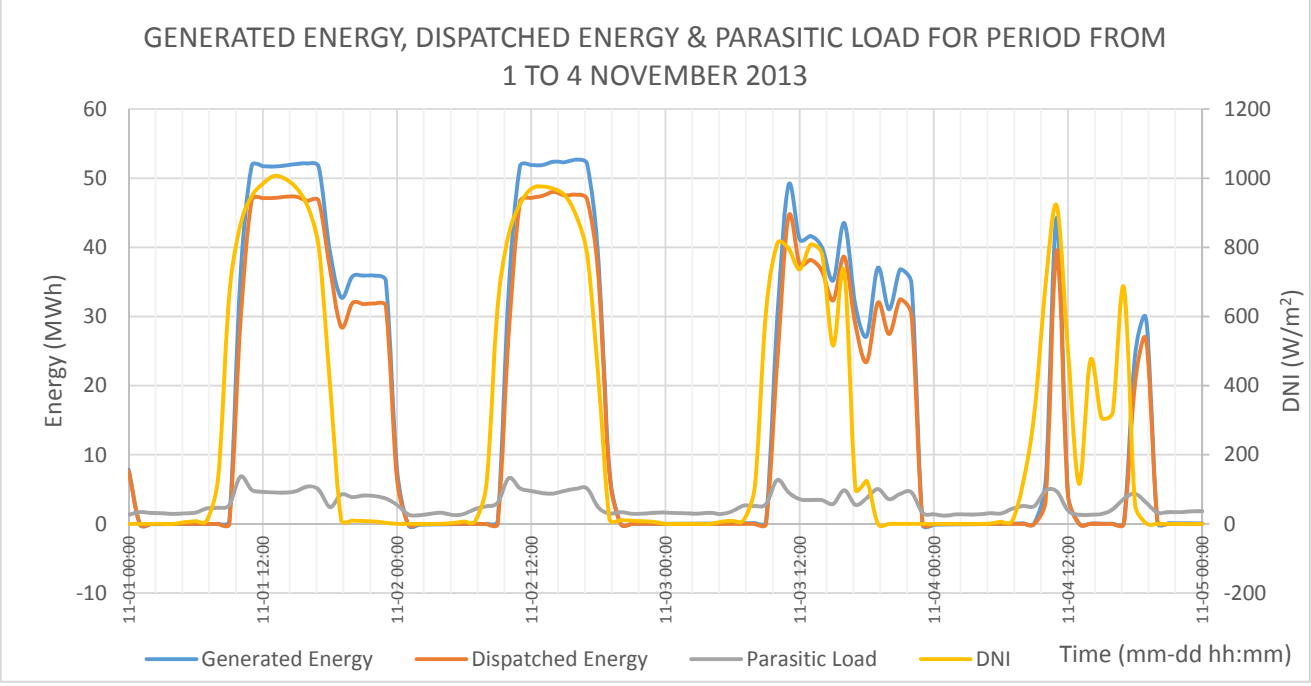

Figure 6-2: Graph of generated energy, dispatched energy & parasitic load for period from 1 to 4 November 2013

In evaluating the two graphs, it is evident (and hence corroborates the finding above) that there was more solar irradiation in July than in November; this can be

corroborated by the fact that in July power was generated throughout, day and night as there was enough solar irradiation to charge the thermal energy storage system during the day.

Another interesting detail is that the parasitic load increases by about 100% during the course of day, which is mainly because of the main HTF pumps which are operated during the day (to convey thermal energy from the solar field) and switched off during the night. It was further determined that the total parasitic load consumption is lower in winter as opposed to the parasitic load consumption in summer. Nevertheless, further investigations revealed that the ratio of the average parasitic load consumption (in percentage) to the average generated energy is higher in winter than in summer. The ratio of parasitic load consumption to the generated energy in summer was around 12% while in winter it varied between 16% and 24%. To reach this conclusion, calculations were done using the parasitic load and generated energy data for the respective four days of both July (typical summer month) and November (typical winter month) 2013, and the whole periods of July 2013 and November 2013 respectively. The results for both the respective four days of July and the whole July period were comparable, while in the case of November the average power consumption for the four days was 16% of the generated energy and 24% of the generated energy for the entire month of November.

NB: Even though July has 31 days, all the evaluations performed for the entire month of July, were conducted based on the first 30 days of July in order to match the 30 days applicable to November.

6.2 Identification of the Main Power Consumers

A thorough investigation into the main equipment of the power plant was performed as described in Chapter 4, and the main consumers were identified. Attention was then paid to the power consumption of those consumers (equipment).

Six set of pumps and the cooling tower cells fans were identified as the apparent main consumers during normal operation of the plant. These consumers are therefore listed in Table 6-1, together with their respective duty cycle details and the peak power consumption data.

Table 6-1: Main parasitic load consumers with peak loads

DESCRIPTION			PEAK POWER CONSUMPTION (kW)
SYSTEM	**EQUIPMENT**	**DUTY CYCLE**	
HEAT TRANSFER FLUID SYSTEM	HTF MAIN PUMPS	4 X 33% duty	3398
	FREEZE PROTECTION PUMPS	2 X 100% duty	239
	OVERFLOW RETURN PUMPS	2 X 100% duty	127
FEEDWATER SYSTEM	FEEDWATER PUMPS	2 X 100% duty	957
THERMAL ENERGY STORAGE SYSTEM	TES PUMPS	2 X 100% duty per tank (hot and cold tank)	903
COOLING WATER SYSTEM	CIRCULATING WATER PUMPS	3 X 50% duty	322
	COOLING TOWER CELLS FANS	4 X 25% duty	592

As can be determined from the table above, the main HTF pumps consume a substantial amount of power, with a peak power consumption of about 3.3 MW, which proves that they are the main consumers in CSP plants. This peak power consumption (of about 3.3 MW) normally occurs during a typical summer day, when more thermal energy is collected from the solar field, while on other ordinary days the peak power consumption is around 2MW.

Another important detail is that the total peak power consumption of the cooling water system is 0.914 MW, which equates to about 1.8% of the power plant's maximum design power output (50 MW). This ties in with the percentage power consumption deduced from literature for similar types of condenser cooling system technology (see §2.1.1).

6.3 Evaluations and Analysis of the Main Power Consumers

6.3.1 Criteria Used

The main power consumers identified in section 6.2 (Table 6-1) above were evaluated in detail, and in so doing a number of factors were analysed, including

the profile/trend of the parasitic load within the course of days and nights. The other important detail that was assessed is the influence or contribution (in terms of magnitude) of a certain consumer to the total parasitic load of the plant.

6.3.2 Evaluations and Analysis

Figures 6-3 and 6-4 portray the total parasitic load consumption and the individual parasitic load consumption **of** the main power consumers (equipment) identified in section 6.2 for the four days of the months of July and November 2013 respectively. Figures 6-5 and 6-6 depict a comparison of the total parasitic load against the selected parasitic load and the differential parasitic load. The selected parasitic loads refer to the main power consumers listed in Table 6.1, while the differential parasitic load refers to the difference between the total parasitic load and the selected parasitic loads.

It should be noted that for legibility purposes the data for the comparison of total parasitic load and selected parasitic load is presented for only one day. In contrast with Figures 6-3 and 6-4 present, whereby the data for all four days was presented. Applicable bar charts for the whole period of four days can be found in Appendix C, Figures A-2 and A-3.

The evaluation was based on the criteria described in section 6.3.1 above, and as can be seen in Figures 6-3 and 6-4, the profile of the HTF pumps is analogous to that one of the total parasitic load. This shows that the HTF pumps make a significant contribution to the total parasitic loads, and therefore this is one of the parasitic loads that may need to be studied further and if possible mitigating factors incorporated in order to achieve optimum power consumption.

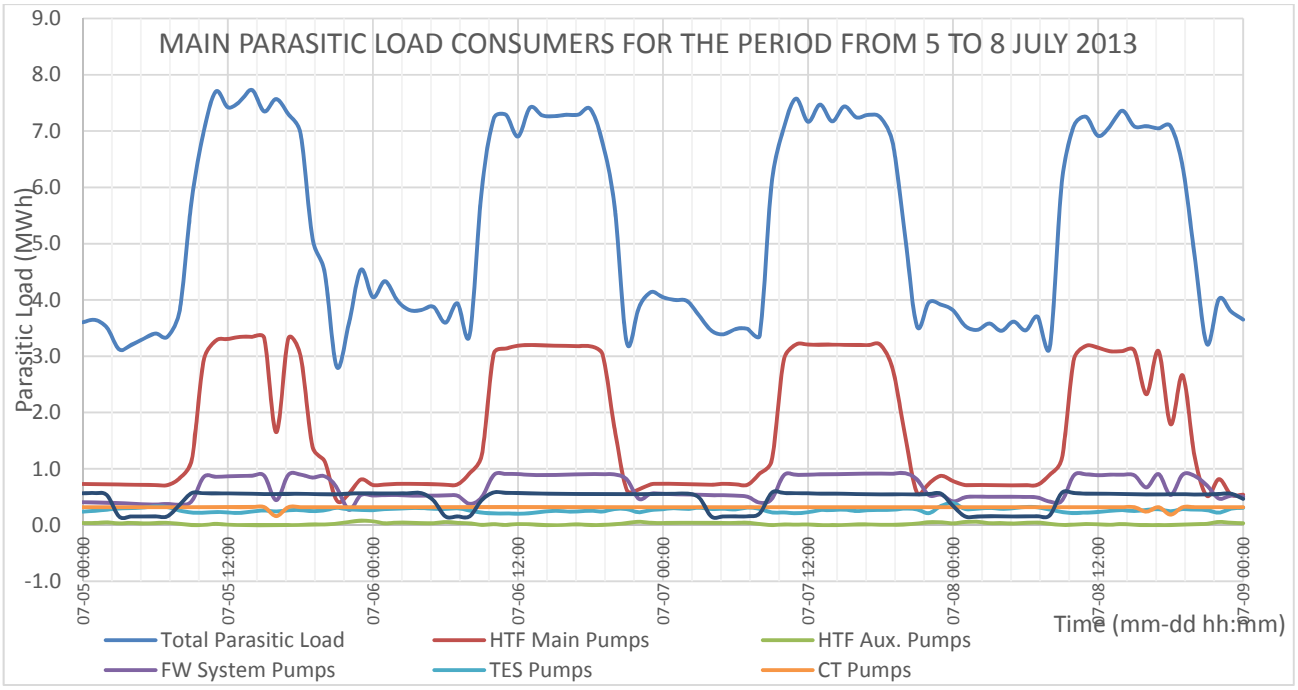

Figure 6-3: Graph of main parasitic load consumers against total parasitic load for period from 5 to 8 July 2013

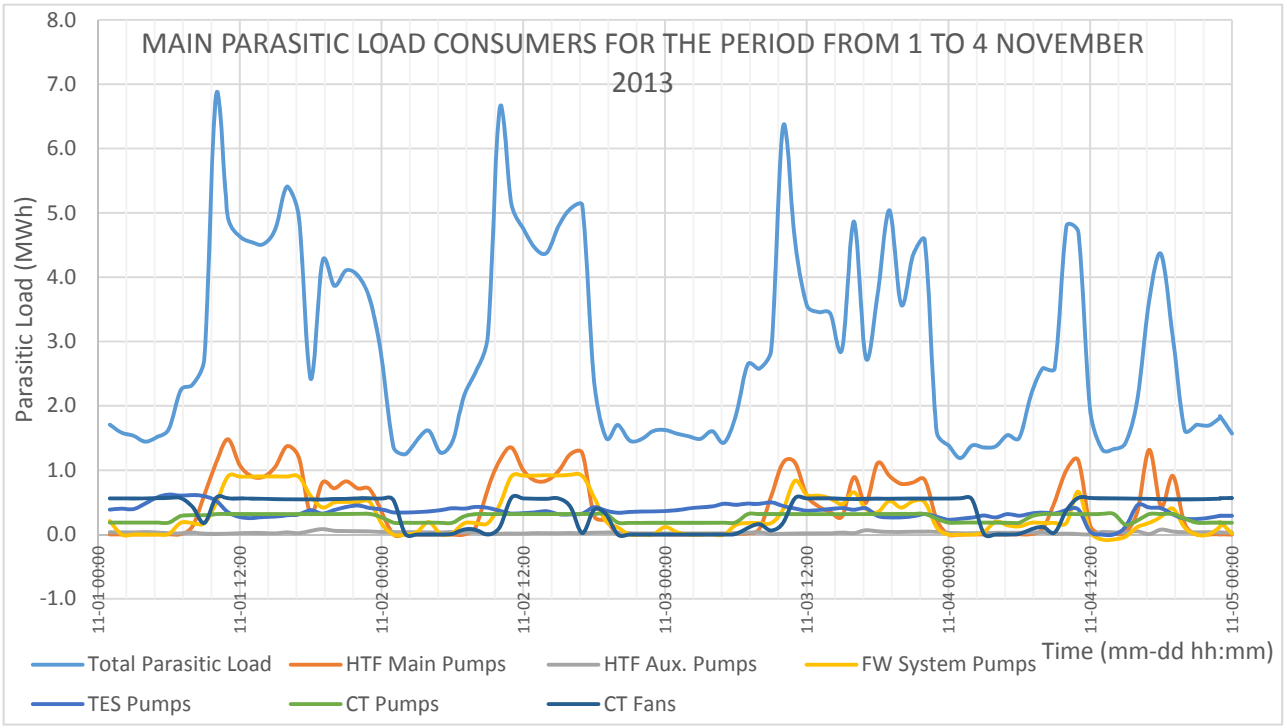

Figure 6-4: Graph of main parasitic consumers against total parasitic load for period from 1 to 4 November 2013

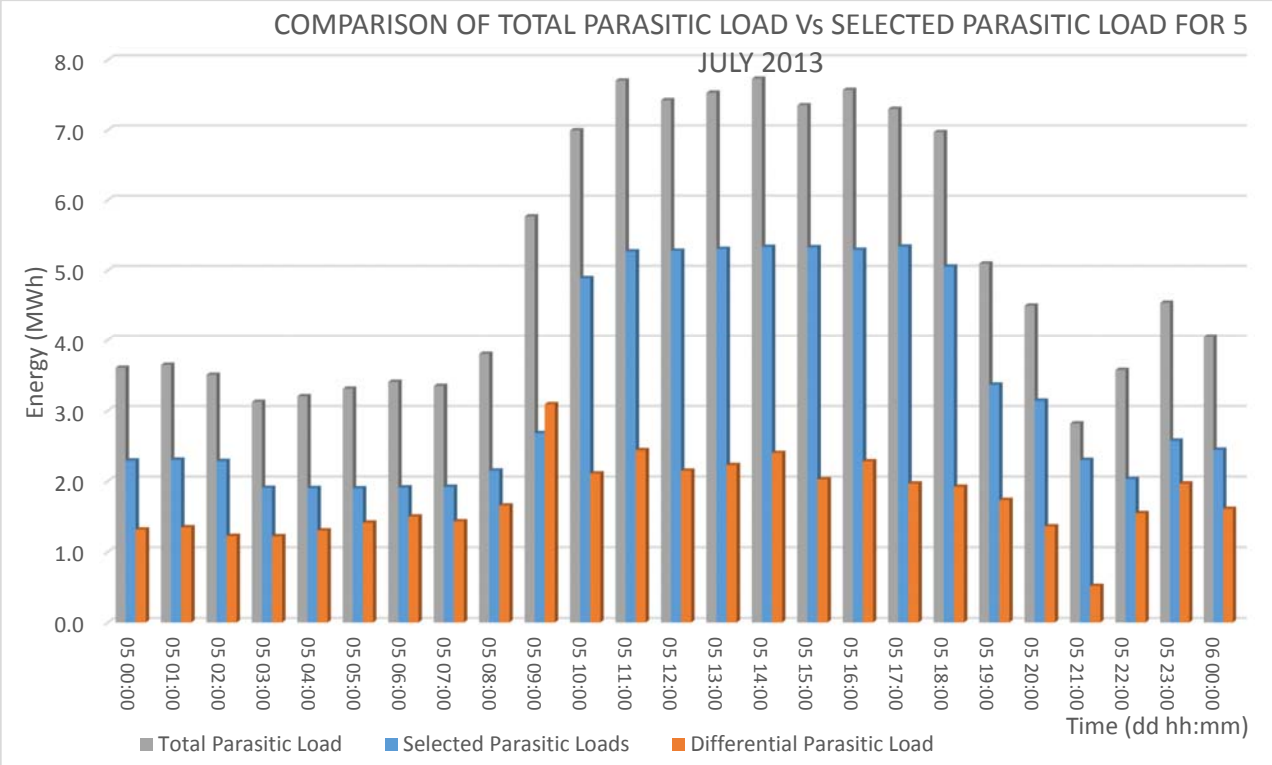

Figure 6-5: Bar chart for comparison of total parasitic load Vs selected consumers for 5 July 2013

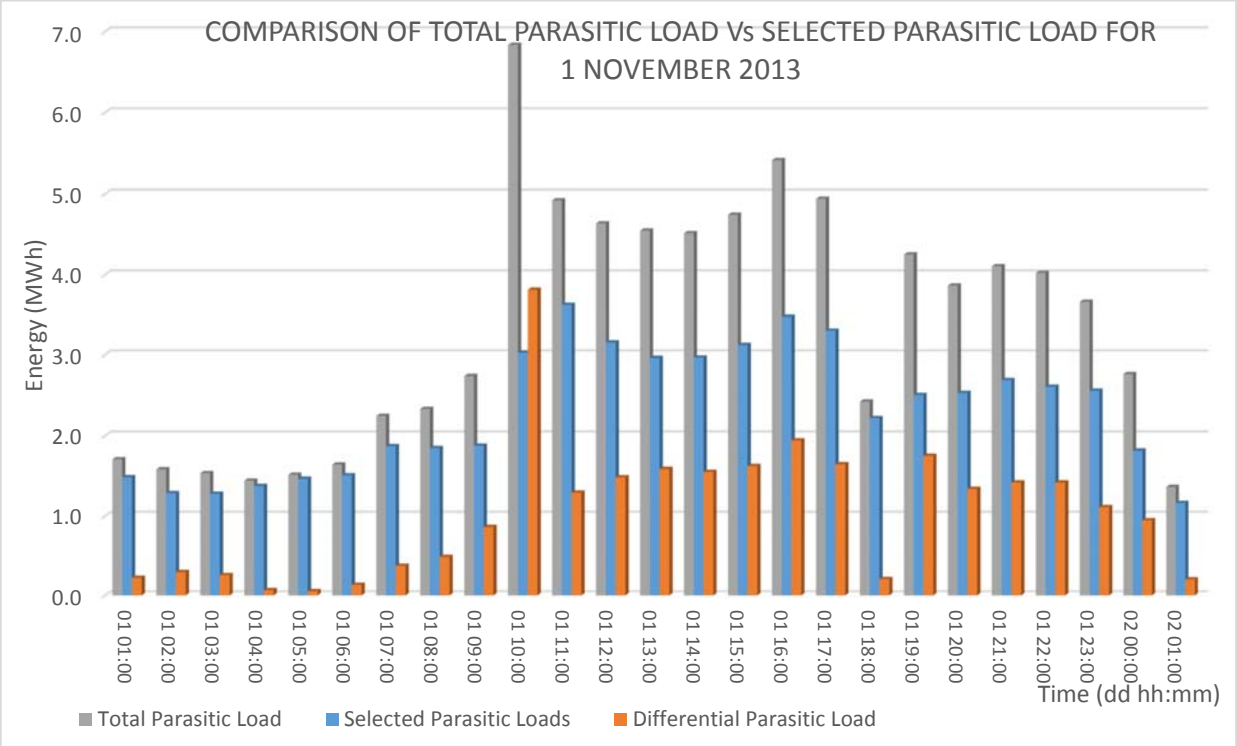

Figure 6-6: Bar chart for comparison of total parasitic load Vs selected consumption for 1 November 2013

As can be seen from Figures 6-5 and 6-6 above, the differential parasitic loads, which basically refers to the parasitic load that is unaccounted for, is quite substantial, and this unaccounted for load increases significantly from about 10:00 daily and decreases again from around 17:00. This finding proves that there is some critical equipment that draws a substantial amount of power but which was not identified in section 6.2. This (unidentified) parasitic load peaks to a maximum of about 3.8 MWh, and based on the timing of its occurrence (whereby the load peaks significantly between around 10:00 to 17:00), this load may be associated with the parabolic trough tracking systems and/or domestic (office) applications.

In an attempt to identify the origin of the unidentified parasitic load, potential peak power consumption of the tracking units was manually calculated (since there was no respective power consumption reading instrumentation incorporated). Then the theoretical peak power consumption calculations of the 624 SCA's tracking units was calculated (i.e. where it is assumed that all tracking units' hydraulics power units motors run simultaneously), using the provided phase current (1.5 A) and the supply voltage (380V ac), where a power factor of 0.85 was also assumed (refer to §5.2.1). The resultant power consumption was roughly 0.524 MWh, which when subtracted from the differential parasitic load in Figures 6-5 and 6-6 (for the times between 09:00 and 18:00 in July and 10:00 and 17:00 in November), results in a more linear and flat profile across the day, when the rest of the differential parasitic load can be assumed to be for domestic use and other relatively small demanding processes in the power plant.

The ratio of the cooling water system's energy consumption to the total generated energy was also found to be affected by the season/period of year. This ratio was worked out for the months of July and November. July has 31 days; therefore the evaluation was conducted based on the first 30 days of July in order to match the 30 days applicable to November. The consumers of the cooling water system that were used for this specific evaluation were the cooling tower pumps and fans. The resultant energy consumption ratios were found to be

2% and 6% for July and November respectively. This trend can be associated with the fact that even though there is reduced power production in November (typical winter month); the applicable parasitic load consumption does not reduce significantly in relation to the generated energy/power.

In both July and November 2013, the consumption of the HTP pumps was 3% of the total generated energy. This finding therefore confirms that the consumption of the HTF pumps is directly proportional to the generated energy. This direct relationship is also validated by the understanding that since the power plant's generated energy is primarily converted from energy gathered from the solar field (minus the applicable energy losses), whereby the HTF pumps are used to transfer the applicable thermal energy (through pumping the HTF) from the solar field to the power block, then HTF pumps' power consumption would understandably be directly proportional to the generated energy.

7 Conclusions and Recommendations

Some important findings were deduced from the evaluations and analysis above (Chapter 6), and these findings form the vital output of this study/evaluation. They can be used to come up with improvements and better management of parasitic load consumption in CSP plants, all in a quest to improve power plant efficiency by dispatching more energy from the CSP plant.

In the following paragraphs such findings will be highlighted and some important conclusions drawn. Recommendations will also be drawn. The recommendations are pertinent to both CSP technology researchers and the CSP plants developers and owners, and hence they can contribute positively to the development of future plants and the existing CSP plants (that are in operation) and more specifically the Andasol 3 power plant.

7.1 Conclusions

The fact that the parasitic load increases during the day is an interesting phenomenon, as it is during this period that the CSP plant also generates more power, and hence, as was elaborated in §6.1, the parasitic load increase is mainly due the fact that at night only one of the HTF pumps is employed (at reduced speed and hence consume less parasitic load) to circulate the HTF around the solar field in order to prevent it from freezing. Even though this function is meant to be performed by the freeze protection pumps, at Andasol 3 the HTF pump was sometimes employed for that purpose. Other reason for the increased parasitic load consumption during the day is that the cooling tower pumps and fans also operate at higher loads during the day. Figures 6-3 and 6-4 can be used as reference in connection with these arguments. Other pertinent consumers are the solar collectors tracking units which are also only employed during the day.

It was found that the average parasitic load is impacted by the changing seasons. It was also determined that even though the total parasitic load

consumption is lower in winter (or in days of low solar irradiations), the impact of parasitic load on the generated power/energy is highest in winter (or colder seasons/days). As indicated in §6.1, the total parasitic load uses up 12% of the generated energy in summer and between 16% and 24% in winter. This phenomenon is due to the fact that in winter (cold days or less sunny days), more heat tracing is employed to prevent freezing of both the HTF and the molten salt piping etc. The other factor is that some of the parasitic consumption of the power plant's processes/equipment is independent of the generating capacity, and thus with reduced power production in colder seasons, the parasitic load consumption is not reduced as much as the reduced power production. The other factor could be linked with the domestic (office applications) energy usage which also normally increases in winter as a result of increased general heating requirements like office heating and water heating applications.

It can be concluded from the graphics in Figures 6-5 and 6-6, that there is a substantial amount of power consumption by some unidentified (unaccounted for) consumers. These unidentified consumers are represented by the red bars; they are referred to as 'Differential Parasitic Load'. This shows that there are some additional consumers that need to be studied and evaluated separately, in order to determine their respective magnitude and consumption profiles with respect to time.

7.2 Recommendations

7.2.1 Measures to reduce parasitic load consumption

In an attempt to improve the performance (by virtue of increasing the overall plant efficiency of this power plant (Andasol 3), measures should be taken to reduce parasitic load consumption. This can be done by employing different energy efficiency measures, which include improving the efficiency of the major equipment and more specifically the major consumers listed in table 6.1. Where feasible, this task can be achieved by employing power factor correction

measures on some strategic motors and other pertinent electrical consuming equipment within the plant.

The power plant also seems to be consuming too much energy (about 16% to 24% of the generated energy) during colder seasons (i.e. in November in the case of this particular evaluation), and it has been concluded above (in §7.1), that this could also be as a result of increased heating requirements for heat tracing applications and office heating, and thus more efficient heating elements should be used together with effective piping/equipment thermal insulation to prevent heat losses. Heating of offices and other buildings should rather be performed using heat pumps instead on conventional element heaters.

7.2.2 Further research on parasitic load evaluation and measures to reduce parasitic load consumption

Since the scope of this project was largely limited to the evaluation of parasitic load at Andasol 3, it is therefore recommended that similar evaluations should be performed on other CSP plants and even on CSP plants with different power outputs. Furthermore, in order to obtain conclusive findings pertinent to this type of CSP plants (the parabolic trough type), more studies/evaluations on parabolic trough type power plants should be performed, and the respective findings with regard to the different power plants should then be compared.

It is further recommended that for similar future research work, more consumers/equipment should be evaluated, as it was found during the current project that there is a substantial amount of parasitic load consumption that is still unaccounted for, hence such parasitic load should be studied and evaluated separately.

7.2.3 Employment of PV to nourish parasitic load

It was found that there is more parasitic load consumption during the day compared to the consumption at night, and this interesting phenomenon makes it appealing to use the abundant solar energy available during the day to nourish

the increased parasitic load consumption. But then it can also be argued that the power plant was designed to cater for that peak parasitic load and hence there should still be adequate power to be dispatched to the grid.

Furthermore, the Levelized Cost of Electricity (LCOE) of a small PV plant is generally lower than that of a CSP plant. With regard to Andasol 3, where the average annual direct normal irradiation is 2136 kWh/m^2 (Gonzalez, 2013) and the average annual global horizontal irradiation is about 1800 kWh/m^2, it is of interest that the LCOE of a PV plant is lower than that of a CSP and it will continue to be like that in the near future (about 15 years from 2015) (see Figure 7-1).

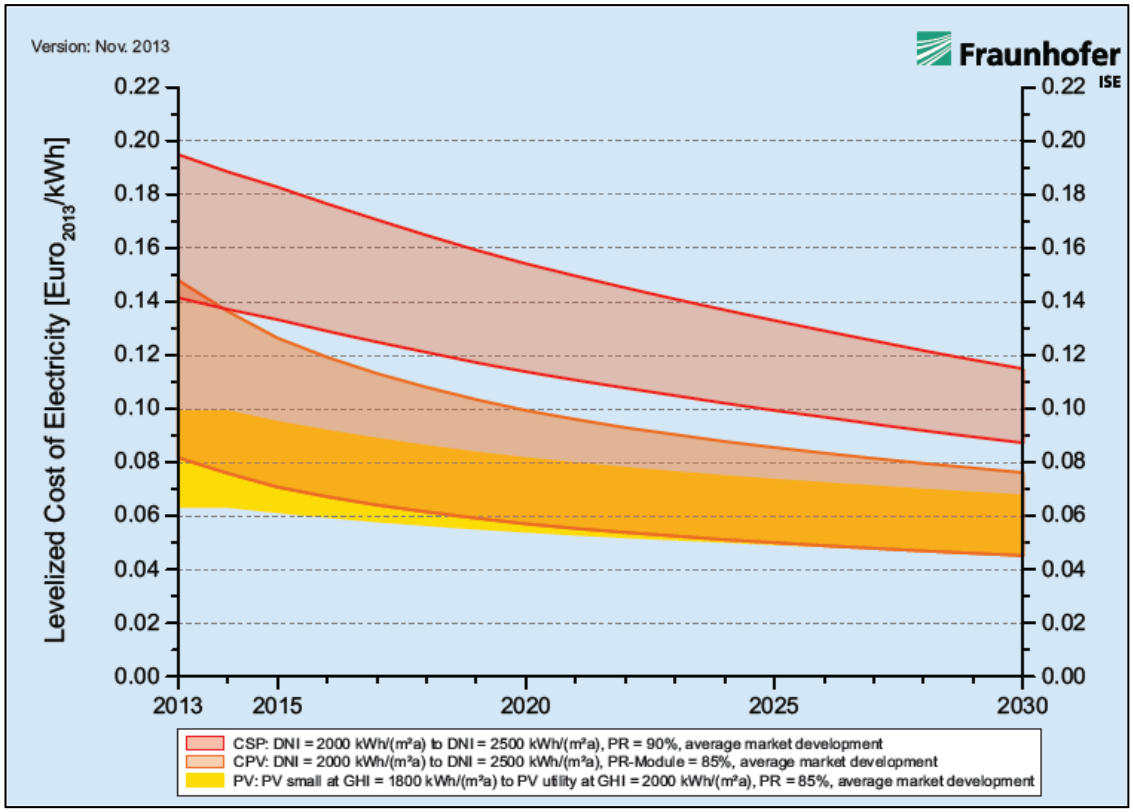

Figure 7-1: Learning curve based prediction of LCOE of various solar technologies (Christopher Kost et al, 2013)

This shows that it might be a viable option to incorporate a small PV plant to cater for the increased parasitic load consumption during the day. It might not even be necessary to incorporate a storage battery as the main function of the plant would be to cater for parasitic load during the day only. But then based on

further economic evaluations, storage batteries may also be incorporated based on the plant owner's discretion.

7.2.4 Feasibility study for the incorporation of a PV plant to cater for parasitic load consumption

Based on the above recommendation (§7.2.3), it is further recommended that a feasibility study with regard to the incorporation of a small PV plant in the existing and future CSP plants should be conducted. Research should also be done with regard to the financial viability of the proposed modification, and the financial viability should be based on both the duration of the specific power plant's feed-in tariffs contract and the power plant's life span.

8 References

Christoph Kost, Johannes N. Mayer, Jessica Thomsen, Niklas Hartmann, Charlotte Senkpiel, Simon Philipps, Sebastian Nold, Simon Lude, Noha Saad, Thomas Chlegl. Levelized Cost of Electricity. *Renewable Energy Technologies*, November.

FIZ Karlsruhe, 2013. *Solar Thermal Power Plants: Utilising Concentrated Sunlight for Generating Energy.*

Flowserve, 2014. *Concentrated Solar Power, Parabolic Trough & Power Tower. Flowserve,* pp. 1-5

F. Dinter, D. Mayorga Gonzalez, 2013. *Operability, reliability and economic benefits of CSP with thermal energy storage: first year of operation of ANDASOL 3. SolarPaces 2013.*

Integrated Pollution Prevention and Control (IPPC), 2001. Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems. *Integrated Pollution Prevention and Control*, December.

Neha Jain, 2013. *Reduction in Parasitic Load in Solar Thermal Power Plant to Improve its Efficiency. International Journal of Scientific Research and Reviews,* pp. 24-30.

NREL, 2013. *Concentrating Solar Power Projects.* [Online]
Available at: http://www.nrel.gov/csp/solarpaces/project_detail.cfm/projectID=117
[Accessed 23 October 2015].

P. Torcellini, N.Long and R. Judkoff, 2003. *Consumptive Water Use for U.S. Power Production.*

Paul Gauche, 2013. *Thermal Energy Systems, Session 4: Coal – Lecture Slides*

William B. Stine and Michael Geyer, 2001. *Power from the Sun.*

Renovetec, 2010. *Solar Thermal Power Plant Engineering: HTF System.* [Online]
Available at:

http://solarthermalpowerplant.com/htfsystemofsolarthermalpowerplants.html [Accessed 21 10 2015].

Robbie Mcelveen, Bill Martin, Ryan Smith and Baldor Electric, 2009. Recent Developments in Motor Technology Allow Direct Drive of Low Speed Cooling Tower Fans. *Cooling Technology Institute,* pp. 1-8.

Sargent & Lundy LLC Consulting Group, 2003. *Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts.* NREL, October, p. D16.

U.S. Department of Energy, 2001. *Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of Concentrating Solar Power Generation.*

UTE ANDSOL III, 2011. *4.1 Overall Plant General Specification (Andasol III)*

Appendix A
Calculated Results

Table of Contents

List of Tables

A.1 Introduction

The aim of this appendix is to show some of the key calculated results discussed in the main report.

The results of relationship between some of the main parasitic load consumers to the total generated energy are therefore presented below.

A.2 Determination of the average HTF pumps energy consumption to the average generated energy

Since the Heat Transfer Fluid (HTF) Pumps has been identified as the main consumer in Parabolic Trough Power plants, it was then found vital and necessary to determine the impact of the latter pumps to the total generated energy.

The respective calculations were performed for both July and November (typical summer and winter periods). The inputs and results of these calculations are shown in Table A-1 below.

The ratio of the consumed energy to the generated energy is not significantly affected by the change in season or amount of generated energy, and thus the HTF pumps' parasitic consumption is directly proportional to the generated energy. This finding highlights that the parasitic load consumption for the HTF pumps is directly proportional to the generated energy.

Table A-1: HTF Pumps Average Energy Consumption Vs Average Generated Energy

HTF Pumps Average Energy Consumption Vs Average Generated Energy		
Description	**July 2013**	**November 2013**
Average Generated Energy (MWh)	38.894	9.949
Average Consumed Energy (MWh)	1.300	0.343
Ratio of Consumed Energy to Generated Energy	3.34%	3.44%

A.3 Determination of the average Feedwater pumps energy consumption to the average generated energy

Table A-2 portrays the results for the comparison of the feedwater pumps energy consumption to the generated energy. The ratio of consumed energy to the generated energy is slightly lower in summer (July) than in winter (November).

Table A-2: Feedwater Pumps Average Energy Consumption Vs Average Generated Energy

Feedwater Pumps Average Energy Consumption Vs Average Generated Energy		
Description	**July 2013**	**November 2013**
Average Generated Energy (MWh)	38.894	9.949
Average Consumed Energy (MWh)	0.563	0.191
Ratio of Consumed Energy to Generated Energy	1.45%	1.92%

A.4 Determination of the average energy consumption by the cooling system to the average generated energy

Table A-3 portrays the results for the comparison of the cooling water system energy consumption to the generated energy. The consumption ratio is significantly higher in winter (November) than in summer (July); the difference is by a factor of about 3.5 between the two periods.

Table A-3: Cooling System Average Energy Consumption Vs Average Generated Energy

Cooling System Average Energy Consumption Vs Average Generated Energy		
Description	**July 2013**	**November 2013**
Average Generated Energy (MWh)	38.894	9.949
Average Consumed Energy (MWh)	0.681	0.610
Ratio of Consumed Energy to Generated Energy	1.75%	6.13%

A.5 Determination of the total parasitic load consumption to the generated energy

The total parasitic load consumption was found to be higher in July (typical summer month) as opposed to November (typical winter month).

Table A-4: Total Parasitic Load Consumption Vs Generated Energy

Total Parasitic Load Consumption Vs Generated Energy		
Description	**July 2013**	**November 2013**
Average Generated Energy (MWh)	38.894	9.949
Average Consumed Energy (MWh)	4.495	2.357
Ratio of Consumed Energy to Generated Energy	11.56%	23.69%

Appendix B

July and November 2013 Parasitic Load Data

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
1	2013-07-01 01:00	0.749	0.039	0.357	0.416	0.318	0.560	2.439	3.861	
2	2013-07-01 02:00	0.746	0.037	0.357	0.427	0.318	0.560	2.446	3.683	
3	2013-07-01 03:00	0.750	0.034	0.358	0.433	0.319	0.560	2.453	3.771	
4	2013-07-01 04:00	0.751	0.035	0.358	0.425	0.319	0.561	2.448	3.746	
5	2013-07-01 05:00	0.750	0.035	0.358	0.410	0.319	0.565	2.436	3.820	
6	2013-07-01 06:00	0.750	0.046	0.356	0.440	0.319	0.568	2.479	3.810	
7	2013-07-01 07:00	0.752	0.049	0.351	0.433	0.319	0.567	2.470	4.077	
8	2013-07-01 08:00	0.934	0.031	0.339	0.407	0.319	0.464	2.492	3.774	
9	2013-07-01 09:00	1.231	0.000	0.284	0.255	0.319	0.166	2.255	4.664	
10	2013-07-01 10:00	0.850	0.000	0.563	0.234	0.319	0.572	2.538	4.857	
11	2013-07-01 11:00	1.126	0.012	0.802	0.292	0.319	0.564	3.114	4.491	
12	2013-07-01 12:00	1.434	0.012	0.813	0.289	0.319	0.560	3.425	5.358	
13	2013-07-01 13:00	1.436	0.007	0.796	0.276	0.319	0.556	3.390	4.734	
14	2013-07-01 14:00	1.410	0.005	0.804	0.313	0.319	0.556	3.406	5.012	
15	2013-07-01 15:00	1.336	0.007	0.808	0.313	0.319	0.553	3.335	5.002	
16	2013-07-01 16:00	1.455	0.017	0.804	0.283	0.319	0.547	3.424	5.061	
17	2013-07-01 17:00	1.024	0.021	0.781	0.256	0.318	0.548	2.948	4.402	
18	2013-07-01 18:00	1.405	0.018	0.785	0.286	0.318	0.549	3.360	5.163	
19	2013-07-01 19:00	1.000	0.019	0.775	0.256	0.318	0.544	2.913	4.443	
20	2013-07-01 20:00	0.515	0.008	0.744	0.304	0.318	0.551	2.439	3.443	
21	2013-07-01 21:00	0.342	0.032	0.487	0.305	0.318	0.553	2.037	2.355	
22	2013-07-01 22:00	0.895	0.050	0.524	0.246	0.318	0.561	2.593	5.714	
23	2013-07-01 23:00	1.018	0.040	0.697	0.212	0.318	0.563	2.847	4.988	
24	2013-07-02 00:00	0.970	0.046	0.685	0.218	0.318	0.558	2.794	5.137	01-07-2013
25	2013-07-02 01:00	0.772	0.054	0.464	0.224	0.318	0.556	2.389	0.917	
26	2013-07-02 02:00	0.050	0.046	0.116	0.445	0.203	0.013	0.954	1.885	
27	2013-07-02 03:00	0.005	0.039	-0.001	0.446	0.180	0.000	0.738	1.413	
28	2013-07-02 04:00	0.009	0.038	-0.001	0.453	0.180	0.000	0.734	1.609	
29	2013-07-02 05:00	0.012	0.034	-0.001	0.494	0.179	0.000	0.775	1.319	
30	2013-07-02 06:00	0.017	0.030	-0.001	0.504	0.191	0.007	0.915	1.638	
31	2013-07-02 07:00	0.023	0.036	0.177	0.508	0.315	0.079	1.324	2.427	
32	2013-07-02 08:00	0.184	0.024	0.178	0.540	0.315	0.072	1.428	2.437	
33	2013-07-02 09:00	0.591	0.006	0.179	0.489	0.316	0.000	1.580	2.552	
34	2013-07-02 10:00	1.550	0.002	0.346	0.459	0.316	0.094	2.767	6.766	
35	2013-07-02 11:00	1.468	0.017	0.674	0.418	0.317	0.571	3.465	5.188	
36	2013-07-02 12:00	1.645	0.024	0.773	0.358	0.317	0.564	3.680	4.750	
37	2013-07-02 13:00	1.488	0.017	0.752	0.322	0.317	0.557	3.453	4.372	
38	2013-07-02 14:00	0.867	0.047	0.566	0.269	0.317	0.554	2.621	4.376	
39	2013-07-02 15:00	1.014	0.031	0.587	0.219	0.317	0.559	2.726	4.986	
40	2013-07-02 16:00	0.654	0.037	0.504	0.204	0.316	0.460	2.199	0.967	
41	2013-07-02 17:00	1.103	0.015	0.267	0.206	0.315	0.025	1.941	6.204	
42	2013-07-02 18:00	0.652	0.037	0.496	0.236	0.315	0.359	2.094	2.189	
43	2013-07-02 19:00	0.121	0.057	0.207	0.267	0.292	0.351	1.331	0.605	
44	2013-07-02 20:00	0.000	0.052	0.103	0.292	0.180	0.000	0.734	1.301	
45	2013-07-02 21:00	0.000	0.043	0.102	0.262	0.181	0.000	0.686	1.481	
46	2013-07-02 22:00	0.000	0.028	0.175	0.268	0.181	0.000	0.813	1.453	
47	2013-07-02 23:00	0.000	0.044	0.175	0.305	0.181	0.000	0.812	1.605	
48	2013-07-03 00:00	0.000	0.039	0.174	0.305	0.181	0.000	0.810	1.554	02-07-2013
49	2013-07-03 01:00	0.000	0.034	0.174	0.330	0.181	0.000	0.896	1.570	
50	2013-07-03 02:00	0.000	0.043	0.173	0.351	0.181	0.000	0.856	1.543	
51	2013-07-03 03:00	0.001	0.043	0.173	0.332	0.181	0.000	0.858	1.539	
52	2013-07-03 04:00	0.006	0.024	0.129	0.370	0.183	0.000	0.889	1.736	
53	2013-07-03 05:00	0.012	0.032	-0.001	0.391	0.227	0.000	0.820	1.753	
54	2013-07-03 06:00	0.018	0.041	0.117	0.468	0.237	0.007	1.035	1.929	
55	2013-07-03 07:00	0.024	0.004	0.178	0.450	0.315	0.094	1.279	2.369	
56	2013-07-03 08:00	0.345	0.022	0.180	0.420	0.316	0.160	1.508	2.403	
57	2013-07-03 09:00	0.537	0.004	0.182	0.433	0.316	0.066	1.539	2.627	
58	2013-07-03 10:00	1.409	0.000	0.472	0.391	0.317	0.148	2.736	7.453	
59	2013-07-03 11:00	2.361	0.009	0.817	0.256	0.318	0.565	4.324	6.180	
60	2013-07-03 12:00	2.399	0.005	0.831	0.230	0.318	0.561	4.343	6.173	
61	2013-07-03 13:00	2.610	0.014	0.827	0.216	0.319	0.561	4.547	6.480	
62	2013-07-03 14:00	2.545	0.004	0.824	0.211	0.319	0.562	4.465	6.661	
63	2013-07-03 15:00	2.316	0.017	0.805	0.200	0.320	0.555	4.212	5.775	
64	2013-07-03 16:00	0.636	0.026	0.558	0.219	0.320	0.552	2.311	2.745	
65	2013-07-03 17:00	0.814	0.024	0.535	0.283	0.320	0.554	2.529	4.671	
66	2013-07-03 18:00	0.722	0.037	0.424	0.264	0.320	0.558	2.323	3.376	
67	2013-07-03 19:00	1.018	0.037	0.494	0.232	0.320	0.555	2.655	4.398	
68	2013-07-03 20:00	1.026	0.037	0.487	0.365	0.320	0.559	2.793	4.194	
69	2013-07-03 21:00	0.996	0.031	0.425	0.420	0.320	0.557	2.748	4.126	
70	2013-07-03 22:00	1.000	0.030	0.423	0.457	0.320	0.560	2.789	4.239	
71	2013-07-03 23:00	0.999	0.035	0.425	0.458	0.319	0.559	2.796	4.105	
72	2013-07-04 00:00	0.998	0.032	0.427	0.478	0.319	0.558	2.812	4.281	03-07-2013
73	2013-07-04 01:00	0.996	0.038	0.428	0.460	0.319	0.562	2.803	4.401	
74	2013-07-04 02:00	0.931	0.041	0.401	0.462	0.319	0.563	2.716	1.543	
75	2013-07-04 03:00	0.024	0.041	0.072	0.637	0.318	0.012	1.194	1.996	
76	2013-07-04 04:00	0.006	0.045	-0.001	0.723	0.320	0.000	1.203	1.911	
77	2013-07-04 05:00	0.012	0.035	-0.001	0.723	0.320	0.000	1.199	1.798	
78	2013-07-04 06:00	0.019	0.033	0.041	0.733	0.319	0.007	1.300	1.978	
79	2013-07-04 07:00	0.025	0.035	0.171	0.706	0.320	0.079	1.543	2.482	
80	2013-07-04 08:00	0.315	0.032	0.179	0.654	0.320	0.079	1.642	2.412	
81	2013-07-04 09:00	0.597	0.000	0.190	0.678	0.320	0.026	1.811	4.556	
82	2013-07-04 10:00	2.038	0.012	0.618	0.466	0.320	0.355	3.808	6.598	
83	2013-07-04 11:00	2.862	0.001	0.809	0.296	0.320	0.570	4.856	7.053	
84	2013-07-04 12:00	3.117	0.011	0.831	0.287	0.320	0.567	5.133	7.419	
85	2013-07-04 13:00	3.256	-0.001	0.840	0.241	0.320	0.559	5.214	7.263	
86	2013-07-04 14:00	3.178	0.017	0.846	0.254	0.320	0.561	5.175	7.373	
87	2013-07-04 15:00	3.156	0.004	0.851	0.264	0.320	0.558	5.152	7.687	
88	2013-07-04 16:00	3.205	0.000	0.864	0.281	0.319	0.557	5.226	7.703	
89	2013-07-04 17:00	2.968	0.002	0.884	0.281	0.319	0.556	5.009	7.330	
90	2013-07-04 18:00	1.351	0.016	0.892	0.284	0.319	0.548	3.409	5.013	
91	2013-07-04 19:00	0.681	0.017	0.885	0.283	0.319	0.546	2.731	4.320	
92	2013-07-04 20:00	0.723	0.021	0.891	0.272	0.318	0.547	2.771	4.336	
93	2013-07-04 21:00	0.571	0.034	0.744	0.295	0.318	0.547	2.508	3.582	
94	2013-07-04 22:00	0.863	0.046	0.494	0.255	0.318	0.552	2.528	3.591	
95	2013-07-04 23:00	0.730	0.038	0.411	0.234	0.318	0.555	2.286	3.892	
96	2013-07-05 00:00	0.729	0.036	0.406	0.238	0.318	0.563	2.290	3.603	04-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
97	2013-07-05 01:00	0.726	0.037	0.401	0.253	0.318	0.568	2.301	3.644	
98	2013-07-05 02:00	0.724	0.046	0.395	0.273	0.317	0.528	2.283	3.505	
99	2013-07-05 03:00	0.721	0.029	0.389	0.296	0.317	0.150	1.903	3.121	
100	2013-07-05 04:00	0.716	0.039	0.380	0.298	0.317	0.152	1.901	3.200	
101	2013-07-05 05:00	0.715	0.029	0.369	0.314	0.317	0.153	1.896	3.307	
102	2013-07-05 06:00	0.710	0.034	0.364	0.329	0.317	0.154	1.908	3.403	
103	2013-07-05 07:00	0.710	0.041	0.374	0.320	0.317	0.155	1.917	3.346	
104	2013-07-05 08:00	0.832	0.021	0.361	0.258	0.317	0.359	2.148	3.800	
105	2013-07-05 09:00	1.149	-0.001	0.422	0.222	0.318	0.567	2.677	5.765	
106	2013-07-05 10:00	2.930	0.002	0.854	0.219	0.318	0.563	4.886	6.992	
107	2013-07-05 11:00	3.276	0.020	0.857	0.232	0.318	0.564	5.266	7.702	
108	2013-07-05 12:00	3.305	0.005	0.865	0.224	0.318	0.560	5.277	7.422	
109	2013-07-05 13:00	3.343	-0.001	0.871	0.214	0.318	0.558	5.303	7.529	
110	2013-07-05 14:00	3.344	-0.001	0.876	0.240	0.318	0.555	5.332	7.729	
111	2013-07-05 15:00	3.324	-0.001	0.877	0.258	0.318	0.550	5.327	7.350	
112	2013-07-05 16:00	1.649	0.000	0.443	0.240	0.159	0.549	5.290	7.569	
113	2013-07-05 17:00	3.314	0.000	0.891	0.263	0.318	0.551	5.336	7.299	
114	2013-07-05 18:00	3.018	0.000	0.896	0.263	0.318	0.556	5.050	6.967	
115	2013-07-05 19:00	1.393	0.011	0.844	0.247	0.318	0.551	3.363	5.094	
116	2013-07-05 20:00	1.134	0.009	0.867	0.262	0.317	0.547	3.136	4.494	
117	2013-07-05 21:00	0.437	0.025	0.669	0.305	0.317	0.546	2.299	2.814	
118	2013-07-05 22:00	0.553	0.053	0.270	0.277	0.317	0.557	2.027	3.572	
119	2013-07-05 23:00	0.808	0.079	0.532	0.269	0.317	0.566	2.571	4.535	
120	2013-07-06 00:00	0.712	0.064	0.526	0.264	0.317	0.560	2.442	4.049	05-07-2013
121	2013-07-06 01:00	0.719	0.031	0.531	0.284	0.317	0.562	2.444	4.332	
122	2013-07-06 02:00	0.730	0.043	0.532	0.290	0.317	0.561	2.474	3.995	
123	2013-07-06 03:00	0.731	0.040	0.522	0.302	0.318	0.565	2.477	3.820	
124	2013-07-06 04:00	0.729	0.034	0.523	0.301	0.318	0.566	2.471	3.820	
125	2013-07-06 05:00	0.725	0.033	0.523	0.290	0.318	0.439	2.327	3.878	
126	2013-07-06 06:00	0.717	0.053	0.524	0.285	0.318	0.153	2.049	3.595	
127	2013-07-06 07:00	0.722	0.039	0.521	0.297	0.318	0.154	2.050	3.938	
128	2013-07-06 08:00	0.920	0.029	0.376	0.258	0.318	0.155	2.055	3.372	
129	2013-07-06 09:00	1.235	0.003	0.493	0.222	0.318	0.442	2.713	5.950	
130	2013-07-06 10:00	3.046	0.015	0.889	0.205	0.318	0.579	5.052	7.226	
131	2013-07-06 11:00	3.135	0.001	0.908	0.207	0.318	0.571	5.139	7.290	
132	2013-07-06 12:00	3.186	0.019	0.905	0.201	0.318	0.568	5.198	6.903	
133	2013-07-06 13:00	3.200	0.013	0.890	0.210	0.318	0.563	5.194	7.418	
134	2013-07-06 14:00	3.193	-0.001	0.886	0.236	0.318	0.558	5.192	7.279	
135	2013-07-06 15:00	3.187	-0.001	0.890	0.252	0.318	0.554	5.201	7.265	
136	2013-07-06 16:00	3.183	0.004	0.895	0.243	0.318	0.553	5.196	7.288	
137	2013-07-06 17:00	3.179	0.011	0.901	0.240	0.318	0.551	5.200	7.293	
138	2013-07-06 18:00	3.174	0.000	0.906	0.255	0.318	0.552	5.204	7.390	
139	2013-07-06 19:00	3.029	0.003	0.903	0.240	0.318	0.551	5.041	6.789	
140	2013-07-06 20:00	1.705	0.014	0.898	0.285	0.317	0.549	3.767	5.650	
141	2013-07-06 21:00	0.622	0.034	0.812	0.283	0.317	0.545	2.612	3.244	
142	2013-07-06 22:00	0.634	0.058	0.465	0.227	0.317	0.553	2.252	3.864	
143	2013-07-06 23:00	0.724	0.039	0.558	0.267	0.317	0.551	2.455	4.138	
144	2013-07-07 00:00	0.730	0.036	0.553	0.281	0.316	0.549	2.465	4.047	06-07-2013
145	2013-07-07 01:00	0.734	0.042	0.548	0.300	0.316	0.557	2.497	3.998	
146	2013-07-07 02:00	0.727	0.037	0.543	0.285	0.317	0.557	2.466	3.979	
147	2013-07-07 03:00	0.720	0.041	0.539	0.308	0.317	0.485	2.410	3.718	
148	2013-07-07 04:00	0.715	0.041	0.529	0.284	0.317	0.151	2.037	3.454	
149	2013-07-07 05:00	0.733	0.034	0.530	0.289	0.317	0.152	2.055	3.389	
150	2013-07-07 06:00	0.724	0.038	0.521	0.278	0.317	0.154	2.032	3.482	
151	2013-07-07 07:00	0.716	0.041	0.502	0.311	0.317	0.155	2.043	3.485	
152	2013-07-07 08:00	0.915	0.018	0.398	0.285	0.318	0.207	2.139	3.369	
153	2013-07-07 09:00	1.149	-0.001	0.462	0.224	0.318	0.574	2.726	6.087	
154	2013-07-07 10:00	2.939	0.010	0.886	0.223	0.318	0.570	4.944	7.059	
155	2013-07-07 11:00	3.207	0.006	0.893	0.211	0.318	0.565	5.199	7.576	
156	2013-07-07 12:00	3.206	0.011	0.893	0.226	0.318	0.564	5.217	7.166	
157	2013-07-07 13:00	3.205	-0.001	0.901	0.267	0.318	0.557	5.246	7.470	
158	2013-07-07 14:00	3.203	-0.001	0.904	0.265	0.318	0.557	5.246	7.173	
159	2013-07-07 15:00	3.201	-0.001	0.907	0.275	0.318	0.556	5.255	7.438	
160	2013-07-07 16:00	3.199	0.011	0.909	0.248	0.318	0.550	5.236	7.243	
161	2013-07-07 17:00	3.198	0.010	0.912	0.263	0.318	0.547	5.246	7.289	
162	2013-07-07 18:00	3.199	0.004	0.916	0.268	0.318	0.545	5.249	7.237	
163	2013-07-07 19:00	2.776	0.004	0.912	0.270	0.317	0.545	4.824	6.795	
164	2013-07-07 20:00	1.627	0.012	0.922	0.292	0.317	0.545	3.716	5.187	
165	2013-07-07 21:00	0.581	0.023	0.813	0.278	0.317	0.545	2.558	3.539	
166	2013-07-07 22:00	0.738	0.051	0.530	0.211	0.317	0.549	2.395	3.957	
167	2013-07-07 23:00	0.873	0.049	0.539	0.339	0.317	0.557	2.673	3.916	
168	2013-07-08 00:00	0.780	0.030	0.420	0.389	0.317	0.340	2.276	3.815	07-07-2013
169	2013-07-08 01:00	0.710	0.054	0.493	0.285	0.317	0.152	2.010	3.537	
170	2013-07-08 02:00	0.711	0.058	0.506	0.291	0.317	0.153	2.034	3.467	
171	2013-07-08 03:00	0.711	0.033	0.502	0.303	0.317	0.153	2.018	3.581	
172	2013-07-08 04:00	0.709	0.034	0.503	0.288	0.317	0.154	2.005	3.450	
173	2013-07-08 05:00	0.703	0.027	0.501	0.298	0.317	0.154	2.001	3.614	
174	2013-07-08 06:00	0.709	0.038	0.499	0.322	0.318	0.155	2.040	3.459	
175	2013-07-08 07:00	0.716	0.043	0.488	0.314	0.318	0.155	2.035	3.702	
176	2013-07-08 08:00	0.895	0.021	0.415	0.275	0.318	0.172	2.095	3.158	
177	2013-07-08 09:00	1.179	0.001	0.432	0.231	0.318	0.572	2.732	6.091	
178	2013-07-08 10:00	2.946	0.008	0.883	0.213	0.318	0.568	4.935	7.094	
179	2013-07-08 11:00	3.183	0.018	0.901	0.222	0.317	0.557	5.198	7.254	
180	2013-07-08 12:00	3.151	0.012	0.884	0.229	0.317	0.555	5.148	6.915	
181	2013-07-08 13:00	3.088	0.005	0.893	0.254	0.317	0.554	5.111	7.089	
182	2013-07-08 14:00	3.090	0.017	0.893	0.265	0.317	0.552	5.135	7.362	
183	2013-07-08 15:00	3.097	0.005	0.883	0.248	0.317	0.548	5.098	7.084	
184	2013-07-08 16:00	2.324	0.000	0.668	0.268	0.238	0.544	5.118	7.088	
185	2013-07-08 17:00	3.090	-0.001	0.905	0.281	0.317	0.542	5.135	7.048	
186	2013-07-08 18:00	1.792	0.000	0.535	0.245	0.185	0.546	5.096	7.086	
187	2013-07-08 19:00	2.658	0.006	0.896	0.283	0.317	0.548	4.708	6.361	
188	2013-07-08 20:00	1.199	0.016	0.871	0.273	0.317	0.542	3.218	4.757	
189	2013-07-08 21:00	0.519	0.022	0.703	0.265	0.317	0.543	2.369	3.217	
190	2013-07-08 22:00	0.815	0.056	0.470	0.220	0.317	0.551	2.429	4.016	
191	2013-07-08 23:00	0.538	0.040	0.524	0.290	0.318	0.557	2.266	3.794	
192	2013-07-09 00:00	0.540	0.031	0.504	0.307	0.318	0.466	2.165	3.651	08-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
193	2013-07-09 01:00	0.541	0.037	0.500	0.336	0.318	0.334	2.065	3.572	
194	2013-07-09 02:00	0.542	0.031	0.495	0.341	0.318	0.337	2.063	3.572	
195	2013-07-09 03:00	0.544	0.035	0.497	0.321	0.318	0.337	2.050	3.579	
196	2013-07-09 04:00	0.545	0.030	0.492	0.327	0.319	0.337	2.049	3.487	
197	2013-07-09 05:00	0.546	0.037	0.494	0.335	0.319	0.193	1.924	3.397	
198	2013-07-09 06:00	0.548	0.039	0.496	0.341	0.320	0.154	1.898	3.345	
199	2013-07-09 07:00	0.563	0.039	0.493	0.343	0.318	0.170	1.926	3.570	
200	2013-07-09 08:00	0.820	0.026	0.362	0.292	0.317	0.562	2.378	3.685	
201	2013-07-09 09:00	1.028	0.003	0.403	0.207	0.317	0.564	2.522	5.142	
202	2013-07-09 10:00	2.372	0.015	0.805	0.228	0.317	0.563	4.299	6.342	
203	2013-07-09 11:00	3.022	0.019	0.903	0.239	0.317	0.562	5.061	7.164	
204	2013-07-09 12:00	2.471	0.010	0.910	0.268	0.318	0.558	4.534	6.441	
205	2013-07-09 13:00	2.819	0.018	0.887	0.284	0.318	0.558	4.883	6.888	
206	2013-07-09 14:00	2.645	0.003	0.908	0.261	0.318	0.555	4.689	6.847	
207	2013-07-09 15:00	2.547	0.000	0.912	0.248	0.318	0.550	4.574	6.634	
208	2013-07-09 16:00	2.393	0.007	0.907	0.275	0.318	0.545	4.444	6.406	
209	2013-07-09 17:00	2.598	0.021	0.847	0.294	0.318	0.545	4.623	6.431	
210	2013-07-09 18:00	0.687	0.048	0.469	0.359	0.318	0.542	2.422	2.237	
211	2013-07-09 19:00	0.843	0.048	0.379	0.304	0.318	0.549	2.440	4.751	
212	2013-07-09 20:00	1.020	0.017	0.463	0.240	0.318	0.550	2.607	4.293	
213	2013-07-09 21:00	0.422	0.044	0.379	0.184	0.318	0.548	1.894	2.847	
214	2013-07-09 22:00	0.611	0.038	0.412	0.221	0.318	0.552	2.152	3.922	
215	2013-07-09 23:00	0.585	0.040	0.463	0.257	0.318	0.557	2.220	4.035	
216	2013-07-10 00:00	0.555	0.035	0.458	0.305	0.318	0.549	2.220	3.794	09-07-2013
217	2013-07-10 01:00	0.532	0.034	0.456	0.324	0.318	0.552	2.217	3.966	
218	2013-07-10 02:00	0.532	0.032	0.454	0.298	0.318	0.555	2.189	3.705	
219	2013-07-10 03:00	0.532	0.032	0.452	0.300	0.318	0.554	2.187	3.893	
220	2013-07-10 04:00	0.505	0.052	0.412	0.351	0.318	0.557	2.196	0.870	
221	2013-07-10 05:00	0.009	0.041	0.044	0.558	0.216	0.025	0.982	1.548	
222	2013-07-10 06:00	0.008	0.039	0.013	0.571	0.182	0.000	0.915	1.265	
223	2013-07-10 07:00	0.015	0.006	0.178	0.538	0.182	0.000	1.096	1.763	
224	2013-07-10 08:00	0.254	0.039	0.181	0.533	0.249	0.078	1.422	2.176	
225	2013-07-10 09:00	0.523	0.004	0.185	0.521	0.316	0.157	1.705	3.786	
226	2013-07-10 10:00	1.088	-0.001	0.428	0.557	0.317	0.339	2.728	5.839	
227	2013-07-10 11:00	1.312	-0.001	0.823	0.432	0.318	0.560	3.416	5.493	
228	2013-07-10 12:00	1.663	-0.001	0.851	0.365	0.319	0.559	3.756	5.301	
229	2013-07-10 13:00	1.666	0.009	0.846	0.289	0.319	0.555	3.684	5.641	
230	2013-07-10 14:00	2.035	-0.001	0.861	0.264	0.318	0.548	4.021	5.655	
231	2013-07-10 15:00	1.942	0.001	0.860	0.256	0.317	0.547	3.907	5.918	
232	2013-07-10 16:00	1.951	0.008	0.863	0.286	0.317	0.543	3.967	6.170	
233	2013-07-10 17:00	2.521	0.005	0.885	0.280	0.317	0.542	4.585	6.394	
234	2013-07-10 18:00	1.921	0.021	0.879	0.292	0.317	0.542	3.971	5.973	
235	2013-07-10 19:00	1.399	0.006	0.865	0.317	0.317	0.541	3.445	5.323	
236	2013-07-10 20:00	0.745	0.008	0.679	0.286	0.317	0.444	2.479	0.672	
237	2013-07-10 21:00	0.543	0.041	0.273	0.299	0.317	0.090	1.563	3.851	
238	2013-07-10 22:00	0.587	0.058	0.359	0.260	0.317	0.304	1.884	4.110	
239	2013-07-10 23:00	0.471	0.039	0.339	0.209	0.317	0.556	1.930	3.385	
240	2013-07-11 00:00	0.550	0.037	0.390	0.235	0.318	0.553	2.082	3.711	10-07-2013
241	2013-07-11 01:00	0.584	0.047	0.445	0.240	0.318	0.554	2.187	3.628	
242	2013-07-11 02:00	0.542	0.033	0.416	0.305	0.318	0.552	2.167	3.508	
243	2013-07-11 03:00	0.534	0.035	0.404	0.306	0.318	0.465	2.061	3.460	
244	2013-07-11 04:00	0.519	0.038	0.401	0.297	0.318	0.151	1.723	2.929	
245	2013-07-11 05:00	0.520	0.037	0.398	0.294	0.319	0.152	1.719	3.053	
246	2013-07-11 06:00	0.521	0.033	0.395	0.306	0.319	0.171	1.744	3.249	
247	2013-07-11 07:00	0.524	0.057	0.392	0.271	0.319	0.381	1.944	3.539	
248	2013-07-11 08:00	0.708	0.042	0.320	0.251	0.319	0.564	2.204	3.305	
249	2013-07-11 09:00	0.921	0.001	0.332	0.229	0.320	0.566	2.368	4.919	
250	2013-07-11 10:00	1.630	0.001	0.811	0.232	0.320	0.561	3.553	5.734	
251	2013-07-11 11:00	2.438	0.019	0.884	0.242	0.319	0.556	4.458	6.408	
252	2013-07-11 12:00	2.426	0.008	0.889	0.241	0.319	0.551	4.434	6.395	
253	2013-07-11 13:00	2.549	0.000	0.900	0.222	0.318	0.552	4.541	6.473	
254	2013-07-11 14:00	2.937	0.007	0.908	0.248	0.318	0.552	4.969	6.844	
255	2013-07-11 15:00	2.628	0.016	0.909	0.249	0.318	0.550	4.670	6.666	
256	2013-07-11 16:00	2.669	-0.001	0.910	0.255	0.317	0.549	4.699	6.753	
257	2013-07-11 17:00	2.161	0.005	0.910	0.275	0.317	0.547	4.215	5.880	
258	2013-07-11 18:00	1.757	0.015	0.898	0.265	0.317	0.545	3.795	5.645	
259	2013-07-11 19:00	1.250	0.015	0.880	0.255	0.317	0.547	3.264	4.651	
260	2013-07-11 20:00	1.048	0.021	0.809	0.275	0.317	0.541	3.011	4.283	
261	2013-07-11 21:00	0.549	0.041	0.597	0.285	0.317	0.540	2.331	2.679	
262	2013-07-11 22:00	0.845	0.050	0.443	0.274	0.318	0.546	2.476	5.285	
263	2013-07-11 23:00	1.024	0.040	0.671	0.228	0.318	0.550	2.831	4.696	
264	2013-07-12 00:00	1.027	0.031	0.671	0.228	0.318	0.551	2.825	4.574	11-07-2013
265	2013-07-12 01:00	1.049	0.040	0.675	0.204	0.319	0.556	2.842	4.945	
266	2013-07-12 02:00	1.047	0.040	0.677	0.229	0.319	0.559	2.870	4.677	
267	2013-07-12 03:00	1.033	0.034	0.679	0.216	0.318	0.560	2.840	4.811	
268	2013-07-12 04:00	0.994	0.039	0.681	0.232	0.317	0.557	2.821	4.665	
269	2013-07-12 05:00	0.990	0.040	0.681	0.216	0.316	0.557	2.801	5.040	
270	2013-07-12 06:00	0.629	0.055	0.385	0.277	0.293	0.382	2.037	0.012	
271	2013-07-12 07:00	0.014	0.038	-0.001	0.446	0.185	0.000	0.745	1.173	
272	2013-07-12 08:00	0.663	0.036	-0.001	0.462	0.183	0.000	1.355	1.750	
273	2013-07-12 09:00	0.164	0.022	-0.001	0.469	0.182	0.000	0.925	1.629	
274	2013-07-12 10:00	0.642	0.018	0.148	0.483	0.315	0.144	1.750	2.871	
275	2013-07-12 11:00	2.101	0.020	0.212	0.401	0.316	0.191	3.241	6.906	
276	2013-07-12 12:00	0.686	0.024	0.483	0.251	0.316	0.555	2.314	3.573	
277	2013-07-12 13:00	0.292	0.041	0.447	0.326	0.316	0.549	1.970	2.599	
278	2013-07-12 14:00	0.541	0.052	0.248	0.297	0.316	0.555	2.009	3.878	
279	2013-07-12 15:00	0.852	0.037	0.511	0.292	0.315	0.556	2.563	2.174	
280	2013-07-12 16:00	0.215	0.030	0.178	0.480	0.240	0.096	1.238	1.102	
281	2013-07-12 17:00	0.057	0.034	0.173	0.500	0.185	0.000	0.992	1.433	
282	2013-07-12 18:00	0.000	0.033	0.013	0.449	0.185	0.000	0.763	1.299	
283	2013-07-12 19:00	0.000	0.034	-0.001	0.514	0.184	0.000	0.814	1.405	
284	2013-07-12 20:00	0.000	0.039	-0.001	0.505	0.184	0.000	0.825	1.405	
285	2013-07-12 21:00	0.000	0.039	-0.001	0.544	0.183	0.000	0.876	1.450	
286	2013-07-12 22:00	0.000	0.032	0.085	0.575	0.183	0.000	1.031	1.680	
287	2013-07-12 23:00	0.000	0.022	-0.001	0.538	0.182	0.000	0.898	1.568	
288	2013-07-13 00:00	0.000	0.039	0.014	0.549	0.182	0.000	0.893	1.576	12-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
289	2013-07-13 01:00	0.000	0.039	0.028	0.556	0.182	0.000	0.917	1.551	
290	2013-07-13 02:00	0.002	0.035	-0.001	0.595	0.182	0.000	0.981	1.525	
291	2013-07-13 03:00	0.004	0.052	0.073	0.592	0.182	0.000	1.014	1.552	
292	2013-07-13 04:00	0.007	0.028	-0.001	0.633	0.182	0.000	1.014	1.610	
293	2013-07-13 05:00	0.009	0.038	-0.001	0.601	0.182	0.000	0.949	1.562	
294	2013-07-13 06:00	0.012	0.031	0.160	0.585	0.182	0.000	1.133	1.688	
295	2013-07-13 07:00	0.017	0.026	0.175	0.609	0.257	0.067	1.377	2.317	
296	2013-07-13 08:00	0.292	0.000	0.176	0.637	0.316	0.160	1.693	2.492	
297	2013-07-13 09:00	0.908	0.000	0.181	0.656	0.316	0.158	2.219	4.942	
298	2013-07-13 10:00	2.486	0.006	0.675	0.462	0.316	0.468	4.412	7.319	
299	2013-07-13 11:00	2.983	0.003	0.886	0.214	0.316	0.562	4.964	6.791	
300	2013-07-13 12:00	3.048	0.003	0.910	0.204	0.317	0.559	5.040	7.044	
301	2013-07-13 13:00	3.064	0.015	0.918	0.221	0.317	0.553	5.088	7.063	
302	2013-07-13 14:00	2.978	0.008	0.907	0.221	0.317	0.551	4.983	6.755	
303	2013-07-13 15:00	3.083	0.012	0.909	0.248	0.317	0.546	5.115	7.224	
304	2013-07-13 16:00	3.106	0.013	0.918	0.226	0.317	0.546	5.127	6.532	
305	2013-07-13 17:00	1.013	0.033	0.607	0.229	0.317	0.543	2.740	3.988	
306	2013-07-13 18:00	0.987	0.024	0.590	0.281	0.317	0.545	2.743	4.744	
307	2013-07-13 19:00	0.877	0.038	0.580	0.246	0.317	0.545	2.602	3.449	
308	2013-07-13 20:00	1.303	0.014	0.638	0.254	0.317	0.548	3.073	5.317	
309	2013-07-13 21:00	0.870	0.037	0.655	0.210	0.317	0.546	2.634	2.997	
310	2013-07-13 22:00	0.651	0.042	0.338	0.280	0.317	0.551	2.180	3.475	
311	2013-07-13 23:00	0.670	0.036	0.336	0.284	0.317	0.554	2.197	3.541	
312	2013-07-14 00:00	0.602	0.047	0.297	0.313	0.317	0.557	2.133	3.283	13-07-2013
313	2013-07-14 01:00	0.584	0.049	0.247	0.320	0.318	0.561	2.079	3.228	
314	2013-07-14 02:00	0.573	0.028	0.230	0.342	0.318	0.494	1.985	3.139	
315	2013-07-14 03:00	0.553	0.031	0.226	0.337	0.318	0.149	1.613	2.912	
316	2013-07-14 04:00	0.545	0.038	0.225	0.326	0.318	0.150	1.601	3.112	
317	2013-07-14 05:00	0.538	0.033	0.223	0.293	0.319	0.151	1.556	2.950	
318	2013-07-14 06:00	0.535	0.035	0.221	0.296	0.319	0.152	1.558	2.780	
319	2013-07-14 07:00	0.553	0.034	0.220	0.343	0.319	0.153	1.622	2.863	
320	2013-07-14 08:00	0.741	0.032	0.231	0.344	0.319	0.155	1.822	3.678	
321	2013-07-14 09:00	1.102	0.003	0.295	0.303	0.319	0.172	2.194	4.127	
322	2013-07-14 10:00	1.381	0.000	0.729	0.258	0.319	0.574	3.260	5.622	
323	2013-07-14 11:00	2.092	0.000	0.882	0.235	0.319	0.560	4.087	5.731	
324	2013-07-14 12:00	2.362	0.009	0.889	0.271	0.319	0.561	4.411	6.071	
325	2013-07-14 13:00	2.456	0.006	0.897	0.260	0.320	0.558	4.497	6.436	
326	2013-07-14 14:00	2.661	0.009	0.896	0.254	0.320	0.563	4.703	6.517	
327	2013-07-14 15:00	2.664	0.018	0.891	0.270	0.320	0.561	4.724	6.933	
328	2013-07-14 16:00	2.753	0.005	0.890	0.236	0.320	0.558	4.762	6.694	
329	2013-07-14 17:00	3.043	0.005	0.912	0.258	0.319	0.559	5.095	7.381	
330	2013-07-14 18:00	3.052	0.009	0.910	0.273	0.319	0.559	5.122	7.245	
331	2013-07-14 19:00	2.544	0.006	0.903	0.272	0.319	0.558	4.602	6.248	
332	2013-07-14 20:00	1.062	0.017	0.866	0.272	0.319	0.555	3.092	4.775	
333	2013-07-14 21:00	0.607	0.034	0.764	0.258	0.319	0.553	2.533	2.974	
334	2013-07-14 22:00	0.635	0.047	0.388	0.225	0.319	0.554	2.167	3.830	
335	2013-07-14 23:00	0.762	0.034	0.503	0.243	0.319	0.560	2.420	4.017	
336	2013-07-15 00:00	0.756	0.030	0.499	0.303	0.318	0.557	2.464	3.964	14-07-2013
337	2013-07-15 01:00	0.745	0.030	0.469	0.314	0.318	0.507	2.382	3.824	
338	2013-07-15 02:00	0.739	0.035	0.465	0.290	0.318	0.559	2.404	4.000	
339	2013-07-15 03:00	0.733	0.042	0.464	0.283	0.318	0.557	2.397	3.733	
340	2013-07-15 04:00	0.725	0.028	0.462	0.274	0.318	0.152	1.959	3.607	
341	2013-07-15 05:00	0.708	0.036	0.461	0.279	0.317	0.153	1.955	3.352	
342	2013-07-15 06:00	0.714	0.034	0.460	0.298	0.317	0.154	1.976	3.445	
343	2013-07-15 07:00	0.716	0.034	0.460	0.289	0.317	0.155	1.971	3.526	
344	2013-07-15 08:00	0.802	0.028	0.424	0.270	0.317	0.274	2.115	3.592	
345	2013-07-15 09:00	1.041	0.002	0.374	0.206	0.317	0.571	2.510	5.115	
346	2013-07-15 10:00	2.532	0.006	0.879	0.216	0.317	0.568	4.518	6.883	
347	2013-07-15 11:00	3.084	0.012	0.895	0.246	0.318	0.563	5.117	7.154	
348	2013-07-15 12:00	3.088	0.001	0.895	0.259	0.318	0.559	5.120	7.201	
349	2013-07-15 13:00	3.085	0.015	0.896	0.249	0.318	0.559	5.121	7.223	
350	2013-07-15 14:00	2.902	0.007	0.898	0.258	0.318	0.555	4.937	6.954	
351	2013-07-15 15:00	2.706	0.003	0.901	0.253	0.318	0.553	4.732	6.596	
352	2013-07-15 16:00	2.749	0.019	0.903	0.244	0.318	0.551	4.784	7.014	
353	2013-07-15 17:00	2.587	0.008	0.907	0.276	0.318	0.548	4.644	6.599	
354	2013-07-15 18:00	1.865	0.014	0.902	0.269	0.318	0.546	3.914	5.840	
355	2013-07-15 19:00	1.601	0.003	0.915	0.256	0.318	0.542	3.634	5.389	
356	2013-07-15 20:00	1.106	0.021	0.878	0.269	0.317	0.540	3.132	4.565	
357	2013-07-15 21:00	0.481	0.030	0.641	0.237	0.317	0.540	2.246	2.875	
358	2013-07-15 22:00	0.789	0.057	0.379	0.237	0.317	0.549	2.328	3.929	
359	2013-07-15 23:00	0.654	0.050	0.509	0.252	0.317	0.553	2.334	4.029	
360	2013-07-16 00:00	0.576	0.034	0.515	0.327	0.317	0.550	2.318	3.946	15-07-2013
361	2013-07-16 01:00	0.563	0.034	0.508	0.350	0.317	0.520	2.290	3.787	
362	2013-07-16 02:00	0.554	0.037	0.504	0.314	0.317	0.150	1.875	3.330	
363	2013-07-16 03:00	0.546	0.037	0.504	0.288	0.317	0.151	1.841	3.287	
364	2013-07-16 04:00	0.513	0.036	0.504	0.299	0.317	0.152	1.820	3.381	
365	2013-07-16 05:00	0.506	0.033	0.504	0.300	0.317	0.153	1.812	3.338	
366	2013-07-16 06:00	0.498	0.049	0.504	0.307	0.317	0.154	1.827	3.436	
367	2013-07-16 07:00	0.506	0.032	0.499	0.322	0.317	0.154	1.829	3.467	
368	2013-07-16 08:00	0.681	0.023	0.424	0.274	0.317	0.155	1.872	3.111	
369	2013-07-16 09:00	1.116	-0.001	0.374	0.184	0.317	0.255	2.245	4.754	
370	2013-07-16 10:00	2.245	0.013	0.814	0.239	0.317	0.568	4.194	7.255	
371	2013-07-16 11:00	2.948	0.010	0.854	0.241	0.317	0.565	4.934	7.058	
372	2013-07-16 12:00	2.786	0.009	0.850	0.240	0.317	0.555	4.757	6.945	
373	2013-07-16 13:00	2.784	0.000	0.860	0.265	0.317	0.551	4.776	6.921	
374	2013-07-16 14:00	2.793	0.000	0.863	0.275	0.318	0.550	4.797	6.661	
375	2013-07-16 15:00	2.800	0.000	0.864	0.289	0.318	0.552	4.822	7.041	
376	2013-07-16 16:00	2.802	0.005	0.865	0.257	0.317	0.549	4.795	6.691	
377	2013-07-16 17:00	2.798	0.012	0.866	0.278	0.317	0.551	4.821	7.189	
378	2013-07-16 18:00	2.135	0.011	0.864	0.264	0.317	0.549	4.139	5.960	
379	2013-07-16 19:00	1.559	0.015	0.824	0.267	0.317	0.546	3.529	5.367	
380	2013-07-16 20:00	0.765	-0.001	0.869	0.284	0.317	0.544	2.777	4.187	
381	2013-07-16 21:00	0.588	0.035	0.723	0.277	0.317	0.541	2.480	2.916	
382	2013-07-16 22:00	0.651	0.049	0.393	0.236	0.317	0.439	2.085	3.689	
383	2013-07-16 23:00	0.484	0.041	0.462	0.228	0.316	0.151	1.683	3.519	
384	2013-07-17 00:00	0.478	0.032	0.503	0.314	0.316	0.152	1.795	3.268	16-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
385	2013-07-17 01:00	0.479	0.035	0.503	0.315	0.316	0.153	1.800	3.472	
386	2013-07-17 02:00	0.490	0.038	0.499	0.331	0.316	0.153	1.827	3.237	
387	2013-07-17 03:00	0.511	0.033	0.497	0.336	0.316	0.154	1.846	3.394	
388	2013-07-17 04:00	0.504	0.035	0.499	0.339	0.316	0.155	1.848	3.204	
389	2013-07-17 05:00	0.508	0.029	0.501	0.303	0.316	0.155	1.811	3.369	
390	2013-07-17 06:00	0.507	0.035	0.506	0.308	0.316	0.156	1.828	3.411	
391	2013-07-17 07:00	0.509	0.039	0.502	0.298	0.316	0.156	1.820	3.432	
392	2013-07-17 08:00	0.713	0.034	0.417	0.303	0.317	0.257	2.040	3.058	
393	2013-07-17 09:00	1.020	0.002	0.328	0.202	0.317	0.569	2.437	5.045	
394	2013-07-17 10:00	2.572	0.015	0.808	0.221	0.317	0.563	4.496	6.562	
395	2013-07-17 11:00	2.816	0.008	0.837	0.221	0.317	0.560	4.758	6.861	
396	2013-07-17 12:00	2.844	0.007	0.858	0.262	0.318	0.558	4.845	6.426	
397	2013-07-17 13:00	2.878	0.020	0.856	0.261	0.318	0.553	4.885	7.028	
398	2013-07-17 14:00	2.888	0.019	0.860	0.262	0.318	0.552	4.898	7.091	
399	2013-07-17 15:00	2.835	0.002	0.867	0.265	0.318	0.551	4.838	6.893	
400	2013-07-17 16:00	2.829	-0.001	0.871	0.277	0.318	0.549	4.843	6.788	
401	2013-07-17 17:00	2.392	0.033	0.783	0.285	0.318	0.548	4.359	5.793	
402	2013-07-17 18:00	1.011	0.034	0.505	0.278	0.318	0.546	2.692	3.747	
403	2013-07-17 19:00	1.079	0.026	0.462	0.287	0.318	0.547	2.719	4.991	
404	2013-07-17 20:00	0.875	0.027	0.668	0.297	0.318	0.543	2.728	3.586	
405	2013-07-17 21:00	0.344	0.047	0.360	0.294	0.317	0.540	1.903	2.224	
406	2013-07-17 22:00	0.553	0.040	0.353	0.258	0.317	0.410	1.930	4.286	
407	2013-07-17 23:00	0.449	0.033	0.467	0.302	0.317	0.198	1.766	3.133	
408	2013-07-18 00:00	0.459	0.033	0.468	0.323	0.317	0.151	1.750	3.256	17-07-2013
409	2013-07-18 01:00	0.456	0.034	0.461	0.364	0.317	0.151	1.783	3.153	
410	2013-07-18 02:00	0.458	0.047	0.438	0.350	0.317	0.152	1.761	3.149	
411	2013-07-18 03:00	0.454	0.035	0.454	0.355	0.317	0.153	1.767	3.192	
412	2013-07-18 04:00	0.468	0.027	0.458	0.351	0.317	0.154	1.774	3.187	
413	2013-07-18 05:00	0.468	0.032	0.454	0.395	0.316	0.155	1.820	3.186	
414	2013-07-18 06:00	0.459	0.038	0.436	0.388	0.316	0.156	1.793	3.144	
415	2013-07-18 07:00	0.435	0.054	0.433	0.360	0.316	0.156	1.754	3.340	
416	2013-07-18 08:00	0.676	0.023	0.387	0.340	0.316	0.156	1.898	3.045	
417	2013-07-18 09:00	1.107	0.002	0.337	0.223	0.317	0.156	2.141	4.364	
418	2013-07-18 10:00	1.882	0.014	0.783	0.211	0.317	0.407	3.613	5.917	
419	2013-07-18 11:00	2.395	0.018	0.847	0.250	0.317	0.560	4.387	6.434	
420	2013-07-18 12:00	2.595	0.005	0.843	0.302	0.317	0.555	4.617	6.742	
421	2013-07-18 13:00	2.613	0.017	0.838	0.317	0.317	0.552	4.654	6.863	
422	2013-07-18 14:00	2.440	0.015	0.837	0.336	0.318	0.548	4.494	6.894	
423	2013-07-18 15:00	2.417	0.001	0.837	0.313	0.318	0.547	4.432	6.659	
424	2013-07-18 16:00	2.301	-0.001	0.838	0.316	0.318	0.543	4.315	6.606	
425	2013-07-18 17:00	1.940	0.013	0.836	0.320	0.318	0.541	3.969	5.800	
426	2013-07-18 18:00	0.881	0.029	0.728	0.295	0.318	0.538	2.788	3.824	
427	2013-07-18 19:00	1.159	0.020	0.592	0.304	0.317	0.540	2.931	4.704	
428	2013-07-18 20:00	0.950	0.016	0.771	0.286	0.317	0.541	2.881	4.605	
429	2013-07-18 21:00	0.469	0.037	0.638	0.281	0.317	0.538	2.279	2.611	
430	2013-07-18 22:00	0.468	0.037	0.321	0.263	0.317	0.551	1.956	3.593	
431	2013-07-18 23:00	0.457	0.021	0.433	0.286	0.317	0.196	1.710	3.001	
432	2013-07-19 00:00	0.432	0.034	0.420	0.351	0.317	0.153	1.705	2.989	18-07-2013
433	2013-07-19 01:00	0.437	0.031	0.399	0.376	0.317	0.153	1.713	3.025	
434	2013-07-19 02:00	0.450	0.040	0.414	0.362	0.317	0.154	1.737	3.279	
435	2013-07-19 03:00	0.469	0.023	0.446	0.339	0.317	0.155	1.748	3.230	
436	2013-07-19 04:00	0.504	0.032	0.469	0.318	0.317	0.155	1.796	3.424	
437	2013-07-19 05:00	0.505	0.044	0.461	0.330	0.317	0.156	1.813	3.204	
438	2013-07-19 06:00	0.521	0.028	0.469	0.341	0.317	0.156	1.831	3.564	
439	2013-07-19 07:00	0.571	0.044	0.471	0.331	0.317	0.157	1.890	3.426	
440	2013-07-19 08:00	0.842	0.037	0.403	0.343	0.213	0.157	1.994	3.085	
441	2013-07-19 09:00	1.351	0.000	0.338	0.220	0.000	0.256	2.164	5.206	
442	2013-07-19 10:00	2.779	0.015	0.800	0.210	0.000	0.563	4.366	6.933	
443	2013-07-19 11:00	2.535	0.008	0.847	0.231	0.000	0.552	4.172	6.240	
444	2013-07-19 12:00	3.081	0.012	0.854	0.244	0.000	0.551	4.742	6.776	
445	2013-07-19 13:00	3.081	0.012	0.859	0.269	0.000	0.549	4.770	7.407	
446	2013-07-19 14:00	3.074	0.000	0.863	0.271	0.000	0.549	4.756	7.074	
447	2013-07-19 15:00	3.067	0.000	0.868	0.246	0.000	0.545	4.724	7.161	
448	2013-07-19 16:00	3.060	0.014	0.869	0.281	0.000	0.540	4.764	7.129	
449	2013-07-19 17:00	3.053	0.003	0.870	0.273	0.000	0.540	4.738	7.113	
450	2013-07-19 18:00	2.922	0.000	0.872	0.282	0.000	0.544	4.619	6.884	
451	2013-07-19 19:00	1.551	0.017	0.853	0.285	0.000	0.542	3.249	5.208	
452	2013-07-19 20:00	0.737	0.023	0.836	0.271	0.000	0.541	2.408	4.066	
453	2013-07-19 21:00	0.472	0.044	0.595	0.277	0.000	0.537	1.925	2.414	
454	2013-07-19 22:00	0.707	0.052	0.454	0.240	0.000	0.420	1.872	4.515	
455	2013-07-19 23:00	0.765	0.034	0.588	0.283	0.000	0.151	1.820	3.673	
456	2013-07-20 00:00	0.744	0.035	0.555	0.346	0.000	0.152	1.831	3.621	19-07-2013
457	2013-07-20 01:00	0.728	0.035	0.541	0.383	0.000	0.309	1.995	3.788	
458	2013-07-20 02:00	0.628	0.040	0.504	0.348	0.000	0.341	1.860	3.431	
459	2013-07-20 03:00	0.479	0.035	0.496	0.314	0.000	0.215	1.537	3.372	
460	2013-07-20 04:00	0.482	0.035	0.505	0.298	0.000	0.153	1.472	3.302	
461	2013-07-20 05:00	0.473	0.026	0.507	0.307	0.000	0.154	1.467	3.459	
462	2013-07-20 06:00	0.462	0.034	0.506	0.300	0.000	0.155	1.456	3.346	
463	2013-07-20 07:00	0.513	0.039	0.509	0.317	0.000	0.155	1.533	3.476	
464	2013-07-20 08:00	0.796	0.029	0.440	0.296	0.000	0.155	1.716	3.208	
465	2013-07-20 09:00	1.137	0.002	0.296	0.211	0.000	0.155	1.799	4.176	
466	2013-07-20 10:00	1.828	0.000	0.781	0.214	0.000	0.529	3.352	5.969	
467	2013-07-20 11:00	2.899	0.005	0.849	0.253	0.000	0.560	4.565	6.787	
468	2013-07-20 12:00	3.060	0.008	0.847	0.249	0.000	0.554	4.717	7.083	
469	2013-07-20 13:00	3.065	0.000	0.850	0.262	0.000	0.552	4.728	6.932	
470	2013-07-20 14:00	3.070	0.007	0.852	0.260	0.000	0.547	4.737	6.975	
471	2013-07-20 15:00	3.073	0.013	0.855	0.244	0.000	0.544	4.729	7.230	
472	2013-07-20 16:00	3.077	-0.001	0.857	0.279	0.000	0.538	4.750	7.174	
473	2013-07-20 17:00	3.081	-0.001	0.859	0.275	0.000	0.537	4.750	7.191	
474	2013-07-20 18:00	2.382	0.008	0.861	0.282	0.000	0.538	4.071	6.159	
475	2013-07-20 19:00	1.682	0.001	0.835	0.278	0.000	0.541	3.337	5.303	
476	2013-07-20 20:00	1.109	0.008	0.841	0.255	0.000	0.541	2.754	4.483	
477	2013-07-20 21:00	0.677	0.041	0.657	0.270	0.000	0.537	2.182	2.355	
478	2013-07-20 22:00	0.862	0.059	0.463	0.249	0.000	0.543	2.176	4.958	
479	2013-07-20 23:00	0.681	0.039	0.507	0.291	0.000	0.547	2.065	3.769	
480	2013-07-21 00:00	0.625	0.039	0.491	0.322	0.000	0.548	2.024	3.942	20-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
481	2013-07-21 01:00	0.586	0.034	0.491	0.339	0.000	0.551	2.001	3.749	
482	2013-07-21 02:00	0.480	0.030	0.445	0.291	0.000	0.555	1.801	3.637	
483	2013-07-21 03:00	0.534	0.036	0.463	0.286	0.000	0.557	1.874	3.702	
484	2013-07-21 04:00	0.527	0.037	0.452	0.307	0.000	0.557	1.880	3.756	
485	2013-07-21 05:00	0.549	0.033	0.466	0.324	0.000	0.556	1.927	3.916	
486	2013-07-21 06:00	0.590	0.034	0.458	0.352	0.000	0.558	1.990	3.811	
487	2013-07-21 07:00	0.576	0.034	0.453	0.354	0.000	0.561	1.978	3.964	
488	2013-07-21 08:00	0.780	0.029	0.382	0.319	0.000	0.561	2.071	3.321	
489	2013-07-21 09:00	1.146	0.003	0.305	0.215	0.000	0.565	2.234	5.142	
490	2013-07-21 10:00	1.545	0.021	0.710	0.220	0.000	0.562	3.058	5.134	
491	2013-07-21 11:00	2.411	0.009	0.751	0.249	0.000	0.560	3.979	6.327	
492	2013-07-21 12:00	2.781	0.016	0.816	0.278	0.000	0.559	4.450	7.196	
493	2013-07-21 13:00	2.854	0.002	0.826	0.270	0.000	0.558	4.509	7.098	
494	2013-07-21 14:00	2.790	0.010	0.831	0.254	0.000	0.555	4.439	6.886	
495	2013-07-21 15:00	2.768	-0.001	0.841	0.272	0.000	0.552	4.432	6.907	
496	2013-07-21 16:00	2.178	0.024	0.780	0.260	0.000	0.548	3.790	5.474	
497	2013-07-21 17:00	1.645	0.036	0.639	0.279	0.000	0.546	3.144	4.832	
498	2013-07-21 18:00	0.957	0.035	0.354	0.280	0.000	0.547	2.173	3.237	
499	2013-07-21 19:00	1.851	0.006	0.557	0.252	0.000	0.549	3.215	6.013	
500	2013-07-21 20:00	1.206	0.022	0.688	0.260	0.000	0.543	2.718	4.401	
501	2013-07-21 21:00	0.716	0.064	0.520	0.270	0.000	0.539	2.108	3.592	
502	2013-07-21 22:00	0.921	0.040	0.645	0.224	0.000	0.546	2.376	4.731	
503	2013-07-21 23:00	0.913	0.035	0.601	0.244	0.000	0.550	2.341	4.248	
504	2013-07-22 00:00	0.909	0.030	0.577	0.297	0.000	0.551	2.364	4.769	21-07-2013
505	2013-07-22 01:00	0.908	0.024	0.648	0.215	0.000	0.550	2.345	4.622	
506	2013-07-22 02:00	0.907	0.037	0.657	0.200	0.000	0.554	2.355	4.742	
507	2013-07-22 03:00	0.906	0.032	0.657	0.199	0.000	0.556	2.350	4.655	
508	2013-07-22 04:00	0.905	0.032	0.657	0.211	0.000	0.551	2.356	4.888	
509	2013-07-22 05:00	0.723	0.048	0.476	0.211	0.000	0.553	2.012	1.665	
510	2013-07-22 06:00	0.266	0.039	0.175	0.343	0.075	0.097	1.010	1.128	
511	2013-07-22 07:00	0.011	0.016	0.176	0.385	0.250	0.040	1.094	1.971	
512	2013-07-22 08:00	0.277	0.033	0.179	0.406	0.318	0.152	1.479	2.494	
513	2013-07-22 09:00	0.757	0.013	0.182	0.387	0.318	0.126	1.783	4.266	
514	2013-07-22 10:00	1.964	0.005	0.597	0.327	0.318	0.341	3.551	6.744	
515	2013-07-22 11:00	2.860	0.006	0.851	0.182	0.318	0.557	4.773	6.854	
516	2013-07-22 12:00	3.047	0.023	0.857	0.183	0.318	0.552	4.979	6.945	
517	2013-07-22 13:00	3.037	0.008	0.859	0.177	0.317	0.549	4.948	6.830	
518	2013-07-22 14:00	3.025	0.001	0.862	0.183	0.317	0.546	4.933	6.782	
519	2013-07-22 15:00	3.056	0.019	0.863	0.206	0.317	0.542	5.002	7.222	
520	2013-07-22 16:00	3.067	0.003	0.852	0.195	0.317	0.543	4.976	7.070	
521	2013-07-22 17:00	2.935	0.019	0.834	0.225	0.317	0.542	4.872	6.440	
522	2013-07-22 18:00	2.236	0.020	0.733	0.213	0.317	0.541	4.060	6.414	
523	2013-07-22 19:00	1.563	0.007	0.828	0.213	0.317	0.538	3.465	5.376	
524	2013-07-22 20:00	0.768	0.033	0.848	0.246	0.317	0.537	2.748	3.718	
525	2013-07-22 21:00	0.879	0.042	0.458	0.272	0.317	0.541	2.508	4.225	
526	2013-07-22 22:00	0.856	0.034	0.716	0.213	0.316	0.547	2.681	4.849	
527	2013-07-22 23:00	0.885	0.034	0.731	0.229	0.316	0.549	2.745	4.735	
528	2013-07-23 00:00	0.892	0.029	0.729	0.207	0.317	0.553	2.726	4.836	22-07-2013
529	2013-07-23 01:00	0.885	0.035	0.735	0.195	0.318	0.555	2.723	4.750	
530	2013-07-23 02:00	0.877	0.033	0.726	0.191	0.318	0.555	2.700	4.743	
531	2013-07-23 03:00	0.869	0.036	0.725	0.215	0.319	0.551	2.715	4.921	
532	2013-07-23 04:00	0.860	0.037	0.725	0.217	0.319	0.555	2.715	4.910	
533	2013-07-23 05:00	0.687	0.044	0.401	0.227	0.320	0.554	2.233	0.926	
534	2013-07-23 06:00	0.376	0.046	0.177	0.399	0.215	0.072	1.286	1.793	
535	2013-07-23 07:00	0.043	0.013	0.175	0.455	0.236	0.032	1.143	2.081	
536	2013-07-23 08:00	0.228	0.036	0.180	0.437	0.314	0.130	1.458	2.469	
537	2013-07-23 09:00	0.762	0.003	0.187	0.471	0.315	0.156	1.895	4.984	
538	2013-07-23 10:00	1.825	0.000	0.656	0.312	0.316	0.514	3.623	6.543	
539	2013-07-23 11:00	2.453	0.011	0.827	0.192	0.316	0.558	4.358	6.486	
540	2013-07-23 12:00	2.875	0.012	0.837	0.182	0.317	0.557	4.780	6.683	
541	2013-07-23 13:00	2.880	0.020	0.823	0.185	0.317	0.554	4.779	7.159	
542	2013-07-23 14:00	2.834	0.017	0.812	0.186	0.318	0.549	4.715	6.744	
543	2013-07-23 15:00	2.927	0.008	0.849	0.204	0.318	0.543	4.848	6.987	
544	2013-07-23 16:00	2.617	0.022	0.821	0.211	0.317	0.545	4.533	5.943	
545	2013-07-23 17:00	2.322	0.010	0.765	0.212	0.317	0.544	4.169	6.786	
546	2013-07-23 18:00	0.914	0.032	0.496	0.207	0.317	0.541	2.507	2.838	
547	2013-07-23 19:00	1.135	0.025	0.406	0.241	0.317	0.540	2.663	4.464	
548	2013-07-23 20:00	1.410	0.007	0.690	0.242	0.317	0.542	3.207	5.289	
549	2013-07-23 21:00	0.744	0.040	0.567	0.230	0.317	0.542	2.439	2.801	
550	2013-07-23 22:00	0.851	0.042	0.412	0.228	0.316	0.550	2.399	4.592	
551	2013-07-23 23:00	0.712	0.030	0.582	0.228	0.317	0.553	2.420	4.134	
552	2013-07-24 00:00	0.782	0.033	0.591	0.198	0.317	0.553	2.473	4.262	23-07-2013
553	2013-07-24 01:00	0.812	0.031	0.592	0.230	0.317	0.556	2.537	4.299	
554	2013-07-24 02:00	0.815	0.034	0.592	0.271	0.317	0.555	2.585	4.492	
555	2013-07-24 03:00	0.813	0.029	0.593	0.264	0.318	0.553	2.568	4.302	
556	2013-07-24 04:00	0.810	0.030	0.593	0.277	0.318	0.555	2.583	4.540	
557	2013-07-24 05:00	0.812	0.032	0.594	0.265	0.318	0.562	2.581	4.381	
558	2013-07-24 06:00	0.814	0.035	0.594	0.267	0.318	0.563	2.591	4.450	
559	2013-07-24 07:00	0.676	0.032	0.420	0.244	0.318	0.556	2.247	2.516	
560	2013-07-24 08:00	0.471	0.037	0.189	0.406	0.319	0.282	1.703	1.079	
561	2013-07-24 09:00	0.619	0.002	0.192	0.429	0.319	0.156	1.717	4.724	
562	2013-07-24 10:00	1.852	-0.001	0.684	0.347	0.319	0.185	3.386	6.188	
563	2013-07-24 11:00	2.795	-0.001	0.839	0.226	0.319	0.561	4.739	6.712	
564	2013-07-24 12:00	2.907	-0.001	0.845	0.237	0.319	0.556	4.863	6.917	
565	2013-07-24 13:00	2.899	0.007	0.850	0.191	0.319	0.557	4.823	6.656	
566	2013-07-24 14:00	2.895	-0.001	0.856	0.220	0.319	0.554	4.844	6.692	
567	2013-07-24 15:00	2.897	-0.001	0.862	0.216	0.319	0.550	4.843	6.721	
568	2013-07-24 16:00	2.130	0.028	0.643	0.229	0.319	0.542	3.889	5.322	
569	2013-07-24 17:00	2.361	0.008	0.778	0.255	0.318	0.541	4.261	6.077	
570	2013-07-24 18:00	2.206	0.026	0.702	0.238	0.318	0.544	4.033	5.263	
571	2013-07-24 19:00	1.700	0.014	0.691	0.253	0.318	0.544	3.520	5.730	
572	2013-07-24 20:00	1.232	0.011	0.797	0.255	0.318	0.544	3.157	4.767	
573	2013-07-24 21:00	0.509	0.037	0.634	0.272	0.317	0.541	2.309	2.499	
574	2013-07-24 22:00	0.678	0.051	0.342	0.275	0.317	0.518	2.182	3.876	
575	2013-07-24 23:00	0.456	0.050	0.383	0.220	0.317	0.152	1.577	2.985	
576	2013-07-25 00:00	0.459	0.044	0.377	0.262	0.317	0.153	1.610	3.038	24-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
577	2013-07-25 01:00	0.460	0.030	0.375	0.264	0.317	0.153	1.598	2.884	
578	2013-07-25 02:00	0.461	0.035	0.372	0.297	0.317	0.153	1.636	3.157	
579	2013-07-25 03:00	0.462	0.028	0.370	0.280	0.317	0.154	1.610	2.939	
580	2013-07-25 04:00	0.464	0.033	0.373	0.302	0.317	0.154	1.642	3.167	
581	2013-07-25 05:00	0.465	0.025	0.379	0.221	0.317	0.155	1.560	3.019	
582	2013-07-25 06:00	0.466	0.008	0.384	0.218	0.317	0.155	1.548	3.021	
583	2013-07-25 07:00	0.458	0.042	0.390	0.207	0.317	0.156	1.569	3.063	
584	2013-07-25 08:00	0.639	0.032	0.354	0.213	0.317	0.156	1.711	2.925	
585	2013-07-25 09:00	1.056	0.003	0.281	0.200	0.317	0.156	2.013	3.817	
586	2013-07-25 10:00	0.758	0.019	0.459	0.173	0.317	0.441	2.167	4.508	
587	2013-07-25 11:00	2.781	0.014	0.788	0.178	0.317	0.562	4.639	6.886	
588	2013-07-25 12:00	2.960	0.017	0.764	0.180	0.318	0.556	4.795	6.473	
589	2013-07-25 13:00	2.873	0.006	0.764	0.205	0.318	0.555	4.719	7.061	
590	2013-07-25 14:00	2.970	0.006	0.845	0.221	0.318	0.553	4.913	7.124	
591	2013-07-25 15:00	2.934	0.011	0.832	0.218	0.318	0.548	4.861	6.813	
592	2013-07-25 16:00	2.826	0.015	0.796	0.207	0.317	0.542	4.702	6.855	
593	2013-07-25 17:00	2.813	0.008	0.834	0.198	0.317	0.543	4.713	6.405	
594	2013-07-25 18:00	1.989	0.034	0.525	0.215	0.317	0.538	3.618	4.915	
595	2013-07-25 19:00	1.377	0.017	0.595	0.237	0.317	0.534	3.077	4.827	
596	2013-07-25 20:00	1.006	0.016	0.705	0.263	0.317	0.535	2.841	4.576	
597	2013-07-25 21:00	0.534	0.036	0.547	0.273	0.317	0.538	2.243	2.766	
598	2013-07-25 22:00	0.644	0.038	0.385	0.234	0.316	0.446	2.062	3.760	
599	2013-07-25 23:00	0.481	0.034	0.386	0.250	0.316	0.151	1.618	3.134	
600	2013-07-26 00:00	0.482	0.031	0.385	0.260	0.316	0.152	1.626	3.023	25-07-2013
601	2013-07-26 01:00	0.482	0.033	0.384	0.276	0.316	0.153	1.643	3.083	
602	2013-07-26 02:00	0.482	0.033	0.375	0.279	0.316	0.154	1.638	3.021	
603	2013-07-26 03:00	0.482	0.032	0.375	0.287	0.316	0.154	1.647	2.992	
604	2013-07-26 04:00	0.482	0.029	0.374	0.264	0.316	0.155	1.621	3.038	
605	2013-07-26 05:00	0.483	0.033	0.370	0.271	0.316	0.156	1.628	3.004	
606	2013-07-26 06:00	0.483	0.031	0.370	0.287	0.316	0.157	1.643	3.039	
607	2013-07-26 07:00	0.486	0.039	0.366	0.294	0.316	0.157	1.658	3.123	
608	2013-07-26 08:00	0.634	0.035	0.358	0.296	0.316	0.157	1.795	2.960	
609	2013-07-26 09:00	0.949	0.004	0.283	0.242	0.316	0.438	2.232	4.653	
610	2013-07-26 10:00	1.870	-0.001	0.756	0.186	0.316	0.561	3.688	6.106	
611	2013-07-26 11:00	2.869	0.013	0.834	0.201	0.316	0.556	4.790	6.972	
612	2013-07-26 12:00	2.752	-0.001	0.869	0.201	0.317	0.551	4.689	6.525	
613	2013-07-26 13:00	2.824	0.011	0.866	0.217	0.317	0.547	4.782	6.813	
614	2013-07-26 14:00	2.827	0.003	0.881	0.261	0.317	0.545	4.834	6.629	
615	2013-07-26 15:00	2.850	0.000	0.880	0.270	0.317	0.542	4.857	6.632	
616	2013-07-26 16:00	2.861	0.000	0.878	0.256	0.317	0.542	4.854	6.876	
617	2013-07-26 17:00	2.856	0.015	0.871	0.279	0.317	0.541	4.879	6.616	
618	2013-07-26 18:00	2.829	0.010	0.876	0.269	0.317	0.540	4.839	6.940	
619	2013-07-26 19:00	1.880	0.011	0.870	0.284	0.317	0.540	3.900	5.368	
620	2013-07-26 20:00	0.719	0.015	0.852	0.282	0.316	0.539	2.721	4.080	
621	2013-07-26 21:00	0.480	0.032	0.639	0.256	0.316	0.543	2.266	2.637	
622	2013-07-26 22:00	0.654	0.048	0.406	0.217	0.316	0.348	1.988	3.716	
623	2013-07-26 23:00	0.473	0.035	0.460	0.278	0.316	0.149	1.711	3.299	
624	2013-07-27 00:00	0.474	0.032	0.460	0.292	0.316	0.150	1.724	3.078	26-07-2013
625	2013-07-27 01:00	0.474	0.030	0.455	0.306	0.316	0.151	1.732	3.223	
626	2013-07-27 02:00	0.474	0.032	0.455	0.301	0.316	0.152	1.731	2.959	
627	2013-07-27 03:00	0.475	0.032	0.458	0.278	0.316	0.153	1.711	3.226	
628	2013-07-27 04:00	0.478	0.033	0.459	0.254	0.316	0.154	1.693	3.096	
629	2013-07-27 05:00	0.483	0.028	0.459	0.285	0.316	0.155	1.726	3.279	
630	2013-07-27 06:00	0.489	0.031	0.459	0.277	0.316	0.155	1.728	3.148	
631	2013-07-27 07:00	0.513	0.031	0.488	0.284	0.316	0.155	1.787	3.576	
632	2013-07-27 08:00	0.744	0.034	0.413	0.261	0.316	0.271	2.039	2.993	
633	2013-07-27 09:00	1.098	0.003	0.331	0.232	0.316	0.562	2.543	5.313	
634	2013-07-27 10:00	2.515	0.016	0.804	0.195	0.316	0.564	4.410	6.699	
635	2013-07-27 11:00	2.851	0.005	0.856	0.204	0.316	0.553	4.784	7.300	
636	2013-07-27 12:00	2.781	0.000	0.872	0.233	0.316	0.551	4.752	6.732	
637	2013-07-27 13:00	2.769	0.000	0.866	0.238	0.316	0.547	4.735	6.354	
638	2013-07-27 14:00	0.678	0.021	0.505	0.263	0.316	0.542	2.325	2.510	
639	2013-07-27 15:00	0.629	0.032	0.359	0.273	0.316	0.544	2.152	3.475	
640	2013-07-27 16:00	0.502	0.046	0.285	0.255	0.316	0.546	1.949	3.587	
641	2013-07-27 17:00	0.507	0.047	0.394	0.265	0.316	0.316	1.844	3.416	
642	2013-07-27 18:00	0.462	0.039	0.388	0.300	0.316	0.150	1.655	3.034	
643	2013-07-27 19:00	0.501	0.031	0.412	0.353	0.317	0.152	1.766	3.251	
644	2013-07-27 20:00	1.007	0.010	0.418	0.278	0.317	0.188	2.218	4.156	
645	2013-07-27 21:00	0.594	0.023	0.639	0.226	0.317	0.532	2.330	2.949	
646	2013-07-27 22:00	0.825	0.043	0.476	0.261	0.317	0.553	2.473	4.740	
647	2013-07-27 23:00	0.881	0.031	0.583	0.287	0.317	0.555	2.654	4.378	
648	2013-07-28 00:00	0.240	0.036	0.263	0.316	0.283	0.237	1.424	-0.146	27-07-2013
649	2013-07-28 01:00	0.000	0.034	0.001	0.286	0.181	0.000	0.574	1.232	
650	2013-07-28 02:00	0.000	0.032	0.004	0.308	0.181	0.000	0.588	1.308	
651	2013-07-28 03:00	0.000	0.038	0.008	0.322	0.181	0.000	0.612	1.251	
652	2013-07-28 04:00	0.000	0.035	0.011	0.343	0.181	0.000	0.633	1.238	
653	2013-07-28 05:00	0.000	0.042	0.015	0.363	0.181	0.000	0.664	1.167	
654	2013-07-28 06:00	0.000	0.031	0.018	0.358	0.181	0.000	0.680	1.430	
655	2013-07-28 07:00	0.002	0.005	0.068	0.384	0.182	0.000	0.794	1.445	
656	2013-07-28 08:00	0.005	0.026	0.079	0.364	0.208	0.027	0.840	1.688	
657	2013-07-28 09:00	0.014	0.000	0.174	0.336	0.316	0.160	1.193	2.271	
658	2013-07-28 10:00	0.832	0.022	0.179	0.391	0.316	0.159	1.948	2.991	
659	2013-07-28 11:00	2.790	0.011	0.356	0.338	0.316	0.201	4.011	8.773	
660	2013-07-28 12:00	2.388	0.011	0.786	0.278	0.316	0.530	4.308	2.803	
661	2013-07-28 13:00	1.102	0.025	0.289	0.276	0.316	0.084	2.093	3.534	
662	2013-07-28 14:00	0.583	0.044	0.208	0.286	0.316	0.266	1.704	5.682	
663	2013-07-28 15:00	0.669	0.042	0.601	0.271	0.316	0.554	2.453	4.170	
664	2013-07-28 16:00	1.846	0.045	0.608	0.301	0.316	0.546	3.661	5.002	
665	2013-07-28 17:00	0.922	0.062	0.402	0.309	0.317	0.545	2.557	3.171	
666	2013-07-28 18:00	0.725	0.037	0.361	0.285	0.317	0.479	2.202	3.392	
667	2013-07-28 19:00	0.440	0.032	0.355	0.320	0.317	0.152	1.615	3.010	
668	2013-07-28 20:00	0.967	0.025	0.334	0.277	0.317	0.154	2.075	4.248	
669	2013-07-28 21:00	0.501	0.020	0.566	0.220	0.318	0.155	1.780	2.269	
670	2013-07-28 22:00	0.666	0.057	0.326	0.271	0.318	0.155	1.793	3.611	
671	2013-07-28 23:00	0.930	0.034	0.440	0.428	0.318	0.156	2.307	4.037	
672	2013-07-29 00:00	0.862	0.034	0.491	0.446	0.318	0.157	2.310	4.151	28-07-2013

ANDASOL 3 POWER PLANT JULY 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
673	2013-07-29 01:00	0.623	0.041	0.423	0.385	0.316	0.145	1.939	0.723	29-07-2013
674	2013-07-29 02:00	0.000	0.030	0.014	0.368	0.186	0.000	0.665	1.331	
675	2013-07-29 03:00	0.001	0.034	-0.001	0.411	0.185	0.000	0.721	1.355	
676	2013-07-29 04:00	0.002	0.032	0.044	0.387	0.184	0.000	0.730	1.378	
677	2013-07-29 05:00	0.004	0.033	0.028	0.434	0.183	0.000	0.743	1.400	
678	2013-07-29 06:00	0.005	0.037	-0.001	0.436	0.182	0.000	0.716	1.306	
679	2013-07-29 07:00	0.006	0.016	0.179	0.412	0.250	0.092	1.126	1.841	
680	2013-07-29 08:00	0.085	0.012	0.182	0.384	0.306	0.158	1.275	2.197	
681	2013-07-29 09:00	0.976	0.007	0.191	0.381	0.315	0.158	2.028	5.270	
682	2013-07-29 10:00	2.610	0.007	0.697	0.349	0.316	0.275	4.254	6.967	
683	2013-07-29 11:00	2.914	0.011	0.844	0.240	0.317	0.569	4.893	6.553	
684	2013-07-29 12:00	2.914	0.000	0.848	0.268	0.317	0.564	4.910	6.910	
685	2013-07-29 13:00	2.912	0.000	0.847	0.253	0.318	0.561	4.890	6.631	
686	2013-07-29 14:00	2.909	-0.001	0.850	0.245	0.318	0.555	4.876	6.497	
687	2013-07-29 15:00	2.906	-0.001	0.853	0.288	0.318	0.553	4.918	6.587	
688	2013-07-29 16:00	2.904	-0.001	0.856	0.291	0.318	0.551	4.918	6.791	
689	2013-07-29 17:00	2.901	-0.001	0.855	0.282	0.317	0.552	4.906	6.810	
690	2013-07-29 18:00	2.898	0.001	0.853	0.286	0.317	0.554	4.910	6.950	
691	2013-07-29 19:00	2.103	0.023	0.857	0.266	0.317	0.553	4.119	5.818	
692	2013-07-29 20:00	1.473	0.005	0.849	0.260	0.317	0.549	3.453	4.931	
693	2013-07-29 21:00	0.651	0.032	0.734	0.262	0.316	0.546	2.540	3.127	
694	2013-07-29 22:00	0.763	0.057	0.395	0.240	0.316	0.556	2.327	3.887	
695	2013-07-29 23:00	0.597	0.051	0.503	0.270	0.316	0.375	2.112	3.623	
696	2013-07-30 00:00	0.587	0.034	0.481	0.305	0.316	0.338	2.060	3.534	
697	2013-07-30 01:00	0.567	0.044	0.482	0.289	0.316	0.340	2.037	3.754	30-07-2013
698	2013-07-30 02:00	0.551	0.033	0.499	0.288	0.316	0.340	2.027	3.511	
699	2013-07-30 03:00	0.545	0.040	0.491	0.307	0.317	0.338	2.037	3.677	
700	2013-07-30 04:00	0.540	0.035	0.478	0.286	0.317	0.339	1.994	3.161	
701	2013-07-30 05:00	0.577	0.037	0.440	0.256	0.317	0.340	1.966	3.837	
702	2013-07-30 06:00	0.587	0.022	0.472	0.289	0.317	0.341	2.028	3.538	
703	2013-07-30 07:00	0.574	0.024	0.459	0.267	0.317	0.341	1.981	3.634	
704	2013-07-30 08:00	0.676	0.036	0.422	0.274	0.317	0.475	2.201	3.278	
705	2013-07-30 09:00	1.093	0.011	0.299	0.267	0.317	0.569	2.556	5.000	
706	2013-07-30 10:00	2.797	0.016	0.762	0.228	0.317	0.566	4.686	7.395	
707	2013-07-30 11:00	2.933	0.005	0.851	0.256	0.317	0.555	4.917	7.036	
708	2013-07-30 12:00	2.902	0.009	0.859	0.259	0.318	0.553	4.899	6.923	
709	2013-07-30 13:00	2.900	0.008	0.855	0.241	0.318	0.553	4.875	6.684	
710	2013-07-30 14:00	2.899	-0.001	0.855	0.278	0.318	0.551	4.900	6.768	
711	2013-07-30 15:00	2.898	0.009	0.856	0.275	0.317	0.549	4.905	6.806	
712	2013-07-30 16:00	2.898	0.010	0.858	0.277	0.317	0.552	4.911	6.855	
713	2013-07-30 17:00	2.892	0.000	0.858	0.281	0.317	0.550	4.896	6.814	
714	2013-07-30 18:00	2.669	0.002	0.857	0.269	0.317	0.550	4.664	6.648	
715	2013-07-30 19:00	1.582	0.017	0.829	0.259	0.317	0.547	3.551	5.414	
716	2013-07-30 20:00	1.032	0.007	0.842	0.274	0.317	0.546	3.017	4.556	
717	2013-07-30 21:00	0.633	0.032	0.706	0.263	0.316	0.544	2.494	2.893	
718	2013-07-30 22:00	0.818	0.052	0.395	0.241	0.316	0.546	2.367	4.276	
719	2013-07-30 23:00	0.612	0.038	0.513	0.283	0.316	0.370	2.133	3.587	
720	2013-07-31 00:00	0.581	0.032	0.474	0.301	0.317	0.334	2.038	3.476	

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
1	2013-11-01 01:00	0.001	0.034	0.209	0.387	0.185	0.561	1.485	1.707	
2	2013-11-01 02:00	0.000	0.032	-0.001	0.402	0.185	0.561	1.288	1.582	
3	2013-11-01 03:00	0.000	0.033	-0.001	0.394	0.185	0.560	1.280	1.535	
4	2013-11-01 04:00	0.002	0.038	-0.001	0.481	0.185	0.561	1.377	1.443	
5	2013-11-01 05:00	0.003	0.030	-0.001	0.577	0.185	0.565	1.465	1.516	
6	2013-11-01 06:00	0.005	0.020	0.011	0.620	0.185	0.568	1.509	1.641	
7	2013-11-01 07:00	0.006	0.018	0.182	0.604	0.287	0.566	1.869	2.242	
8	2013-11-01 08:00	0.128	0.031	0.179	0.613	0.299	0.429	1.846	2.330	
9	2013-11-01 09:00	0.615	0.011	0.175	0.595	0.299	0.180	1.874	2.735	
10	2013-11-01 10:00	1.115	0.007	0.489	0.524	0.318	0.571	3.024	6.836	
11	2013-11-01 11:00	1.480	0.016	0.903	0.347	0.318	0.563	3.627	4.920	
12	2013-11-01 12:00	1.077	0.022	0.901	0.272	0.318	0.561	3.151	4.635	
13	2013-11-01 13:00	0.906	0.025	0.899	0.255	0.318	0.557	2.959	4.545	
14	2013-11-01 14:00	0.896	0.019	0.902	0.273	0.318	0.556	2.964	4.514	
15	2013-11-01 15:00	1.052	0.018	0.903	0.278	0.317	0.551	3.119	4.742	
16	2013-11-01 16:00	1.373	0.033	0.901	0.299	0.317	0.546	3.468	5.409	
17	2013-11-01 17:00	1.200	0.020	0.898	0.312	0.317	0.548	3.295	4.939	
18	2013-11-01 18:00	0.320	0.055	0.598	0.378	0.317	0.547	2.215	2.420	
19	2013-11-01 19:00	0.809	0.084	0.421	0.325	0.318	0.544	2.501	4.251	
20	2013-11-01 20:00	0.719	0.058	0.498	0.381	0.318	0.551	2.526	3.866	
21	2013-11-01 21:00	0.826	0.054	0.507	0.427	0.319	0.553	2.686	4.106	
22	2013-11-01 22:00	0.716	0.050	0.504	0.452	0.319	0.561	2.603	4.022	
23	2013-11-01 23:00	0.705	0.048	0.508	0.411	0.320	0.562	2.555	3.665	
24	2013-11-02 00:00	0.355	0.040	0.172	0.390	0.270	0.558	1.814	2.760	01-11-2013
25	2013-11-02 01:00	0.001	0.037	-0.001	0.344	0.184	0.537	1.163	1.365	
26	2013-11-02 02:00	0.000	0.035	-0.001	0.341	0.183	0.012	0.633	1.247	
27	2013-11-02 03:00	0.000	0.035	0.036	0.349	0.183	0.000	0.667	1.464	
28	2013-11-02 04:00	0.000	0.033	0.194	0.358	0.183	0.000	0.832	1.613	
29	2013-11-02 05:00	0.000	0.030	0.009	0.379	0.182	0.000	0.664	1.271	
30	2013-11-02 06:00	0.000	0.038	0.022	0.408	0.182	0.009	0.725	1.441	
31	2013-11-02 07:00	0.000	0.029	0.176	0.402	0.284	0.079	1.138	2.160	
32	2013-11-02 08:00	0.123	0.036	0.176	0.430	0.318	0.071	1.325	2.539	
33	2013-11-02 09:00	0.710	0.005	0.176	0.415	0.317	0.000	1.623	3.085	
34	2013-11-02 10:00	1.151	0.010	0.461	0.369	0.317	0.111	2.419	6.621	
35	2013-11-02 11:00	1.351	0.015	0.904	0.324	0.317	0.571	3.482	5.136	
36	2013-11-02 12:00	1.001	0.014	0.916	0.334	0.317	0.562	3.143	4.757	
37	2013-11-02 13:00	0.838	0.022	0.914	0.343	0.317	0.555	2.989	4.453	
38	2013-11-02 14:00	0.840	0.020	0.922	0.362	0.317	0.555	3.016	4.381	
39	2013-11-02 15:00	0.988	0.020	0.915	0.314	0.317	0.560	3.113	4.799	
40	2013-11-02 16:00	1.251	0.023	0.928	0.313	0.318	0.429	3.262	5.066	
41	2013-11-02 17:00	1.265	0.018	0.912	0.324	0.319	0.023	2.860	5.116	
42	2013-11-02 18:00	0.288	0.028	0.579	0.424	0.319	0.383	2.021	2.378	
43	2013-11-02 19:00	0.219	0.031	0.206	0.371	0.320	0.317	1.463	1.505	
44	2013-11-02 20:00	0.000	0.027	0.111	0.338	0.186	0.000	0.731	1.703	
45	2013-11-02 21:00	0.000	0.020	-0.001	0.352	0.181	0.000	0.646	1.461	
46	2013-11-02 22:00	0.000	0.019	-0.001	0.354	0.181	0.000	0.647	1.481	
47	2013-11-02 23:00	0.000	0.014	-0.001	0.359	0.181	0.000	0.649	1.608	
48	2013-11-03 00:00	0.000	0.019	0.116	0.367	0.181	0.000	0.796	1.625	02-11-2013
49	2013-11-03 01:00	0.000	0.017	0.037	0.378	0.181	0.000	0.728	1.569	
50	2013-11-03 02:00	0.000	0.015	-0.001	0.403	0.181	0.000	0.714	1.527	
51	2013-11-03 03:00	0.001	0.017	-0.001	0.425	0.182	0.000	0.740	1.487	
52	2013-11-03 04:00	0.005	0.018	-0.001	0.435	0.182	0.000	0.756	1.606	
53	2013-11-03 05:00	0.009	0.017	-0.001	0.478	0.182	0.000	0.804	1.427	
54	2013-11-03 06:00	0.013	0.022	0.149	0.462	0.189	0.008	0.991	1.849	
55	2013-11-03 07:00	0.018	0.029	0.178	0.480	0.317	0.101	1.347	2.643	
56	2013-11-03 08:00	0.089	0.035	0.178	0.476	0.317	0.160	1.433	2.578	
57	2013-11-03 09:00	0.601	0.007	0.178	0.501	0.317	0.062	1.664	2.875	
58	2013-11-03 10:00	1.118	0.014	0.390	0.442	0.317	0.180	2.461	6.344	
59	2013-11-03 11:00	1.120	0.015	0.834	0.405	0.317	0.564	3.254	4.575	
60	2013-11-03 12:00	0.610	0.016	0.616	0.369	0.317	0.561	2.489	3.566	
61	2013-11-03 13:00	0.437	0.019	0.605	0.382	0.317	0.562	2.321	3.458	
62	2013-11-03 14:00	0.349	0.018	0.560	0.394	0.317	0.562	2.200	3.434	
63	2013-11-03 15:00	0.282	0.030	0.472	0.412	0.317	0.555	2.068	2.885	
64	2013-11-03 16:00	0.891	0.021	0.656	0.384	0.317	0.551	2.820	4.865	
65	2013-11-03 17:00	0.489	0.066	0.399	0.409	0.318	0.555	2.235	2.744	
66	2013-11-03 18:00	1.108	0.047	0.346	0.288	0.318	0.557	2.664	3.728	
67	2013-11-03 19:00	0.910	0.042	0.521	0.265	0.318	0.556	2.612	5.040	
68	2013-11-03 20:00	0.787	0.038	0.417	0.267	0.318	0.558	2.385	3.571	
69	2013-11-03 21:00	0.808	0.045	0.517	0.282	0.319	0.557	2.527	4.343	
70	2013-11-03 22:00	0.848	0.043	0.502	0.318	0.319	0.560	2.589	4.569	
71	2013-11-03 23:00	0.235	0.041	0.111	0.277	0.247	0.559	1.515	1.597	
72	2013-11-04 00:00	0.000	0.029	-0.001	0.228	0.186	0.558	1.062	1.387	03-11-2013
73	2013-11-04 01:00	0.000	0.018	-0.001	0.246	0.185	0.562	1.073	1.188	
74	2013-11-04 02:00	0.000	0.020	-0.001	0.262	0.185	0.545	1.074	1.383	
75	2013-11-04 03:00	0.000	0.020	0.039	0.295	0.184	0.010	0.612	1.353	
76	2013-11-04 04:00	0.001	0.029	0.200	0.265	0.184	0.000	0.744	1.372	
77	2013-11-04 05:00	0.002	0.026	0.143	0.318	0.183	0.000	0.738	1.545	
78	2013-11-04 06:00	0.003	0.029	0.126	0.291	0.183	0.009	0.708	1.503	
79	2013-11-04 07:00	0.007	0.029	0.182	0.326	0.282	0.079	1.090	2.176	
80	2013-11-04 08:00	0.093	0.034	0.181	0.341	0.317	0.116	1.264	2.586	
81	2013-11-04 09:00	0.513	0.010	0.179	0.326	0.317	0.032	1.379	2.585	
82	2013-11-04 10:00	1.005	0.015	0.184	0.381	0.318	0.379	2.283	4.799	
83	2013-11-04 11:00	1.149	0.006	0.664	0.388	0.318	0.569	3.097	4.696	
84	2013-11-04 12:00	0.137	0.002	0.045	0.044	0.314	0.568	1.194	1.929	
85	2013-11-04 13:00	0.007	0.038	-0.078	0.000	0.319	0.560	0.975	1.327	
86	2013-11-04 14:00	0.012	0.035	-0.078	0.000	0.319	0.562	0.984	1.329	
87	2013-11-04 15:00	0.034	0.032	-0.033	0.121	0.152	0.558	0.936	1.427	
88	2013-11-04 16:00	0.360	0.049	0.117	0.455	0.217	0.559	1.757	2.105	
89	2013-11-04 17:00	1.317	0.007	0.180	0.418	0.317	0.556	2.795	3.643	
90	2013-11-04 18:00	0.435	0.077	0.276	0.409	0.318	0.549	2.063	4.359	
91	2013-11-04 19:00	0.911	0.046	0.402	0.313	0.318	0.547	2.537	3.063	
92	2013-11-04 20:00	0.164	0.036	0.110	0.247	0.248	0.547	1.439	1.621	
93	2013-11-04 21:00	0.000	0.034	-0.001	0.243	0.184	0.545	1.148	1.706	
94	2013-11-04 22:00	0.000	0.035	-0.001	0.257	0.184	0.552	1.171	1.693	
95	2013-11-04 23:00	0.000	0.033	0.125	0.292	0.184	0.556	1.336	1.816	
96	2013-11-05 00:00	0.000	0.030	0.191	0.291	0.183	0.565	1.408	1.838	04-11-2013

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
97	2013-11-05 01:00	0.000	0.030	0.016	0.291	0.183	0.567	1.236	1.570	05-11-2013
98	2013-11-05 02:00	0.000	0.026	0.003	0.319	0.183	0.505	1.164	1.580	
99	2013-11-05 03:00	0.000	0.029	0.006	0.282	0.183	0.151	0.736	1.427	
100	2013-11-05 04:00	0.000	0.026	0.009	0.343	0.183	0.152	0.799	1.406	
101	2013-11-05 05:00	0.002	0.036	0.096	0.338	0.184	0.153	0.894	1.460	
102	2013-11-05 06:00	0.004	0.042	0.092	0.348	0.184	0.154	0.909	1.592	
103	2013-11-05 07:00	0.006	0.035	0.146	0.359	0.258	0.155	1.112	2.159	
104	2013-11-05 08:00	0.009	0.029	0.178	0.349	0.317	0.374	1.480	2.530	
105	2013-11-05 09:00	0.370	0.016	0.181	0.315	0.317	0.568	1.794	2.415	
106	2013-11-05 10:00	0.622	-0.001	0.183	0.352	0.317	0.563	2.036	2.629	
107	2013-11-05 11:00	1.045	0.010	0.351	0.353	0.317	0.564	2.639	6.611	
108	2013-11-05 12:00	0.882	0.008	0.890	0.453	0.317	0.560	3.110	4.679	
109	2013-11-05 13:00	0.756	0.026	0.913	0.412	0.317	0.558	2.981	4.463	
110	2013-11-05 14:00	0.597	0.026	0.805	0.450	0.316	0.555	2.749	3.972	
111	2013-11-05 15:00	0.495	0.029	0.677	0.451	0.317	0.550	2.518	3.133	
112	2013-11-05 16:00	0.391	0.027	0.496	0.473	0.317	0.549	2.252	3.371	
113	2013-11-05 17:00	0.421	0.045	0.398	0.424	0.318	0.550	2.156	3.117	
114	2013-11-05 18:00	0.669	0.038	0.347	0.358	0.319	0.556	2.287	3.665	
115	2013-11-05 19:00	0.940	0.052	0.396	0.299	0.320	0.550	2.557	4.519	
116	2013-11-05 20:00	0.878	0.041	0.472	0.284	0.321	0.548	2.542	4.759	
117	2013-11-05 21:00	0.785	0.041	0.303	0.267	0.294	0.546	2.236	1.307	
118	2013-11-05 22:00	0.304	0.032	-0.001	0.203	0.027	0.558	1.177	1.606	
119	2013-11-05 23:00	0.398	0.025	0.211	0.260	0.197	0.565	1.655	1.982	
120	2013-11-06 00:00	0.382	0.026	0.167	0.261	0.185	0.561	1.582	1.874	
121	2013-11-06 01:00	0.278	0.027	-0.001	0.263	0.183	0.562	1.312	1.639	06-11-2013
122	2013-11-06 02:00	0.280	0.020	-0.001	0.284	0.182	0.562	1.327	1.676	
123	2013-11-06 03:00	0.283	0.019	-0.001	0.277	0.182	0.565	1.324	1.603	
124	2013-11-06 04:00	0.284	0.033	0.066	0.281	0.182	0.567	1.412	1.650	
125	2013-11-06 05:00	0.294	0.024	0.106	0.288	0.182	0.427	1.321	1.700	
126	2013-11-06 06:00	0.304	0.023	-0.001	0.300	0.182	0.153	0.960	1.567	
127	2013-11-06 07:00	0.062	0.027	0.129	0.313	0.253	0.154	1.091	2.064	
128	2013-11-06 08:00	0.039	0.038	0.175	0.328	0.317	0.155	1.248	2.459	
129	2013-11-06 09:00	0.542	0.008	0.177	0.305	0.317	0.413	1.762	2.423	
130	2013-11-06 10:00	0.916	0.009	0.277	0.318	0.317	0.579	2.417	5.771	
131	2013-11-06 11:00	1.277	0.003	0.816	0.333	0.317	0.571	3.319	5.462	
132	2013-11-06 12:00	0.982	0.000	0.893	0.316	0.317	0.567	3.075	4.501	
133	2013-11-06 13:00	0.832	0.017	0.903	0.356	0.317	0.563	2.989	4.512	
134	2013-11-06 14:00	0.816	0.021	0.903	0.387	0.318	0.558	3.002	4.390	
135	2013-11-06 15:00	0.934	0.021	0.897	0.393	0.318	0.554	3.115	4.720	
136	2013-11-06 16:00	1.118	0.019	0.903	0.368	0.318	0.553	3.279	5.029	
137	2013-11-06 17:00	1.154	0.025	0.890	0.366	0.318	0.551	3.303	5.021	
138	2013-11-06 18:00	0.545	0.056	0.553	0.380	0.318	0.552	2.403	2.901	
139	2013-11-06 19:00	0.964	0.059	0.450	0.315	0.318	0.551	2.657	4.558	
140	2013-11-06 20:00	0.893	0.045	0.545	0.290	0.318	0.548	2.640	4.501	
141	2013-11-06 21:00	0.386	0.045	0.212	0.223	0.276	0.546	1.688	0.063	
142	2013-11-06 22:00	0.302	0.039	-0.001	0.219	0.185	0.552	1.295	1.640	
143	2013-11-06 23:00	0.274	0.023	-0.001	0.223	0.184	0.550	1.253	1.475	
144	2013-11-07 00:00	0.329	0.034	-0.001	0.228	0.184	0.551	1.323	1.637	
145	2013-11-07 01:00	0.332	0.032	0.132	0.228	0.184	0.555	1.462	1.802	07-11-2013
146	2013-11-07 02:00	0.335	0.026	-0.001	0.251	0.183	0.558	1.352	1.773	
147	2013-11-07 03:00	0.339	0.019	-0.001	0.260	0.183	0.485	1.284	1.666	
148	2013-11-07 04:00	0.342	0.021	-0.001	0.288	0.182	0.151	0.982	1.630	
149	2013-11-07 05:00	0.346	0.033	-0.001	0.311	0.182	0.152	1.022	1.609	
150	2013-11-07 06:00	0.348	0.027	-0.001	0.297	0.180	0.154	1.004	1.592	
151	2013-11-07 07:00	0.065	0.022	0.165	0.334	0.250	0.155	1.139	1.882	
152	2013-11-07 08:00	0.090	0.035	0.172	0.334	0.297	0.224	1.332	2.188	
153	2013-11-07 09:00	0.566	0.010	0.176	0.321	0.299	0.574	1.946	2.198	
154	2013-11-07 10:00	1.071	0.012	0.365	0.338	0.317	0.570	2.672	6.715	
155	2013-11-07 11:00	1.268	0.002	0.863	0.309	0.317	0.566	3.325	5.132	
156	2013-11-07 12:00	0.921	0.012	0.874	0.262	0.317	0.564	2.949	4.430	
157	2013-11-07 13:00	0.468	0.031	0.638	0.304	0.317	0.558	2.315	2.795	
158	2013-11-07 14:00	0.720	0.051	0.323	0.299	0.317	0.556	2.265	2.169	
159	2013-11-07 15:00	0.957	0.027	0.241	0.286	0.317	0.556	2.383	3.717	
160	2013-11-07 16:00	0.836	0.014	0.449	0.311	0.317	0.550	2.476	5.167	
161	2013-11-07 17:00	1.106	0.015	0.876	0.314	0.316	0.547	3.174	4.732	
162	2013-11-07 18:00	0.335	0.050	0.535	0.355	0.316	0.545	2.135	2.964	
163	2013-11-07 19:00	0.929	0.068	0.419	0.323	0.316	0.544	2.599	4.809	
164	2013-11-07 20:00	0.713	0.041	0.441	0.288	0.316	0.545	2.344	0.947	
165	2013-11-07 21:00	0.305	0.050	0.024	0.267	0.203	0.544	1.392	1.752	
166	2013-11-07 22:00	0.325	0.045	-0.001	0.283	0.181	0.550	1.383	1.693	
167	2013-11-07 23:00	0.311	0.038	-0.001	0.294	0.181	0.556	1.379	1.644	
168	2013-11-08 00:00	0.312	0.034	-0.001	0.289	0.181	0.344	1.160	1.640	
169	2013-11-08 01:00	0.316	0.031	0.087	0.309	0.181	0.152	1.076	1.753	08-11-2013
170	2013-11-08 02:00	0.319	0.029	0.000	0.294	0.181	0.153	0.975	1.660	
171	2013-11-08 03:00	0.321	0.027	0.001	0.275	0.182	0.153	0.959	1.565	
172	2013-11-08 04:00	0.325	0.025	0.003	0.307	0.182	0.154	0.995	1.632	
173	2013-11-08 05:00	0.328	0.024	0.004	0.301	0.182	0.154	0.993	1.650	
174	2013-11-08 06:00	0.326	0.023	0.006	0.330	0.184	0.155	1.023	1.696	
175	2013-11-08 07:00	0.016	0.026	0.175	0.372	0.206	0.156	1.064	1.808	
176	2013-11-08 08:00	0.010	0.016	0.177	0.331	0.298	0.195	1.247	2.160	
177	2013-11-08 09:00	0.013	0.031	0.177	0.355	0.298	0.573	1.576	1.944	
178	2013-11-08 10:00	0.772	0.019	0.177	0.327	0.306	0.568	2.199	2.629	
179	2013-11-08 11:00	0.773	0.013	0.180	0.334	0.316	0.556	2.172	4.333	
180	2013-11-08 12:00	0.663	0.026	0.389	0.364	0.316	0.556	2.313	4.201	
181	2013-11-08 13:00	0.230	0.044	0.396	0.436	0.316	0.554	1.977	2.376	
182	2013-11-08 14:00	0.646	0.034	0.264	0.400	0.316	0.552	2.212	3.166	
183	2013-11-08 15:00	0.260	0.024	0.289	0.372	0.317	0.549	1.810	3.055	
184	2013-11-08 16:00	0.250	0.038	0.378	0.366	0.317	0.545	1.894	2.763	
185	2013-11-08 17:00	0.845	0.052	0.270	0.372	0.317	0.543	2.399	3.039	
186	2013-11-08 18:00	0.613	0.029	0.200	0.351	0.251	0.547	1.991	1.060	
187	2013-11-08 19:00	0.031	0.038	0.120	0.333	0.182	0.548	1.340	1.476	
188	2013-11-08 20:00	0.104	0.036	-0.001	0.358	0.182	0.543	1.292	1.299	
189	2013-11-08 21:00	0.278	0.059	-0.001	0.361	0.182	0.543	1.421	1.593	
190	2013-11-08 22:00	0.280	0.046	-0.001	0.388	0.182	0.553	1.447	1.618	
191	2013-11-08 23:00	0.282	0.037	0.089	0.396	0.182	0.558	1.543	1.717	
192	2013-11-09 00:00	0.284	0.034	0.001	0.423	0.182	0.455	1.379	1.784	

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
193	2013-11-09 01:00	0.286	0.031	-0.001	0.414	0.182	0.335	1.246	1.747	
194	2013-11-09 02:00	0.303	0.029	-0.001	0.450	0.182	0.337	1.299	1.751	
195	2013-11-09 03:00	0.328	0.029	-0.001	0.450	0.182	0.336	1.325	1.793	
196	2013-11-09 04:00	0.329	0.029	-0.001	0.454	0.183	0.337	1.332	1.819	
197	2013-11-09 05:00	0.339	0.044	-0.001	0.448	0.184	0.195	1.211	1.814	
198	2013-11-09 06:00	0.329	0.052	0.050	0.479	0.185	0.154	1.255	1.832	
199	2013-11-09 07:00	0.010	0.013	0.176	0.485	0.238	0.194	1.334	1.946	
200	2013-11-09 08:00	0.047	0.027	0.178	0.527	0.299	0.562	1.839	2.208	
201	2013-11-09 09:00	0.520	0.016	0.180	0.470	0.300	0.565	2.051	2.175	
202	2013-11-09 10:00	0.842	0.013	0.217	0.516	0.315	0.562	2.465	4.872	
203	2013-11-09 11:00	0.317	0.041	0.219	0.496	0.317	0.562	1.952	2.504	
204	2013-11-09 12:00	0.783	0.017	0.248	0.529	0.317	0.558	2.452	4.403	
205	2013-11-09 13:00	0.398	0.012	0.535	0.545	0.317	0.558	2.364	3.998	
206	2013-11-09 14:00	0.466	0.020	0.640	0.447	0.317	0.555	2.445	4.095	
207	2013-11-09 15:00	0.777	0.010	0.845	0.403	0.317	0.549	2.901	4.489	
208	2013-11-09 16:00	1.148	0.010	0.910	0.311	0.317	0.545	3.241	4.984	
209	2013-11-09 17:00	1.028	0.023	0.894	0.329	0.317	0.545	3.136	4.497	
210	2013-11-09 18:00	0.416	0.054	0.498	0.390	0.317	0.542	2.217	2.433	
211	2013-11-09 19:00	0.943	0.067	0.381	0.378	0.318	0.550	2.636	4.345	
212	2013-11-09 20:00	0.324	0.040	0.296	0.488	0.271	0.550	1.969	0.306	
213	2013-11-09 21:00	0.280	0.032	0.043	0.520	0.185	0.548	1.609	1.785	
214	2013-11-09 22:00	0.287	0.024	-0.001	0.496	0.185	0.553	1.543	1.666	
215	2013-11-09 23:00	0.290	0.011	-0.001	0.521	0.185	0.558	1.563	1.741	
216	2013-11-10 00:00	0.293	0.009	0.045	0.521	0.184	0.548	1.600	1.733	09-11-2013
217	2013-11-10 01:00	0.297	0.013	0.109	0.567	0.184	0.551	1.719	1.750	
218	2013-11-10 02:00	0.298	0.016	-0.001	0.605	0.183	0.556	1.658	1.662	
219	2013-11-10 03:00	0.252	0.031	-0.001	0.593	0.183	0.555	1.612	1.725	
220	2013-11-10 04:00	0.275	0.034	-0.001	0.608	0.183	0.540	1.638	1.820	
221	2013-11-10 05:00	0.284	0.034	-0.001	0.635	0.184	0.018	1.153	1.875	
222	2013-11-10 06:00	0.283	0.035	-0.001	0.638	0.185	0.000	1.140	1.936	
223	2013-11-10 07:00	0.010	0.014	0.173	0.630	0.261	0.000	1.282	2.417	
224	2013-11-10 08:00	0.034	0.030	0.175	0.667	0.299	0.083	1.487	2.548	
225	2013-11-10 09:00	0.464	0.022	0.175	0.639	0.298	0.157	1.755	2.483	
226	2013-11-10 10:00	0.511	0.000	0.175	0.681	0.298	0.362	2.027	2.624	
227	2013-11-10 11:00	0.742	0.012	0.224	0.663	0.315	0.560	2.516	4.983	
228	2013-11-10 12:00	0.357	0.036	0.370	0.571	0.317	0.557	2.206	2.890	
229	2013-11-10 13:00	0.324	0.048	0.286	0.534	0.317	0.555	2.063	2.532	
230	2013-11-10 14:00	0.731	0.011	0.288	0.469	0.317	0.548	2.365	3.796	
231	2013-11-10 15:00	0.455	0.009	0.642	0.430	0.317	0.547	2.399	4.437	
232	2013-11-10 16:00	0.773	0.017	0.753	0.439	0.317	0.542	2.841	4.474	
233	2013-11-10 17:00	0.340	0.032	0.575	0.437	0.317	0.542	2.242	2.282	
234	2013-11-10 18:00	0.618	0.064	0.315	0.460	0.317	0.541	2.315	3.187	
235	2013-11-10 19:00	0.911	0.043	0.415	0.362	0.317	0.541	2.589	4.202	
236	2013-11-10 20:00	0.331	0.040	0.168	0.429	0.242	0.423	1.631	4.210	
237	2013-11-10 21:00	0.288	0.030	0.027	0.492	0.182	0.091	1.111	1.600	
238	2013-11-10 22:00	0.286	0.020	0.234	0.468	0.182	0.334	1.524	1.838	
239	2013-11-10 23:00	0.288	0.015	0.001	0.482	0.182	0.556	1.523	1.632	
240	2013-11-11 00:00	0.289	0.002	-0.001	0.482	0.182	0.553	1.508	1.646	10-11-2013
241	2013-11-11 01:00	0.291	0.015	-0.001	0.514	0.182	0.554	1.554	1.702	
242	2013-11-11 02:00	0.291	0.013	-0.001	0.531	0.182	0.552	1.568	1.653	
243	2013-11-11 03:00	0.277	0.028	0.007	0.553	0.182	0.450	1.497	1.707	
244	2013-11-11 04:00	0.280	0.032	0.112	0.582	0.182	0.151	1.338	1.849	
245	2013-11-11 05:00	0.282	0.033	-0.001	0.609	0.182	0.152	1.257	1.776	
246	2013-11-11 06:00	0.231	0.032	0.027	0.587	0.182	0.180	1.270	1.770	
247	2013-11-11 07:00	0.008	0.008	0.170	0.611	0.285	0.390	1.697	2.143	
248	2013-11-11 08:00	0.054	0.034	0.174	0.633	0.313	0.564	1.964	2.541	
249	2013-11-11 09:00	0.476	0.008	0.178	0.618	0.317	0.565	2.163	2.791	
250	2013-11-11 10:00	0.842	0.009	0.256	0.615	0.317	0.561	2.600	5.407	
251	2013-11-11 11:00	0.662	0.002	0.712	0.492	0.317	0.557	2.740	4.005	
252	2013-11-11 12:00	0.519	0.001	0.750	0.482	0.317	0.552	2.620	4.223	
253	2013-11-11 13:00	0.581	0.021	0.821	0.524	0.317	0.552	2.817	4.438	
254	2013-11-11 14:00	0.751	0.022	0.884	0.547	0.317	0.551	3.071	4.402	
255	2013-11-11 15:00	0.784	0.019	0.893	0.489	0.317	0.550	3.052	4.650	
256	2013-11-11 16:00	0.873	0.013	0.895	0.452	0.317	0.550	3.100	4.673	
257	2013-11-11 17:00	0.931	0.027	0.901	0.367	0.318	0.547	3.090	4.597	
258	2013-11-11 18:00	0.451	0.061	0.509	0.443	0.318	0.546	2.327	2.822	
259	2013-11-11 19:00	0.970	0.059	0.422	0.337	0.318	0.546	2.652	5.130	
260	2013-11-11 20:00	0.865	0.042	0.527	0.296	0.319	0.541	2.589	4.435	
261	2013-11-11 21:00	0.412	0.042	0.214	0.283	0.319	0.541	1.811	0.544	
262	2013-11-11 22:00	0.290	0.042	-0.001	0.282	0.189	0.546	1.347	1.674	
263	2013-11-11 23:00	0.287	0.040	-0.001	0.299	0.182	0.550	1.356	1.670	
264	2013-11-12 00:00	0.289	0.030	-0.001	0.315	0.182	0.552	1.366	1.685	11-11-2013
265	2013-11-12 01:00	0.291	0.027	0.046	0.295	0.182	0.557	1.398	1.595	
266	2013-11-12 02:00	0.293	0.028	0.071	0.324	0.182	0.559	1.458	1.681	
267	2013-11-12 03:00	0.296	0.029	0.001	0.310	0.182	0.560	1.378	1.569	
268	2013-11-12 04:00	0.301	0.028	0.003	0.310	0.182	0.558	1.383	1.609	
269	2013-11-12 05:00	0.305	0.022	0.005	0.351	0.182	0.558	1.424	1.675	
270	2013-11-12 06:00	0.299	0.021	0.007	0.347	0.181	0.344	1.200	1.696	
271	2013-11-12 07:00	0.112	0.025	0.106	0.402	0.254	0.000	1.037	2.246	
272	2013-11-12 08:00	0.048	0.028	0.173	0.371	0.316	0.000	1.146	2.643	
273	2013-11-12 09:00	0.519	0.026	0.174	0.362	0.316	0.000	1.397	2.666	
274	2013-11-12 10:00	0.870	0.010	0.195	0.352	0.317	0.155	1.898	4.935	
275	2013-11-12 11:00	1.029	0.038	0.727	0.406	0.317	0.210	2.728	4.818	
276	2013-11-12 12:00	0.824	0.039	0.897	0.344	0.317	0.555	2.977	4.497	
277	2013-11-12 13:00	0.642	0.039	0.838	0.408	0.318	0.549	2.794	4.176	
278	2013-11-12 14:00	0.569	0.023	0.787	0.456	0.318	0.555	2.707	4.301	
279	2013-11-12 15:00	0.773	0.005	0.889	0.441	0.318	0.556	2.983	4.608	
280	2013-11-12 16:00	0.974	0.009	0.910	0.355	0.318	0.060	2.626	4.832	
281	2013-11-12 17:00	0.962	0.026	0.887	0.368	0.318	0.000	2.561	4.636	
282	2013-11-12 18:00	0.415	0.052	0.494	0.394	0.318	0.000	1.672	2.703	
283	2013-11-12 19:00	0.935	0.050	0.419	0.355	0.317	0.000	2.077	5.041	
284	2013-11-12 20:00	0.451	0.039	0.258	0.300	0.272	0.000	1.319	0.295	
285	2013-11-12 21:00	0.291	0.046	-0.001	0.322	0.180	0.000	0.837	1.516	
286	2013-11-12 22:00	0.296	0.045	-0.001	0.324	0.180	0.000	0.844	1.575	
287	2013-11-12 23:00	0.302	0.027	-0.001	0.357	0.180	0.000	0.864	1.606	
288	2013-11-13 00:00	0.307	0.027	0.000	0.315	0.179	0.000	0.828	1.656	12-11-2013

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
289	2013-11-13 01:00	0.313	0.028	0.094	0.337	0.179	0.000	0.950	1.731	
290	2013-11-13 02:00	0.318	0.028	-0.001	0.331	0.179	0.000	0.855	1.669	
291	2013-11-13 03:00	0.324	0.028	-0.001	0.337	0.179	0.000	0.867	1.614	
292	2013-11-13 04:00	0.331	0.027	-0.001	0.362	0.178	0.000	0.898	1.641	
293	2013-11-13 05:00	0.315	0.023	-0.001	0.391	0.178	0.000	0.906	1.649	
294	2013-11-13 06:00	0.284	0.033	-0.001	0.405	0.178	0.000	0.900	1.638	
295	2013-11-13 07:00	0.078	0.034	0.156	0.410	0.249	0.079	1.158	2.109	
296	2013-11-13 08:00	0.022	0.044	0.172	0.419	0.316	0.159	1.341	2.556	
297	2013-11-13 09:00	0.531	0.019	0.172	0.391	0.318	0.158	1.588	2.574	
298	2013-11-13 10:00	0.391	0.027	0.173	0.411	0.319	0.501	1.822	2.618	
299	2013-11-13 11:00	0.229	0.036	0.157	0.413	0.315	0.563	1.726	2.383	
300	2013-11-13 12:00	0.000	0.033	-0.001	0.419	0.182	0.558	1.266	1.425	
301	2013-11-13 13:00	0.748	0.017	0.144	0.444	0.250	0.553	2.163	2.591	
302	2013-11-13 14:00	0.452	0.053	0.174	0.447	0.318	0.551	2.002	2.567	
303	2013-11-13 15:00	0.000	0.046	0.173	0.398	0.182	0.548	1.421	1.649	
304	2013-11-13 16:00	0.000	0.054	0.173	0.413	0.182	0.546	1.444	1.645	
305	2013-11-13 17:00	0.000	0.038	0.173	0.410	0.182	0.542	1.422	1.645	
306	2013-11-13 18:00	0.000	0.027	0.034	0.404	0.182	0.544	1.351	1.645	
307	2013-11-13 19:00	0.159	0.054	-0.001	0.518	0.182	0.545	1.566	1.843	
308	2013-11-13 20:00	0.289	0.046	-0.001	0.511	0.182	0.548	1.574	1.762	
309	2013-11-13 21:00	0.284	0.027	0.024	0.594	0.182	0.545	1.656	1.590	
310	2013-11-13 22:00	0.290	0.019	0.090	0.599	0.182	0.551	1.731	1.923	
311	2013-11-13 23:00	0.223	0.009	-0.001	0.624	0.136	0.555	1.671	1.818	
312	2013-11-14 00:00	0.300	0.013	-0.001	0.648	0.182	0.559	1.700	1.822	**13-11-2013**
313	2013-11-14 01:00	0.300	0.021	-0.001	0.642	0.182	0.560	1.703	1.874	
314	2013-11-14 02:00	0.287	0.036	0.035	0.643	0.182	0.458	1.641	1.884	
315	2013-11-14 03:00	0.284	0.036	0.048	0.642	0.182	0.149	1.341	1.898	
316	2013-11-14 04:00	0.286	0.037	-0.001	0.615	0.182	0.150	1.268	1.766	
317	2013-11-14 05:00	0.287	0.036	-0.001	0.655	0.182	0.151	1.309	1.795	
318	2013-11-14 06:00	0.287	0.039	-0.001	0.647	0.182	0.152	1.306	1.816	
319	2013-11-14 07:00	0.089	0.025	0.085	0.702	0.269	0.153	1.475	2.137	
320	2013-11-14 08:00	0.000	0.024	0.177	0.667	0.302	0.155	1.548	2.452	
321	2013-11-14 09:00	0.000	0.024	0.184	0.716	0.303	0.197	1.645	2.879	
322	2013-11-14 10:00	0.000	0.033	0.046	0.663	0.182	0.575	1.576	1.747	
323	2013-11-14 11:00	0.044	0.025	-0.001	0.701	0.182	0.560	1.568	1.590	
324	2013-11-14 12:00	0.698	0.031	0.156	0.689	0.182	0.561	2.317	2.226	
325	2013-11-14 13:00	1.008	0.017	0.192	0.670	0.305	0.559	2.751	5.612	
326	2013-11-14 14:00	0.479	0.042	0.422	0.559	0.318	0.563	2.383	3.113	
327	2013-11-14 15:00	0.402	0.050	0.260	0.551	0.318	0.561	2.142	2.958	
328	2013-11-14 16:00	1.056	0.042	0.233	0.461	0.318	0.559	2.668	3.889	
329	2013-11-14 17:00	0.489	0.041	0.343	0.409	0.319	0.558	2.159	3.646	
330	2013-11-14 18:00	0.895	0.033	0.319	0.351	0.319	0.559	2.475	4.707	
331	2013-11-14 19:00	0.452	0.029	0.211	0.261	0.264	0.559	1.800	0.739	
332	2013-11-14 20:00	0.000	0.032	-0.001	0.246	0.182	0.554	1.077	1.202	
333	2013-11-14 21:00	0.000	0.032	-0.001	0.276	0.182	0.552	1.112	1.497	
334	2013-11-14 22:00	0.000	0.032	0.211	0.296	0.182	0.555	1.350	1.541	
335	2013-11-14 23:00	0.000	0.033	0.001	0.282	0.182	0.561	1.134	1.531	
336	2013-11-15 00:00	0.000	0.033	-0.001	0.320	0.182	0.557	1.175	1.401	**14-11-2013**
337	2013-11-15 01:00	0.000	0.034	-0.001	0.315	0.182	0.492	1.107	1.475	
338	2013-11-15 02:00	0.000	0.034	-0.001	0.344	0.182	0.558	1.211	1.478	
339	2013-11-15 03:00	0.001	0.033	0.052	0.367	0.182	0.526	1.247	1.455	
340	2013-11-15 04:00	0.004	0.033	0.117	0.384	0.183	0.152	0.963	1.760	
341	2013-11-15 05:00	0.007	0.035	-0.001	0.360	0.184	0.153	0.834	1.646	
342	2013-11-15 06:00	0.010	0.032	-0.001	0.413	0.184	0.154	0.899	1.659	
343	2013-11-15 07:00	0.013	0.020	0.113	0.389	0.248	0.155	1.132	1.990	
344	2013-11-15 08:00	0.016	0.020	0.174	0.420	0.306	0.286	1.447	2.488	
345	2013-11-15 09:00	0.468	0.018	0.177	0.406	0.319	0.570	1.975	2.888	
346	2013-11-15 10:00	1.023	-0.001	0.238	0.402	0.319	0.568	2.549	5.363	
347	2013-11-15 11:00	1.128	-0.001	0.802	0.386	0.319	0.564	3.197	5.109	
348	2013-11-15 12:00	0.848	0.012	0.910	0.332	0.318	0.559	2.979	4.707	
349	2013-11-15 13:00	0.652	0.019	0.891	0.426	0.318	0.558	2.863	4.573	
350	2013-11-15 14:00	0.690	0.014	0.890	0.471	0.318	0.554	2.937	4.587	
351	2013-11-15 15:00	0.812	-0.001	0.914	0.465	0.318	0.553	3.062	4.696	
352	2013-11-15 16:00	0.674	0.023	0.658	0.410	0.318	0.551	2.634	3.238	
353	2013-11-15 17:00	0.483	0.044	0.329	0.449	0.317	0.549	2.171	2.436	
354	2013-11-15 18:00	0.977	0.030	0.260	0.408	0.317	0.545	2.537	3.339	
355	2013-11-15 19:00	0.383	0.028	0.195	0.413	0.271	0.542	1.830	1.465	
356	2013-11-15 20:00	0.285	0.022	-0.001	0.405	0.182	0.540	1.433	1.723	
357	2013-11-15 21:00	0.302	0.015	-0.001	0.395	0.182	0.540	1.431	1.796	
358	2013-11-15 22:00	0.300	0.005	-0.001	0.406	0.182	0.550	1.441	1.590	
359	2013-11-15 23:00	0.297	0.012	0.069	0.422	0.182	0.554	1.536	1.783	
360	2013-11-16 00:00	0.298	0.015	0.072	0.484	0.182	0.550	1.599	1.841	**15-11-2013**
361	2013-11-16 01:00	0.298	0.021	-0.001	0.458	0.182	0.498	1.456	1.833	
362	2013-11-16 02:00	0.298	0.034	-0.001	0.487	0.182	0.150	1.149	1.858	
363	2013-11-16 03:00	0.299	0.038	-0.001	0.478	0.182	0.151	1.146	1.886	
364	2013-11-16 04:00	0.297	0.034	-0.001	0.485	0.182	0.152	1.148	1.841	
365	2013-11-16 05:00	0.293	0.037	0.050	0.502	0.182	0.153	1.216	1.855	
366	2013-11-16 06:00	0.289	0.035	0.003	0.498	0.182	0.154	1.160	1.794	
367	2013-11-16 07:00	0.061	0.028	0.120	0.529	0.245	0.155	1.306	2.111	
368	2013-11-16 08:00	0.006	0.017	0.178	0.524	0.299	0.155	1.406	2.365	
369	2013-11-16 09:00	0.339	0.036	0.180	0.511	0.298	0.283	1.693	2.252	
370	2013-11-16 10:00	0.519	0.007	0.182	0.521	0.298	0.567	2.093	2.324	
371	2013-11-16 11:00	0.909	-0.001	0.269	0.503	0.311	0.564	2.555	5.509	
372	2013-11-16 12:00	0.800	-0.001	0.810	0.552	0.319	0.556	3.035	4.685	
373	2013-11-16 13:00	0.704	0.023	0.889	0.611	0.319	0.552	3.097	4.113	
374	2013-11-16 14:00	0.654	0.012	0.866	0.636	0.319	0.549	3.035	4.415	
375	2013-11-16 15:00	0.583	0.020	0.766	0.630	0.319	0.551	2.867	3.417	
376	2013-11-16 16:00	0.496	0.035	0.469	0.632	0.319	0.549	2.500	2.587	
377	2013-11-16 17:00	0.333	0.044	0.268	0.664	0.319	0.551	2.179	2.568	
378	2013-11-16 18:00	0.437	0.028	0.245	0.493	0.292	0.549	2.044	0.753	
379	2013-11-16 19:00	0.279	0.057	0.026	0.506	0.179	0.546	1.593	1.804	
380	2013-11-16 20:00	0.304	0.052	0.005	0.495	0.180	0.544	1.579	1.814	
381	2013-11-16 21:00	0.305	0.044	0.084	0.533	0.180	0.542	1.688	1.900	
382	2013-11-16 22:00	0.297	0.037	0.012	0.528	0.180	0.437	1.491	1.873	
383	2013-11-16 23:00	0.299	0.032	-0.001	0.548	0.181	0.151	1.210	1.783	
384	2013-11-17 00:00	0.301	0.029	-0.001	0.532	0.181	0.152	1.193	1.844	**16-11-2013**

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
385	2013-11-17 01:00	0.303	0.018	0.019	0.560	0.181	0.153	1.234	1.918	
386	2013-11-17 02:00	0.305	0.019	0.083	0.569	0.182	0.153	1.310	1.937	
387	2013-11-17 03:00	0.308	0.052	-0.001	0.577	0.182	0.154	1.272	1.945	
388	2013-11-17 04:00	0.312	0.033	-0.001	0.581	0.182	0.155	1.261	1.920	
389	2013-11-17 05:00	0.315	0.034	-0.001	0.573	0.182	0.155	1.257	1.914	
390	2013-11-17 06:00	0.306	0.035	0.033	0.615	0.182	0.156	1.327	1.949	
391	2013-11-17 07:00	0.107	0.026	0.166	0.580	0.182	0.156	1.359	2.016	
392	2013-11-17 08:00	0.023	0.015	0.169	0.633	0.182	0.276	1.522	2.214	
393	2013-11-17 09:00	0.276	0.041	0.173	0.581	0.182	0.568	1.905	2.135	
394	2013-11-17 10:00	0.436	0.005	0.176	0.587	0.182	0.563	1.949	2.088	
395	2013-11-17 11:00	0.591	-0.001	0.180	0.568	0.220	0.559	2.118	2.602	
396	2013-11-17 12:00	0.691	-0.001	0.187	0.583	0.315	0.556	2.332	5.315	
397	2013-11-17 13:00	0.404	0.019	0.503	0.611	0.318	0.553	2.406	3.925	
398	2013-11-17 14:00	0.426	0.023	0.582	0.629	0.318	0.550	2.527	3.573	
399	2013-11-17 15:00	0.810	0.000	0.875	0.554	0.318	0.550	3.107	4.589	
400	2013-11-17 16:00	0.990	0.000	0.905	0.547	0.318	0.549	3.308	4.964	
401	2013-11-17 17:00	0.665	0.023	0.758	0.499	0.318	0.548	2.811	2.899	
402	2013-11-17 18:00	0.725	0.058	0.333	0.513	0.317	0.545	2.490	2.759	
403	2013-11-17 19:00	0.848	0.031	0.416	0.367	0.317	0.547	2.527	4.609	
404	2013-11-17 20:00	0.585	0.026	0.345	0.304	0.294	0.543	2.097	1.033	
405	2013-11-17 21:00	0.283	0.040	0.049	0.255	0.185	0.541	1.352	1.543	
406	2013-11-17 22:00	0.290	0.035	0.006	0.266	0.184	0.392	1.174	1.513	
407	2013-11-17 23:00	0.292	0.033	0.002	0.302	0.184	0.187	0.998	1.601	
408	2013-11-18 00:00	0.293	0.030	0.180	0.291	0.184	0.151	1.128	1.799	17-11-2013
409	2013-11-18 01:00	0.265	0.027	0.000	0.327	0.183	0.152	0.953	1.673	
410	2013-11-18 02:00	0.308	0.027	0.002	0.372	0.183	0.152	1.044	1.819	
411	2013-11-18 03:00	0.316	0.021	0.004	0.411	0.182	0.153	1.087	1.799	
412	2013-11-18 04:00	0.323	0.029	0.091	0.424	0.182	0.154	1.204	1.955	
413	2013-11-18 05:00	0.331	0.037	0.010	0.455	0.182	0.155	1.170	1.942	
414	2013-11-18 06:00	0.339	0.039	-0.001	0.469	0.182	0.156	1.184	1.916	
415	2013-11-18 07:00	0.253	0.038	-0.001	0.514	0.182	0.156	1.177	1.968	
416	2013-11-18 08:00	0.008	0.035	-0.001	0.503	0.182	0.156	1.018	1.761	
417	2013-11-18 09:00	0.012	0.029	0.064	0.499	0.192	0.156	1.147	1.870	
418	2013-11-18 10:00	0.236	0.021	0.169	0.519	0.317	0.429	1.834	2.751	
419	2013-11-18 11:00	0.317	0.008	0.174	0.540	0.306	0.560	1.930	2.564	
420	2013-11-18 12:00	0.224	0.025	0.178	0.583	0.182	0.555	1.803	2.059	
421	2013-11-18 13:00	0.620	0.003	0.186	0.581	0.307	0.552	2.249	3.877	
422	2013-11-18 14:00	0.664	0.028	0.238	0.580	0.317	0.549	2.376	3.681	
423	2013-11-18 15:00	1.050	0.035	0.242	0.488	0.317	0.546	2.679	3.461	
424	2013-11-18 16:00	0.621	0.043	0.198	0.616	0.316	0.544	2.338	1.450	
425	2013-11-18 17:00	0.135	0.042	0.122	0.620	0.183	0.541	1.701	1.800	
426	2013-11-18 18:00	0.323	0.059	-0.001	0.688	0.182	0.538	1.789	1.934	
427	2013-11-18 19:00	0.322	0.050	-0.001	0.704	0.182	0.540	1.798	1.989	
428	2013-11-18 20:00	0.324	0.044	-0.001	0.722	0.182	0.541	1.813	1.935	
429	2013-11-18 21:00	0.325	0.040	-0.001	0.703	0.182	0.539	1.789	1.972	
430	2013-11-18 22:00	0.322	0.033	0.007	0.720	0.182	0.551	1.818	1.937	
431	2013-11-18 23:00	0.001	0.014	0.174	0.704	0.182	0.187	1.473	2.039	
432	2013-11-19 00:00	0.001	0.028	0.082	0.725	0.182	0.153	1.292	1.869	18-11-2013
433	2013-11-19 01:00	0.000	0.038	-0.001	0.709	0.182	0.153	1.196	1.814	
434	2013-11-19 02:00	0.000	0.035	-0.001	0.740	0.182	0.154	1.225	1.894	
435	2013-11-19 03:00	0.000	0.040	-0.001	0.733	0.182	0.155	1.222	1.894	
436	2013-11-19 04:00	0.000	0.037	-0.001	0.765	0.182	0.155	1.251	1.896	
437	2013-11-19 05:00	0.000	0.035	-0.001	0.789	0.182	0.156	1.276	1.861	
438	2013-11-19 06:00	0.000	0.026	0.074	0.835	0.182	0.156	1.452	2.037	
439	2013-11-19 07:00	0.005	0.030	0.180	0.839	0.223	0.157	1.589	2.203	
440	2013-11-19 08:00	0.014	0.002	0.176	0.829	0.297	0.157	1.701	2.537	
441	2013-11-19 09:00	0.374	0.025	0.176	0.790	0.311	0.282	2.002	2.818	
442	2013-11-19 10:00	0.864	-0.001	0.188	0.798	0.318	0.562	2.730	5.398	
443	2013-11-19 11:00	0.635	0.008	0.482	0.650	0.318	0.552	2.645	4.124	
444	2013-11-19 12:00	0.506	0.017	0.696	0.680	0.318	0.551	2.767	3.770	
445	2013-11-19 13:00	0.445	0.026	0.667	0.627	0.317	0.549	2.632	4.352	
446	2013-11-19 14:00	0.545	0.009	0.839	0.631	0.317	0.547	2.887	4.641	
447	2013-11-19 15:00	0.764	0.017	0.837	0.562	0.317	0.544	3.040	4.210	
448	2013-11-19 16:00	0.740	0.014	0.858	0.511	0.317	0.540	2.978	4.812	
449	2013-11-19 17:00	0.783	0.018	0.880	0.546	0.317	0.541	3.084	4.015	
450	2013-11-19 18:00	0.487	0.056	0.440	0.534	0.317	0.544	2.376	2.265	
451	2013-11-19 19:00	0.758	0.035	0.271	0.426	0.317	0.542	2.349	3.381	
452	2013-11-19 20:00	0.335	0.043	0.120	0.360	0.224	0.541	1.623	1.352	
453	2013-11-19 21:00	0.268	0.058	-0.001	0.341	0.184	0.537	1.386	1.951	
454	2013-11-19 22:00	0.267	0.046	-0.001	0.318	0.184	0.416	1.230	1.906	
455	2013-11-19 23:00	0.268	0.039	0.013	0.338	0.184	0.151	0.991	1.877	
456	2013-11-20 00:00	0.294	0.037	0.193	0.361	0.183	0.152	1.220	1.996	19-11-2013
457	2013-11-20 01:00	0.294	0.032	0.021	0.600	0.183	0.316	1.444	1.978	
458	2013-11-20 02:00	0.293	0.025	-0.001	0.711	0.183	0.341	1.551	1.984	
459	2013-11-20 03:00	0.268	0.039	-0.001	0.776	0.183	0.202	1.472	2.047	
460	2013-11-20 04:00	0.003	0.040	-0.001	0.797	0.183	0.153	1.288	1.904	
461	2013-11-20 05:00	0.007	0.035	-0.001	0.784	0.183	0.154	1.273	1.790	
462	2013-11-20 06:00	0.011	0.040	0.116	0.801	0.183	0.155	1.419	1.914	
463	2013-11-20 07:00	0.015	0.030	0.177	0.790	0.252	0.155	1.584	2.205	
464	2013-11-20 08:00	0.019	0.011	0.177	0.794	0.298	0.155	1.678	2.490	
465	2013-11-20 09:00	0.464	0.033	0.178	0.780	0.298	0.159	1.921	2.658	
466	2013-11-20 10:00	0.437	0.027	0.179	0.785	0.298	0.545	2.271	2.405	
467	2013-11-20 11:00	0.505	0.018	0.180	0.803	0.300	0.558	2.364	2.389	
468	2013-11-20 12:00	0.475	0.003	0.181	0.792	0.319	0.553	2.323	2.801	
469	2013-11-20 13:00	0.389	0.019	0.192	0.810	0.319	0.551	2.280	4.500	
470	2013-11-20 14:00	0.187	0.046	0.217	0.805	0.319	0.548	2.121	2.129	
471	2013-11-20 15:00	0.261	0.024	0.184	0.804	0.319	0.545	2.135	2.176	
472	2013-11-20 16:00	0.376	0.010	0.363	0.811	0.319	0.539	2.418	4.490	
473	2013-11-20 17:00	1.449	0.003	0.803	0.722	0.320	0.537	3.834	5.804	
474	2013-11-20 18:00	0.319	0.047	0.501	0.511	0.320	0.538	2.237	1.994	
475	2013-11-20 19:00	0.223	0.049	0.222	0.550	0.240	0.541	1.835	0.525	
476	2013-11-20 20:00	0.001	0.034	-0.001	0.544	0.178	0.541	1.408	1.465	
477	2013-11-20 21:00	0.001	0.033	-0.001	0.547	0.178	0.537	1.406	1.522	
478	2013-11-20 22:00	0.000	0.034	-0.001	0.537	0.178	0.543	1.405	1.583	
479	2013-11-20 23:00	0.000	0.035	-0.001	0.548	0.178	0.546	1.418	1.646	
480	2013-11-21 00:00	0.000	0.035	-0.001	0.552	0.178	0.549	1.425	1.652	20-11-2013

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
481	2013-11-21 01:00	0.000	0.055	0.156	0.549	0.178	0.550	1.604	1.830	
482	2013-11-21 02:00	0.000	0.030	0.000	0.519	0.178	0.555	1.396	1.623	
483	2013-11-21 03:00	0.000	0.027	0.002	0.565	0.178	0.556	1.470	1.688	
484	2013-11-21 04:00	0.165	0.047	0.003	0.525	0.179	0.558	1.560	1.820	
485	2013-11-21 05:00	0.286	0.042	0.005	0.588	0.180	0.557	1.665	1.863	
486	2013-11-21 06:00	0.006	0.032	0.007	0.546	0.180	0.558	1.441	1.667	
487	2013-11-21 07:00	0.010	0.021	0.146	0.556	0.228	0.562	1.701	2.029	
488	2013-11-21 08:00	0.014	0.000	0.178	0.551	0.298	0.562	1.824	2.421	
489	2013-11-21 09:00	0.420	0.030	0.178	0.559	0.298	0.565	2.056	2.478	
490	2013-11-21 10:00	0.429	0.008	0.178	0.548	0.297	0.563	2.023	2.426	
491	2013-11-21 11:00	0.438	0.025	0.178	0.578	0.297	0.559	2.075	2.558	
492	2013-11-21 12:00	0.627	0.004	0.178	0.565	0.297	0.559	2.230	2.811	
493	2013-11-21 13:00	0.239	0.021	0.188	0.551	0.297	0.557	1.852	2.937	
494	2013-11-21 14:00	0.252	0.016	0.273	0.580	0.296	0.555	1.972	3.750	
495	2013-11-21 15:00	0.563	0.012	0.606	0.591	0.311	0.552	2.635	4.145	
496	2013-11-21 16:00	0.513	0.028	0.569	0.584	0.317	0.547	2.557	3.533	
497	2013-11-21 17:00	1.244	0.003	0.816	0.412	0.318	0.547	3.339	5.023	
498	2013-11-21 18:00	0.279	0.040	0.462	0.362	0.318	0.547	2.006	-0.273	
499	2013-11-21 19:00	0.064	0.045	0.075	0.374	0.193	0.548	1.330	1.649	
500	2013-11-21 20:00	0.001	0.030	-0.001	0.423	0.180	0.542	1.229	1.464	
501	2013-11-21 21:00	0.000	0.030	-0.001	0.404	0.180	0.539	1.207	1.446	
502	2013-11-21 22:00	0.000	0.034	0.021	0.463	0.180	0.546	1.299	1.516	
503	2013-11-21 23:00	0.000	0.035	0.233	0.463	0.179	0.548	1.515	1.734	
504	2013-11-22 00:00	0.000	0.031	0.019	0.498	0.179	0.551	1.335	1.547	21-11-2013
505	2013-11-22 01:00	0.000	0.033	-0.001	0.487	0.179	0.549	1.306	1.548	
506	2013-11-22 02:00	0.000	0.035	0.025	0.487	0.179	0.554	1.340	1.579	
507	2013-11-22 03:00	0.001	0.031	0.153	0.511	0.179	0.555	1.497	1.852	
508	2013-11-22 04:00	0.003	0.033	-0.001	0.529	0.179	0.550	1.360	1.688	
509	2013-11-22 05:00	0.006	0.047	-0.001	0.575	0.179	0.552	1.425	1.708	
510	2013-11-22 06:00	0.008	0.036	-0.001	0.588	0.179	0.076	0.951	1.694	
511	2013-11-22 07:00	0.011	0.034	0.083	0.564	0.179	0.041	1.001	1.794	
512	2013-11-22 08:00	0.013	0.006	0.170	0.560	0.179	0.150	1.303	2.167	
513	2013-11-22 09:00	0.290	0.028	0.171	0.534	0.282	0.128	1.508	2.299	
514	2013-11-22 10:00	0.438	0.026	0.171	0.544	0.277	0.364	1.821	2.319	
515	2013-11-22 11:00	0.479	0.022	0.172	0.547	0.183	0.557	1.961	2.155	
516	2013-11-22 12:00	0.465	0.027	0.172	0.563	0.183	0.552	1.963	2.285	
517	2013-11-22 13:00	0.220	0.032	0.173	0.538	0.183	0.550	1.751	2.010	
518	2013-11-22 14:00	0.001	0.024	0.173	0.540	0.183	0.545	1.641	1.869	
519	2013-11-22 15:00	0.000	0.002	0.174	0.522	0.183	0.542	1.642	1.932	
520	2013-11-22 16:00	0.000	0.029	0.022	0.551	0.183	0.543	1.440	1.665	
521	2013-11-22 17:00	0.000	0.032	-0.001	0.538	0.183	0.543	1.407	1.712	
522	2013-11-22 18:00	0.000	0.037	-0.001	0.595	0.182	0.540	1.468	1.724	
523	2013-11-22 19:00	0.000	0.032	-0.001	0.563	0.182	0.538	1.428	1.742	
524	2013-11-22 20:00	0.000	0.040	0.052	0.616	0.182	0.537	1.593	1.966	
525	2013-11-22 21:00	0.000	0.053	0.233	0.554	0.182	0.540	1.780	2.220	
526	2013-11-22 22:00	0.000	0.045	-0.001	0.581	0.182	0.548	1.445	1.756	
527	2013-11-22 23:00	0.000	0.039	-0.001	0.596	0.182	0.550	1.455	1.724	
528	2013-11-23 00:00	0.000	0.034	0.115	0.582	0.182	0.552	1.556	1.769	22-11-2013
529	2013-11-23 01:00	0.000	0.036	0.147	0.640	0.182	0.556	1.654	1.871	
530	2013-11-23 02:00	0.000	0.032	0.001	0.593	0.182	0.554	1.455	1.665	
531	2013-11-23 03:00	0.000	0.034	0.003	0.616	0.183	0.552	1.483	1.737	
532	2013-11-23 04:00	0.000	0.042	0.140	0.622	0.184	0.555	1.638	1.899	
533	2013-11-23 05:00	0.000	0.036	0.035	0.629	0.185	0.554	1.535	1.754	
534	2013-11-23 06:00	0.004	0.029	-0.001	0.620	0.186	0.028	0.962	1.730	
535	2013-11-23 07:00	0.008	0.028	0.123	0.644	0.186	0.034	1.197	2.110	
536	2013-11-23 08:00	0.012	0.002	0.176	0.616	0.271	0.137	1.435	2.580	
537	2013-11-23 09:00	0.282	0.034	0.178	0.614	0.318	0.156	1.657	2.816	
538	2013-11-23 10:00	0.491	0.018	0.180	0.616	0.303	0.527	2.134	2.514	
539	2013-11-23 11:00	1.258	0.002	0.185	0.602	0.310	0.558	2.914	5.480	
540	2013-11-23 12:00	0.718	-0.001	0.531	0.540	0.319	0.557	2.663	4.730	
541	2013-11-23 13:00	0.469	0.020	0.773	0.530	0.319	0.554	2.665	3.761	
542	2013-11-23 14:00	0.359	0.018	0.568	0.455	0.319	0.548	2.267	3.190	
543	2013-11-23 15:00	0.416	0.000	0.635	0.492	0.319	0.543	2.405	4.292	
544	2013-11-23 16:00	0.855	0.000	0.906	0.446	0.319	0.544	3.071	4.104	
545	2013-11-23 17:00	0.499	0.056	0.616	0.393	0.319	0.544	2.426	2.559	
546	2013-11-23 18:00	0.722	0.042	0.146	0.426	0.319	0.540	2.200	0.596	
547	2013-11-23 19:00	0.000	0.033	-0.001	0.392	0.221	0.542	1.262	1.429	
548	2013-11-23 20:00	0.000	0.034	-0.001	0.393	0.181	0.542	1.225	1.541	
549	2013-11-23 21:00	0.000	0.034	-0.001	0.428	0.181	0.543	1.261	1.592	
550	2013-11-23 22:00	0.000	0.032	0.090	0.428	0.182	0.550	1.357	1.720	
551	2013-11-23 23:00	0.000	0.031	0.175	0.438	0.182	0.553	1.455	1.827	
552	2013-11-24 00:00	0.000	0.035	0.110	0.488	0.182	0.553	1.451	1.702	23-11-2013
553	2013-11-24 01:00	0.000	0.035	0.002	0.480	0.182	0.556	1.329	1.581	
554	2013-11-24 02:00	0.000	0.033	0.005	0.533	0.182	0.554	1.374	1.635	
555	2013-11-24 03:00	0.001	0.033	0.008	0.565	0.182	0.553	1.409	1.631	
556	2013-11-24 04:00	0.002	0.032	0.123	0.581	0.183	0.556	1.548	1.786	
557	2013-11-24 05:00	0.003	0.035	-0.001	0.620	0.183	0.561	1.469	1.714	
558	2013-11-24 06:00	0.004	0.034	-0.001	0.609	0.183	0.562	1.458	1.755	
559	2013-11-24 07:00	0.006	0.022	0.142	0.629	0.183	0.556	1.727	2.077	
560	2013-11-24 08:00	0.007	0.000	0.171	0.628	0.252	0.266	1.547	2.359	
561	2013-11-24 09:00	0.364	0.025	0.173	0.639	0.300	0.156	1.707	2.354	
562	2013-11-24 10:00	0.457	0.016	0.175	0.656	0.303	0.208	1.815	2.359	
563	2013-11-24 11:00	0.794	0.000	0.186	0.631	0.312	0.560	2.483	4.856	
564	2013-11-24 12:00	0.591	0.000	0.478	0.592	0.318	0.556	2.534	4.862	
565	2013-11-24 13:00	0.635	0.009	0.882	0.607	0.318	0.557	3.008	4.598	
566	2013-11-24 14:00	0.687	0.016	0.889	0.592	0.318	0.554	3.055	4.326	
567	2013-11-24 15:00	0.740	0.003	0.900	0.613	0.318	0.549	3.123	4.529	
568	2013-11-24 16:00	0.975	0.000	0.910	0.504	0.318	0.541	3.248	4.729	
569	2013-11-24 17:00	0.830	0.014	0.839	0.521	0.318	0.543	3.064	3.773	
570	2013-11-24 18:00	0.340	0.045	0.388	0.543	0.318	0.543	2.176	1.633	
571	2013-11-24 19:00	0.499	0.034	0.190	0.540	0.318	0.544	2.124	3.359	
572	2013-11-24 20:00	0.451	0.045	0.188	0.505	0.320	0.543	2.052	1.257	
573	2013-11-24 21:00	0.411	0.033	0.175	0.466	0.183	0.543	1.810	2.240	
574	2013-11-24 22:00	0.371	0.033	-0.002	0.476	0.182	0.502	1.562	1.909	
575	2013-11-24 23:00	0.291	0.034	-0.004	0.447	0.182	0.152	1.103	1.764	
576	2013-11-25 00:00	0.293	0.035	-0.005	0.436	0.182	0.153	1.092	1.788	24-11-2013

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
577	2013-11-25 01:00	0.294	0.037	-0.007	0.468	0.182	0.153	1.127	1.762	
578	2013-11-25 02:00	0.296	0.011	-0.009	0.476	0.182	0.153	1.110	1.737	
579	2013-11-25 03:00	0.298	0.030	-0.011	0.449	0.182	0.154	1.102	1.581	
580	2013-11-25 04:00	0.299	0.027	-0.012	0.449	0.182	0.154	1.099	1.658	
581	2013-11-25 05:00	0.301	0.002	-0.014	0.382	0.182	0.155	1.008	1.617	
582	2013-11-25 06:00	0.304	0.002	-0.015	0.421	0.182	0.155	1.050	1.656	
583	2013-11-25 07:00	0.293	0.010	-0.015	0.404	0.182	0.156	1.030	1.640	
584	2013-11-25 08:00	0.297	0.013	-0.015	0.450	0.182	0.156	1.082	1.664	
585	2013-11-25 09:00	0.301	0.013	-0.015	0.487	0.182	0.156	1.125	1.648	
586	2013-11-25 10:00	0.104	0.013	-0.015	0.440	0.182	0.460	1.185	1.293	
587	2013-11-25 11:00	0.005	0.004	-0.015	0.476	0.182	0.562	1.215	1.384	
588	2013-11-25 12:00	0.009	0.008	-0.015	0.465	0.182	0.557	1.207	1.148	
589	2013-11-25 13:00	0.013	0.013	-0.015	0.433	0.182	0.554	1.186	1.345	
590	2013-11-25 14:00	0.016	0.013	-0.015	0.488	0.182	0.553	1.239	1.223	
591	2013-11-25 15:00	0.020	0.015	-0.015	0.426	0.182	0.548	1.177	1.246	
592	2013-11-25 16:00	0.024	0.016	-0.015	0.461	0.182	0.542	1.211	1.294	
593	2013-11-25 17:00	0.593	0.015	-0.015	0.455	0.182	0.544	1.774	1.826	
594	2013-11-25 18:00	0.401	0.023	-0.015	0.445	0.097	0.538	1.489	1.352	
595	2013-11-25 19:00	0.435	0.022	-0.015	0.484	0.000	0.535	1.461	1.690	
596	2013-11-25 20:00	0.438	0.023	-0.015	0.489	0.000	0.535	1.469	1.670	
597	2013-11-25 21:00	0.441	0.022	-0.015	0.487	0.000	0.538	1.472	1.682	
598	2013-11-25 22:00	0.443	0.023	-0.015	0.501	0.000	0.421	1.372	1.630	
599	2013-11-25 23:00	0.446	0.022	-0.015	0.493	0.000	0.151	1.096	1.590	
600	2013-11-26 00:00	0.449	0.022	-0.015	0.487	0.000	0.152	1.095	1.548	25-11-2013
601	2013-11-26 01:00	0.452	0.023	-0.015	0.515	0.000	0.153	1.127	1.620	
602	2013-11-26 02:00	0.454	0.024	-0.015	0.473	0.000	0.154	1.090	1.583	
603	2013-11-26 03:00	0.057	0.013	-0.015	0.529	0.000	0.154	0.923	1.550	
604	2013-11-26 04:00	0.389	0.018	-0.015	0.471	0.000	0.155	1.033	1.578	
605	2013-11-26 05:00	0.453	0.024	-0.015	0.529	0.000	0.156	1.148	1.616	
606	2013-11-26 06:00	0.231	0.017	-0.015	0.480	0.000	0.157	0.977	1.409	
607	2013-11-26 07:00	0.328	0.009	-0.015	0.519	0.000	0.157	1.057	1.469	
608	2013-11-26 08:00	0.466	0.012	-0.015	0.508	0.000	0.156	1.127	1.586	
609	2013-11-26 09:00	0.473	0.006	-0.015	0.497	0.000	0.464	1.425	1.590	
610	2013-11-26 10:00	0.526	0.006	-0.015	0.511	0.000	0.561	1.589	1.531	
611	2013-11-26 11:00	0.701	0.006	-0.015	0.475	0.000	0.557	1.723	1.626	
612	2013-11-26 12:00	0.335	0.002	-0.015	0.511	0.000	0.550	1.383	1.398	
613	2013-11-26 13:00	0.000	0.000	-0.015	0.484	0.000	0.547	1.016	0.960	
614	2013-11-26 14:00	0.000	0.000	-0.015	0.477	0.000	0.544	1.006	1.002	
615	2013-11-26 15:00	0.000	-0.001	-0.015	0.490	0.000	0.541	1.016	1.028	
616	2013-11-26 16:00	0.000	-0.001	-0.015	0.465	0.000	0.543	0.992	0.989	
617	2013-11-26 17:00	0.000	-0.001	-0.015	0.469	0.000	0.540	0.993	0.962	
618	2013-11-26 18:00	0.000	-0.001	-0.015	0.507	0.000	0.540	1.031	0.989	
619	2013-11-26 19:00	0.001	0.000	-0.015	0.497	0.000	0.541	1.023	0.988	
620	2013-11-26 20:00	0.003	0.000	-0.015	0.532	0.000	0.539	1.058	1.224	
621	2013-11-26 21:00	0.004	0.000	-0.015	0.521	0.000	0.542	1.051	1.142	
622	2013-11-26 22:00	0.006	0.000	-0.015	0.509	0.000	0.338	0.837	1.104	
623	2013-11-26 23:00	0.015	0.002	-0.015	0.539	0.000	0.149	0.690	1.254	
624	2013-11-27 00:00	0.152	0.022	-0.015	0.526	0.000	0.150	0.836	1.152	26-11-2013
625	2013-11-27 01:00	0.455	0.020	-0.015	0.525	0.000	0.151	1.138	1.624	
626	2013-11-27 02:00	0.158	0.018	-0.015	0.526	0.000	0.152	0.984	1.544	
627	2013-11-27 03:00	0.000	0.014	-0.015	0.522	0.000	0.153	0.902	1.292	
628	2013-11-27 04:00	0.000	0.014	-0.015	0.535	0.000	0.154	0.914	1.551	
629	2013-11-27 05:00	0.445	0.026	-0.015	0.504	0.000	0.155	1.115	1.501	
630	2013-11-27 06:00	0.469	0.025	-0.015	0.544	0.000	0.155	1.178	1.565	
631	2013-11-27 07:00	0.470	0.016	-0.015	0.486	0.000	0.155	1.112	1.493	
632	2013-11-27 08:00	0.061	0.013	-0.015	0.533	0.000	0.289	0.881	1.215	
633	2013-11-27 09:00	0.000	0.013	-0.015	0.495	0.000	0.563	1.246	1.248	
634	2013-11-27 10:00	0.000	0.013	-0.015	0.504	0.000	0.563	1.219	1.400	
635	2013-11-27 11:00	0.000	0.013	-0.015	0.507	0.000	0.552	1.057	1.025	
636	2013-11-27 12:00	0.000	0.013	-0.015	0.489	0.000	0.550	1.036	1.164	
637	2013-11-27 13:00	0.000	0.013	-0.015	0.509	0.000	0.546	1.053	1.007	
638	2013-11-27 14:00	0.000	0.013	-0.015	0.493	0.000	0.541	1.031	1.010	
639	2013-11-27 15:00	0.000	0.013	-0.015	0.503	0.000	0.545	1.045	1.148	
640	2013-11-27 16:00	0.000	0.013	-0.015	0.505	0.000	0.546	1.125	1.084	
641	2013-11-27 17:00	0.000	0.013	-0.015	0.488	0.000	0.298	0.783	1.086	
642	2013-11-27 18:00	0.000	0.013	-0.015	0.495	0.000	0.150	0.644	1.164	
643	2013-11-27 19:00	0.001	0.013	-0.015	0.522	0.000	0.152	0.673	1.084	
644	2013-11-27 20:00	0.003	0.012	-0.015	0.510	0.000	0.190	0.863	1.395	
645	2013-11-27 21:00	0.006	-0.001	-0.015	0.528	0.000	0.544	1.258	1.353	
646	2013-11-27 22:00	0.009	0.000	-0.015	0.523	0.000	0.553	1.244	1.410	
647	2013-11-27 23:00	0.012	0.000	-0.015	0.512	0.000	0.556	1.233	1.282	
648	2013-11-28 00:00	0.000	0.000	-0.015	0.530	0.000	0.232	0.943	1.369	27-11-2013
649	2013-11-28 01:00	0.000	0.000	-0.015	0.517	0.000	0.000	0.699	1.369	
650	2013-11-28 02:00	0.000	0.000	-0.015	0.532	0.000	0.000	0.716	1.319	
651	2013-11-28 03:00	0.000	0.000	-0.015	0.529	0.000	0.000	0.722	1.439	
652	2013-11-28 04:00	0.000	0.017	-0.015	0.538	0.000	0.000	0.770	1.472	
653	2013-11-28 05:00	0.000	0.014	-0.015	0.526	0.000	0.000	0.753	1.366	
654	2013-11-28 06:00	0.000	0.016	-0.015	0.529	0.000	0.000	0.755	1.539	
655	2013-11-28 07:00	0.000	0.015	-0.015	0.564	0.000	0.000	0.753	1.427	
656	2013-11-28 08:00	0.000	-0.001	-0.015	0.507	0.000	0.036	0.726	1.327	
657	2013-11-28 09:00	0.000	0.000	-0.015	0.554	0.000	0.160	0.897	1.279	
658	2013-11-28 10:00	0.000	0.000	-0.015	0.471	0.000	0.159	0.706	1.096	
659	2013-11-28 11:00	0.000	0.000	-0.015	0.533	0.000	0.226	0.745	1.001	
660	2013-11-28 12:00	0.000	0.000	-0.015	0.484	0.000	0.497	1.079	1.026	
661	2013-11-28 13:00	0.000	0.000	-0.015	0.512	0.000	0.084	0.705	1.054	
662	2013-11-28 14:00	0.000	0.000	-0.015	0.500	0.000	0.290	0.899	1.170	
663	2013-11-28 15:00	0.000	-0.001	-0.015	0.522	0.000	0.553	1.183	1.014	
664	2013-11-28 16:00	0.001	-0.001	-0.015	0.483	0.000	0.546	1.138	1.031	
665	2013-11-28 17:00	0.001	-0.001	-0.015	0.533	0.000	0.545	1.187	1.201	
666	2013-11-28 18:00	0.001	-0.001	-0.015	0.497	0.000	0.460	1.067	1.054	
667	2013-11-28 19:00	0.001	-0.001	-0.015	0.540	0.000	0.152	0.801	1.133	
668	2013-11-28 20:00	0.001	-0.001	-0.015	0.532	0.000	0.154	0.795	1.253	
669	2013-11-28 21:00	0.000	-0.001	-0.015	0.516	0.000	0.156	0.781	1.064	
670	2013-11-28 22:00	0.000	-0.001	-0.015	0.547	0.000	0.155	0.812	1.192	
671	2013-11-28 23:00	0.000	-0.001	-0.015	0.520	0.000	0.156	0.786	1.180	
672	2013-11-29 00:00	0.000	-0.001	-0.015	0.543	0.000	0.158	0.810	1.082	28-11-2013

ANDASOL 3 POWER PLANT NOVEMBER 2013 PARASITIC LOAD DATA

Acumulated Time (Hrs)	Actual Time	HTF Main Pumps Parasitic Load (MWh)	HTF Aux Pumps Parasitic Load (MWh)	FW System Pumps (MWh)	TES Pumps (MWh)	CT Pumps (MWh)	CT Fans (MWh)	Total Selected Parasitic Load (MWh)	TOTAL PARASITIC LOAD (MWh)	Specific Date
673	2013-11-29 01:00	0.000	-0.001	-0.015	0.531	0.000	0.142	0.797	1.204	29-11-2013
674	2013-11-29 02:00	0.000	-0.001	-0.015	0.528	0.000	0.000	0.746	1.290	
675	2013-11-29 03:00	0.000	-0.001	-0.015	0.544	0.000	0.000	0.758	1.347	
676	2013-11-29 04:00	0.000	-0.001	-0.015	0.526	0.000	0.000	0.736	1.281	
677	2013-11-29 05:00	0.000	-0.001	-0.015	0.538	0.000	0.000	0.742	1.286	
678	2013-11-29 06:00	0.000	-0.001	-0.015	0.513	0.000	0.000	0.705	1.288	
679	2013-11-29 07:00	0.001	-0.001	-0.015	0.547	0.000	0.093	0.835	1.158	
680	2013-11-29 08:00	0.004	-0.001	-0.015	0.517	0.000	0.158	0.872	1.374	
681	2013-11-29 09:00	0.009	-0.001	-0.015	0.525	0.000	0.158	0.868	1.172	
682	2013-11-29 10:00	0.014	-0.001	-0.015	0.509	0.000	0.301	0.944	1.148	
683	2013-11-29 11:00	0.019	-0.001	-0.015	0.493	0.000	0.569	1.200	1.211	
684	2013-11-29 12:00	0.064	0.011	-0.015	0.496	0.000	0.564	1.227	1.083	
685	2013-11-29 13:00	0.428	0.014	-0.015	0.478	0.000	0.561	1.464	1.362	
686	2013-11-29 14:00	0.421	0.000	-0.015	0.476	0.000	0.555	1.437	1.404	
687	2013-11-29 15:00	0.417	-0.001	-0.015	0.494	0.000	0.553	1.448	1.264	
688	2013-11-29 16:00	0.413	-0.001	-0.015	0.607	0.000	0.551	1.555	1.526	
689	2013-11-29 17:00	0.409	-0.001	-0.015	0.790	0.000	0.551	1.735	1.626	
690	2013-11-29 18:00	0.442	0.011	-0.015	0.824	0.000	0.554	1.815	1.675	
691	2013-11-29 19:00	0.403	0.013	-0.015	0.811	0.000	0.552	1.764	1.686	
692	2013-11-29 20:00	0.405	0.013	-0.015	0.851	0.000	0.550	1.804	1.758	
693	2013-11-29 21:00	0.407	0.013	-0.015	0.836	0.000	0.546	1.787	1.730	
694	2013-11-29 22:00	0.409	0.013	-0.015	0.831	0.000	0.556	1.793	1.754	
695	2013-11-29 23:00	0.411	0.013	-0.015	0.865	0.000	0.359	1.633	1.700	
696	2013-11-30 00:00	0.413	0.013	-0.015	0.837	0.000	0.338	1.585	1.698	
697	2013-11-30 01:00	0.415	0.013	-0.015	0.862	0.000	0.340	1.614	1.706	30-11-2013
698	2013-11-30 02:00	0.417	0.014	-0.015	0.845	0.000	0.340	1.600	1.643	
699	2013-11-30 03:00	0.417	0.014	-0.015	0.843	0.000	0.339	1.597	1.626	
700	2013-11-30 04:00	0.418	0.007	-0.015	0.861	0.000	0.339	1.610	1.641	
701	2013-11-30 05:00	0.418	0.013	-0.015	0.835	0.000	0.340	1.590	1.594	
702	2013-11-30 06:00	0.419	0.014	-0.014	0.862	0.000	0.340	1.620	1.652	
703	2013-11-30 07:00	0.419	0.009	-0.012	0.845	0.000	0.341	1.601	1.710	
704	2013-11-30 08:00	0.389	0.008	-0.011	0.870	0.000	0.475	1.730	1.658	
705	2013-11-30 09:00	0.377	0.010	-0.009	0.839	0.000	0.568	1.784	1.608	
706	2013-11-30 10:00	0.400	0.000	-0.007	0.844	0.000	0.566	1.802	1.544	
707	2013-11-30 11:00	0.398	0.000	-0.006	0.827	0.000	0.555	1.774	1.566	
708	2013-11-30 12:00	0.396	0.014	-0.004	0.825	0.000	0.553	1.784	1.624	
709	2013-11-30 13:00	0.395	0.014	-0.002	0.816	0.005	0.553	1.780	1.633	
710	2013-11-30 14:00	0.393	0.014	-0.001	0.832	0.237	0.549	2.022	1.861	
711	2013-11-30 15:00	0.391	0.021	-0.001	0.814	0.216	0.549	1.990	1.938	
712	2013-11-30 16:00	0.390	0.029	-0.001	0.826	0.185	0.552	1.980	1.852	
713	2013-11-30 17:00	0.388	0.038	-0.001	0.836	0.184	0.550	1.994	1.940	
714	2013-11-30 18:00	0.384	0.035	-0.001	0.801	0.184	0.550	1.953	1.938	
715	2013-11-30 19:00	0.380	0.036	-0.001	0.891	0.183	0.546	2.035	2.048	
716	2013-11-30 20:00	0.376	0.034	-0.001	0.813	0.183	0.546	1.951	1.992	
717	2013-11-30 21:00	0.373	0.033	-0.001	0.867	0.183	0.542	1.996	1.982	
718	2013-11-30 22:00	0.373	0.036	-0.001	0.839	0.182	0.546	1.975	1.907	
719	2013-11-30 23:00	0.377	0.031	0.051	0.842	0.182	0.351	1.835	1.976	
720	2013-11-30 23:00	0.381	0.036	0.200	0.861	0.182	0.335	1.995	2.158	

Appendix C
Additional Graphical Results

List of figures

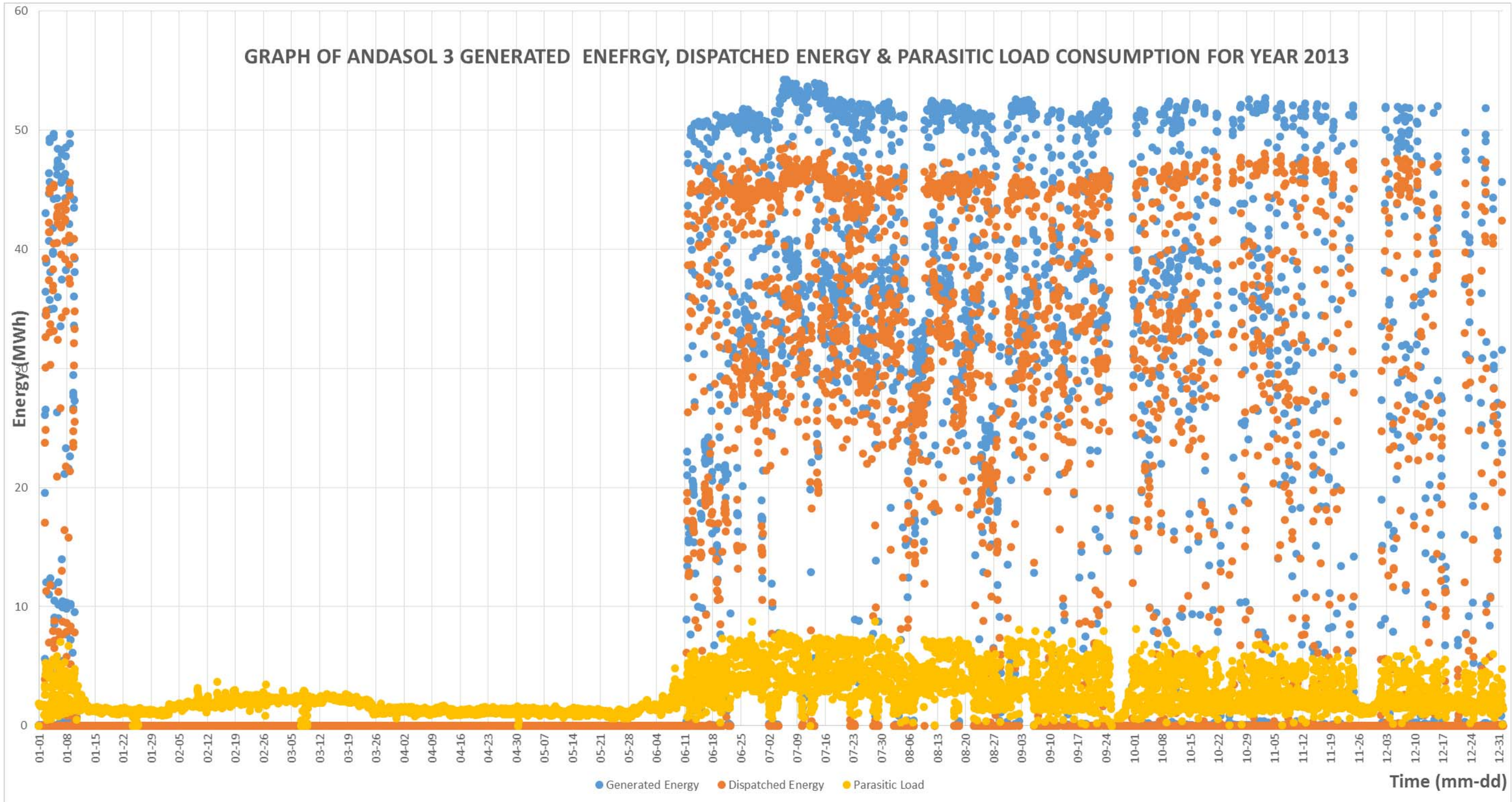

Figure A-1: Graph of Andasol 3 Generated Energy, Dispatched Energy and Parasitic Load Consumption for Year 2013

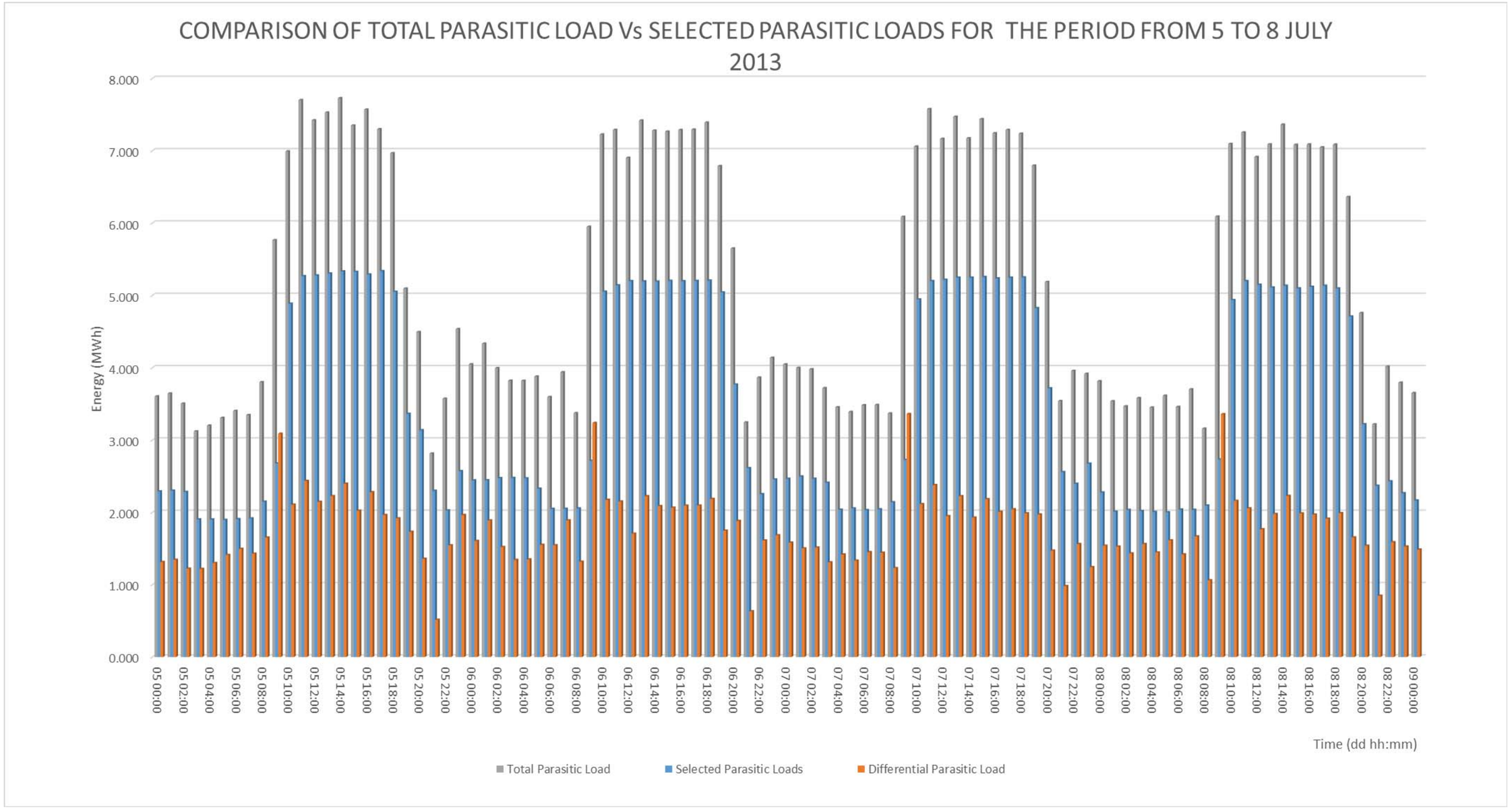

Figure A-2: Comparison of Total Parasitic Load Vs Selected Parasitic Load for the Period from 5 to 8 July 2013

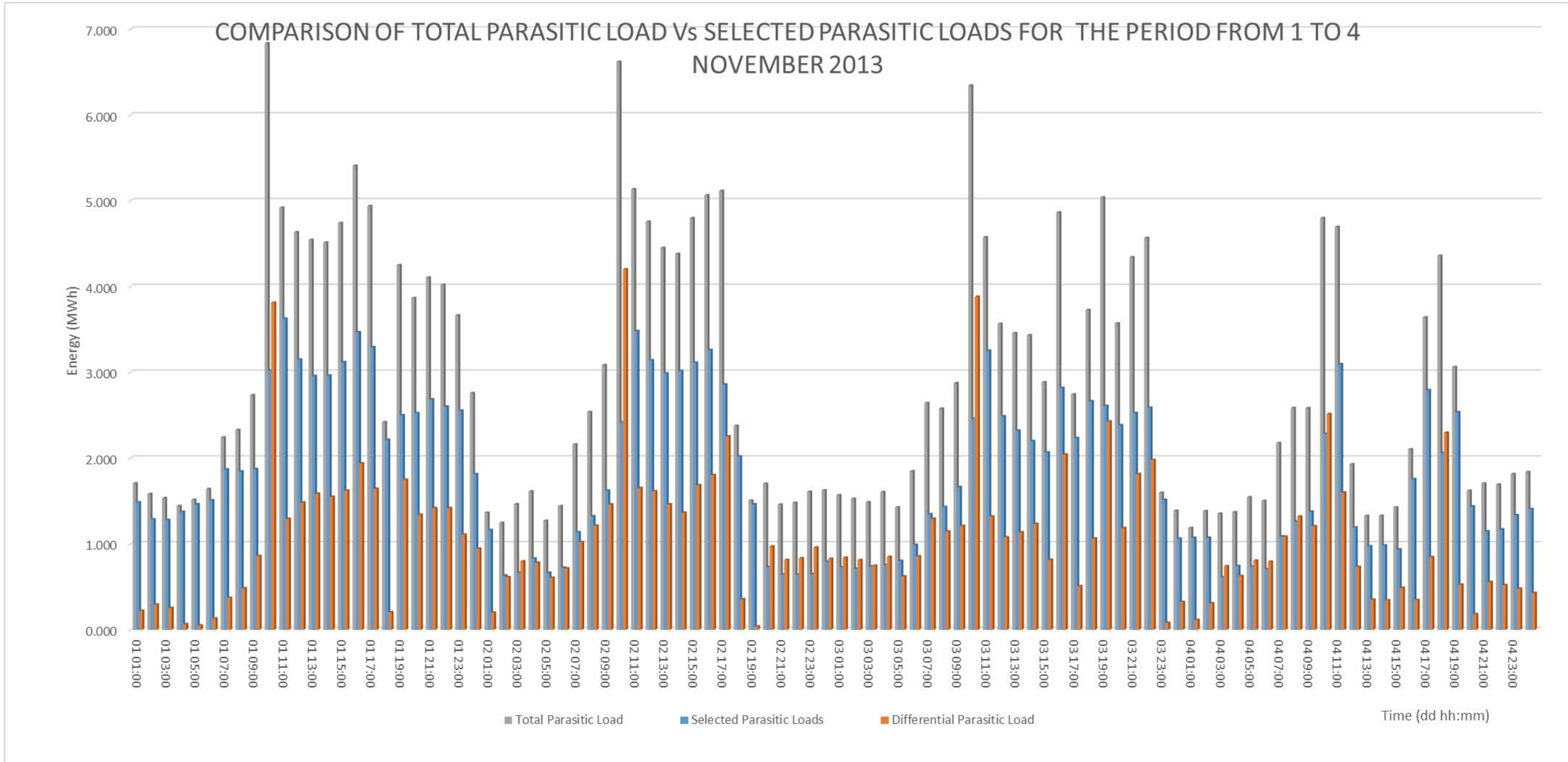

Figure A-3: Comparison of Total parasitic Load Vs Selected Parasitic Load for the Period from 1 to 4 November 2013