An-Najah National University

Faculty of Graduate Studies

ANALYSISAND IMPROVEMENT OF NABLUS ELECTRICAL DISTRIBUTION NETWORK BY ADDING A NEW CONNECTION POINT IN SARRA VILLAGE AND TWO TRANSFER SUB-STATIONS TO FEED THE NETWORK

By
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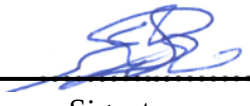
Dr. Omar Maen Internal Examiner	 Signature

Dedication

إلى صاحب الفضل الأول والأخير إلى الهادي سواء السبيل الله عز وجل ....
إلى من أضاء الأرض بنوره وقاد قلوب البشرية إلى مرفأ الأمان، معلم البشرية محمد صلى الله عليه وسلم ....
إلى من هم أكرم منا جميعا شهداء وطني الحبيب والى المرابطين والأسرى والجرحى ....
إلى من أبصرت بها طريق حياتي واستمديت منها قوتي واعتزازي بذاتي إلى الكفاح الذي لا يتوقف والى الشامخة التي علمتني معنى الإصرار وان لا شيء مستحيل في الحياة مع الإيمان والتخطيط بالعمل إلى من لم تنسني بدعائها لي إلى والدتي سناء (أم محمد) الغالية على قلبي ومنبع وجودي وضحكتي التي لا تنطفئ أطال الله في عمرها ورزقني حسن برها .....
إلى من كان معلمي الأول وبذل ما عنده لإتمام دراستي وعلمي إلى من شرفني بحمل أسمه وكان مصدر قوتي وثقتي بنفسي إلى من صاحب الأخلاق والدين والسمعة الحسنة والدي توفيق (أبو محمد) أطال الله في عمره وحفظه لي .....
إلى السد والسند إلى من كان رفيق دربي فهو الصاحب والأخ وكل شيء أخي أحمد (أب حسن)حفظه الله ...
إلى القلب الحنون إلى صلى رحمي إلى عيوني التي أرى بها أخواتي الغاليين على قلبي دامت السعادة في بيوتكم ....
إلى حبيبتي وكل حياتي إلى من دعمتني وكانت الجبل الذي استند عليه إلى من زرعت الأمل وأعانتني على دراستي زوجتي علا دمتي لي في قلبي ...
إلى انسبائي وأصدقائي وأقاربي إلى كل شخص قال لي كلمة زادتني دفعة للإمام لهم خالص محبتي وشكري ...
إلى صاحب القلب الطيب إلى من كان له فضل وسند في إتمام رسالتي ومسيرتي التعليمية الى مشرفي الدكتور ماهر خماش ...
إلى الذين تعلمت منهم الهدف إلى من ساندني وتعلمت منهم إلى من كان لهم فضل في تأسيسي وعلمي إلى أساتذتي د.معين عمر و د.سامر السعدي ...
اهدي إليكم جميعا ثمرة جهدي في دراسة هذا البحث المتواضع، راجيا من الله أن تكون نافذة علم وبطاقة معرفة وأن ينفعني وينفع بنا ...

الباحث: محمد توفيق قصاب

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

ANALYSIS AND IMPROVEMENT OF NABLUS ELECTRICAL DISTRIBUTION NETWORK BY ADDING A NEW CONNECTION POINT IN SARRA VILLAGE AND TWO TRANSFER SUB-STATIONS TO FEED THE NETWORK

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: Mohammad T. N. Qassab

Signature: 

Date: 18/01/2022

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ANALYSIS AND IMPROVEMENT OF NABLUS ELECTRICAL DISTRIBUTION NETWORK BY ADDING A NEW CONNECTION POINT IN SARRA VILLAGE AND TWO TRANSFER SUB-STATIONS TO FEED THE NETWORK

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Abstract

Lack of electric power sources is one of main problems in Palestine since the population increased dramatically and the required electric power exceeded the permissible limit. In fact, since the Israeli-Electric Company is almost the primary source of electricity, therefore the electric power are limited.

The Palestinians suffer from a shortage of electric power due to increasing of electrical power demand, but Israel Electric Corporation does not keeping up with the increasing demand.

Nablus also suffers from a shortage of electric power due to the existence of new buildings and the sharp increase of population. In addition, the total electric power supplied to Nablus from connection points has the capacity of 65 MW, but electrical loads reached their peak especially in winter.

Consequently, North Electrical Distribution company (NEDCO) cuts off some loads from certain areas in Nablus network for periods of time that exceed an hour per day in order to reduce the pressure on the other connection points in the same electrical network because loads exceed the permissible limit. This leads to failure in electrical transformers as well as in transmission lines and devices.

At SARRA connection point, which is one of the connection points of Nablus, the capacity of the substation is 80 MW, and the used capacity is 40 MW. In this study, the researcher aims to examine the analysis and improvement of Nablus electrical distribution network by adding a new connection point in SARRA village and two distribution sub-stations to feed the network. There, a distribution substation was added in two areas with a capacity for 20 MW to each substation, named: Nablus Al-Jadida

and An-Najah National Hospital. In fact, the electric power capacity has been raised to 105 MW for the city of Nablus.

In this study, the problem was solved considerably by providing new areas with electric power and redistributing the loads from other connection points located in the Nablus city, especially in the eastern industrial area, and new overhead and underground electric transmission lines have been established.

The value of the electric capacity supplied from the connection points to the city of Nablus has decreased, and there is a possibility of future expansion and supplying areas in the future due to the presence of electric energy capacity at the new connection points, according to the results found in this study. Also, economic feasibility of the project was prepared and the initial cost value has been calculated.

Keywords: electric loads, the Israeli- Electric company, electricity distribution in Palestine.

Chapter One

Summary of the Electric –Power condition in Palestine

1.1 Electric Power Source and Consumption inside Palestine

In terms of energy resources, consider Palestine country is regarded as individual of the poorest country in the world. Solar sun energy seems to be the only accessible power source, and it is mostly used thermally to produce energy, biomass (agricultural waste and wood) for rural cooking and heating and power generation. Furthermore, The British Gas Company found natural gas in Gaza sea in December 2000.

Indeed, all other major resources, such as fossil fuels, petrochemical products, and electricity, are supplied from Israel. as demonstrated in table (A.1) in appendix (A).

Table (A.1) in appendix (A)indicates that Israel is the only supplier of electric power making it incapable to supply the load if Israel refuses supply the agreed-upon energy to them that the total of the consumption of electricity in 2019 was (6249104000 KWh).

Power utilization in Palestine is an additional feature of the complicated economic and political situation that the overall power consumption of Palestine in 2020 was (6.8)tWh/year. This is insignificant when compared to neighboring nations' electricity used as shown in figure (B.1) in appendix (B)[11].

Figure (B.1) in appendix (B) represents power consumption of Palestine and other neighboring countries that the consumption of Jordan was (16.13 tWh/year) despite the fact that its population is (9.8 million)[12]. In other words, it was three times greater than Palestine. Still, the last value identified of the total final power consumption in 2020 is shown in figure(B.2) in appendix (B).

It is clear from figure (B.2) in appendix (B) The influence of a large share of residential and other industries in total power consumption accounting for virtually all solar energy usage, liquefied petroleum gas (LPG),and wood cake olive [14].

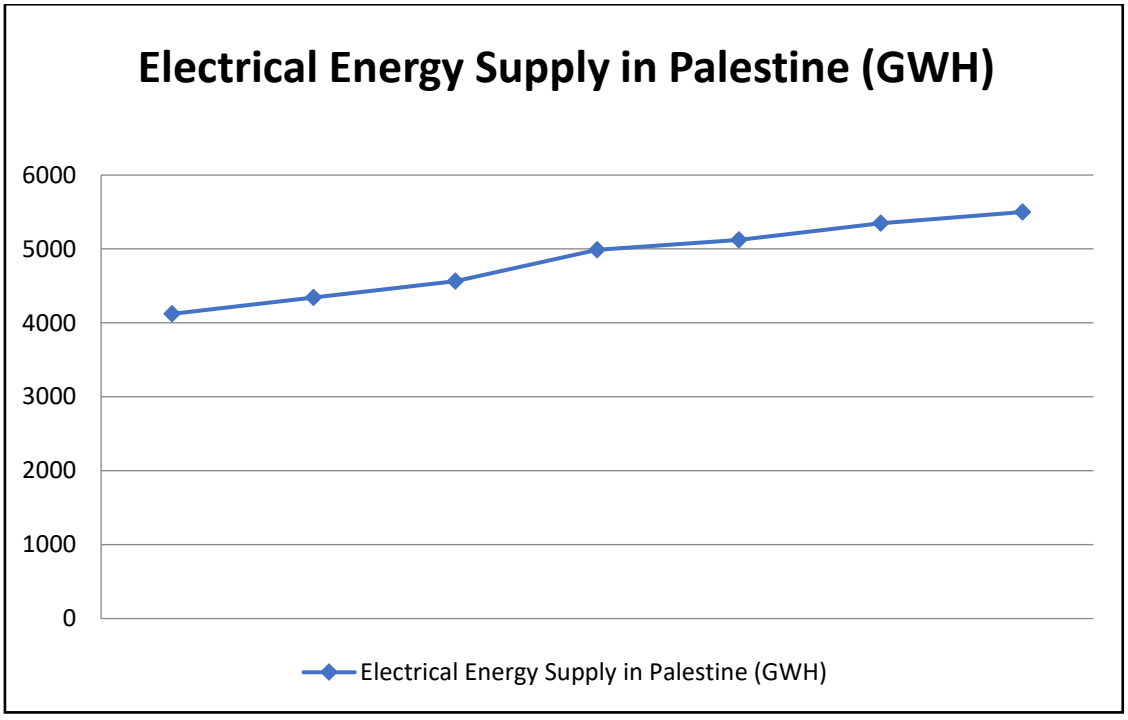
It covers all types of energy confronted in economic and institutional contexts in Palestine, including solar energy (primarily used in household water heating), utilities, petrochemical products (gasoline, fuel oil, and diesel), Liquid petroleum gas, and after

grinding cake olive (In rural places, it can be used for food preparation and heat), coal furthermore wood. Between 2017 and 2020, the average annual growth rate of total Power demand was about 9%, whereas the average annual increase of final energy consumption was roughly 4.1 percent (This discrepancy is accompanied by a rise in the estimation of losses as well as a statistics difference.) [15].

Besides, electric power supply in Palestine varies from place-to-place ranging from 2015 to 2021 measured by GWH that the average annual growth of electric power supply is nearly (11.7 %), between 2015 and 2021 as exposed in figure (1):

Figure 1

Variation of electrical power supplied inside Palestine



Source: shorturl.at/jtvM5.

In addition, it is imperative to introduce another significant figure for electrical power production, electrical power consumption per capita as shown in figure (B.3) in appendix (B).

Figure (B.3) in appendix (B) represents electricity consumption per capita (kWh per person per year) ; it is obvious that Syria is the smallest area whereas Lebanon and Israel are the highest that the Israeli consumption is (6650 kW/h) and Lebanon's is (2993 kW/h)[16].

1.2 electrical power Supply outline

The local identity power deliver is now beneath development with repair, and Palestine has minimal electrical power producing capability because the majority of the electricity is provided by the Israeli electricity company (IEC).

In reality, (82.4%)[1] of such electrical power utilized in Palestine in 2020 was supplied commencing Israel power stations by 33 kV and 22 kV feeder.

Table (A.2) in appendix (A) shows electrical power supply and the percentage of each source in 2020.

1.2.1 Electrical Power Supply in the West Bank

The West Bank's electricity is supplied by Israel, Jordan, and municipal generators. Furthermore, the power supplies from Israel is routed via several 161/33 KV, substations distribution in different area in west bank one from the south, around Hebron, inside settlements, and the other in the north, around Nablus, there in Ariel communities (region C), and one here in Jerusalem's Atarot industrial zone (region C), through 22 kV furthermore 33 kV lines..

Jordan's supply comes through a 33 kV (could resist 132 kV) O.H line (20MW) that exclusively serves Jericho.

Furthermore, the other electricity is generate by limited to a small area miniature diesel generator, by way of a highest capacity of about (650) MVA in the West Bank.

In truth, 30% is supplied directly by a Israeli Electricity Company (IEC), while 70% is supplied administratively by the IEC via Jerusalem Distribution Electricity Company (JDECO).

The IEC, which provides power in bulk to (272) municipalities., Also, (152) gets its electrical power from the Jerusalem Distributive Electricity Company (JDECO), whoever serve Eastern Jerusalem as well as town and village in the West Bank.

However, 38 communities in Palestine are still not linked in the direction of a municipal power grid. The West Bank's electrical networks are all designated distribution systems

that work at 450 V , 33 kV, 22 kV, 10 kV, 6.6 kV, and are served with power by IEC 161/33 kV distribution substation.

The existing loads inside the West Bank be is (700 to 900) MW and is provided from many sites on the IEC grid.

Furthermore, several Palestinian consuming load, particularly into the north West Bank area, are served via distribution line commencing a 161 kV substations within Israel , through which is distribution lines crossing in the boundary headed for serve Palestine heavy load, since within the casing via 22 kV lines serving Qalqilya in addition to Tulkarm. In adding, 33 kV lines connecting Bisan (Israel) serve Jenin and Tubas city .

In general, power delivered to Palestinian consumers at 33 kV or 22 kV via IEC owned medium voltage (MV) networks. Most of the time, the PEA and Palestinian companies have no control on the distribution via the distribution and transmission networks that stretch from of the 161 kV distribution systems.

In most cases, Palestinian control ceases at the connecting point by way of all this lines, so which also be controlled designed for bill reasons through IEC for corporations and municipality. This connections are also a combination of LV and MV.

If indeed the connecting point has been on the medium voltage area, the Palestinian utility could expand the medium voltage infrastructure and construct transformer with Low Voltage lines , If the connecting points has been going to the Low voltage side,and the Palestinian utility will be unable to develop the LV networks.

In other words, incapability to expand both Medium voltage and Low Voltage lines have culminated in system tribulations such seeing that awfully low voltages as significant technical's loss, in early 2017, the power signed with the IEC was approximately (670) MVA again designed for Western Bank, (186) MVA in support of such northern, (106) MVA for such south, in addition to (385) MVA for such center part of JDECO.

In the IEC, on the other hand, denies the majority of Palestinian applications in the north and south region toward enhance the capability of current connections point otherwise even in the direction of establish novel connected point.

They claimed that the existing (161) kv substations lacked capacity or that the distribution feeders were overloaded. On one hand, this has resulted in a supply bottleneck as a effect of the increased require. On the other hand, it is expected that peak demand in the northern region will exceed available contracted capacity with IEC this year, forcing the company to put into practice load shedding in some areas..

The fact that the distribution system inside the northern and southern regions is distorted, with major connection points mechanically disconnected by such an extensive network which will lets the transmission of some extra capability through single points towards an additional and use of one juncture while a replacement in the direction of some other points during the case of a sudden condition, makes the situation urgent..

In the situation of JDECO, the scenario does not exist because of the availability of an integrated network, while the Palestinian side is responsible for the absence of connection in their networks, Even though the Israeli network allows for this connection, the ability to offer recovery was never used.

In Nablus, the northern area's primary load base, is the most severely affected by a shortage of capacity.

1.2.2 Electricity Supply in Gaza Strip

The Gaza Strip receives electrical power from Israel, and Egypt, and the Gaza strip Power Plants (GPP), with their greatest loads in the Gaza Strip being roughly (265-275) MW.

It also is joined to a Israel electric network at 11 locations alongside of the margin, beginning from south on the road to north, using 22-33 KV transmissions system among such as overall rate on 120MW.

Only Rafah receives electricity from Egypt, which is delivered by a 33-kV Overhead (OH)line (19MW).The first phase of GPP was built with a generating capacity of (140) MW. These plant is presently generating (60) MW and is half operational. This suggests that there is unmet demand in the Gaza Strip ,The demand for and shortage in power generation in Gaza is shown in Table (A.3) in Appendix (A).

The major source of fuels for all this station was planned to be fossil fuels, but because to restrictions, the development to produce gas from Gaza's sea was halted, therefore the station now utilizes diesel to generate electricity.

As a result, as compared to the cost of purchasing power from Israel, GPP produces electricity at a high cost. Gaza's power grid is in bad condition, and it will take a significant amount of money to restore and upgrade it.

1.3 Electrical Utilities in Palestine

In Palestine, the power industry is kind of fractured. There is no significant producing capacity mostly in West Bank, and Gaza Power Plant (GPP) is the only source of electricity.

Power supply used to be such a municipal duty in the northern West Bank, but still the Northern Electricity Distribution Company (NEDCO) was founded to provide the northern West Bank for the institutional structure and restructuring of the electrical power industry.

As a result, five independent utilities are important for energy distribution throughout the Gaza strip and West Bank.

The utility companies include:

1. Gaza strip Electrical Distributions Companies (GEDCO): It has been traditional in 1999 with Norway stepped in to help It is the only electrical supplier there in Gaza Strip.
2. Hebron Electrical Power Company. (HEPCO): It encompasses the Halhul and Hebron areas there in southern West Bank.
3. South Electrical Company (SELCO): It was founded in 2002 also with support of the World for the West Bank to cover the residual southern parts of the States Western Banks.
4. North Electricity Distributions Companies (NEDCO): It was founded before 14 years with both help by Norway state and Alswaid, and it cover the section of north either in West Bank.
5. Jerusalem Distributed Electricity Companies (JDECO): Eastern Jerusalem city and the middle Palestine are serviced.

The geographical distribution of these utilities is shown in figure (B.23) in appendix(B).

1.4 Power Future

1.4.1Future Power Plans in the West Bank

Four new 161/33/22 kV major power substations will also be installed and supplied inside the northern, middle, and southern parts of the West Bank as aspect of a $140.1 million[18] construction.

In required to power Palestinian villages and cities, such substation determination replace every part of the other obtainable connection point through IEC companies that function on (33), and (22) kV, and 0.4 KV. As a result power will be provided to the West Bank at a cheaper high voltage tariff than the existing level pricing.

This will result in a significant reduction in technical losses but also a temporary solution to the constraint of available supplies capacity.

The restoration of any and each and every one distributions systems in the entire facilities in the West Bank served by these substations will proceed hand in hand with the installation of such substations. The Northern Electric Distribution Company, which was recently founded, will also benefit from this initiative (NEDCO). This initiative will also make it easier to integrate the Palestinian and Jordanian networks in the future.

This is a viable option, especially considering that, since about October 2019, Palestine has become a full participant of the seven-country interconnectivity project, which includes Jordon, Egyptian, Syrian, Lebanese, Iraqi, Libyan, and Turkish.

That's participation resolve enable Palestine to just be there linked to all this nations' grids on a massive scale, particularly between Gaza and Egypt and also the West Bank and Jordan.

It will also help form Palestine Energy Transmission Limited Ltd. (PETL), a distribution company that would ultimately own, manage, and expand the transmission system. PETL also would participate into electricity agreements with independence and moderately generators as well as neighboring nations, and sell electricity to area distribution utilities

Two power plants is proposed to be built and established in the West Bank in classify to boost arrangement capacities and minimize supplies reliance lying on Israelian through local power production:

1- Qalqilya: near Jayyus power plant inside the north.
2- west of Hebron: Turqumia power plant inside the south.

1.4.2 Future Power Plans in Gaza Strip

The Gaza Strip inside the north will be connected by a 161 kV high-voltage power line. Therefore, by delivering electricity at a cheaper rate and decreasing technical losses throughout the power network, the high voltage link is intended to bring down the price of power for Palestinians..

GEDCO is negotiating a long production arrangement through The IEC enroute for purchase power for Gaza Strip via that's anew connection. A preparation has indeed been discussed to interconnect Gaza's distribution system in the south (Rafah region) to Egypt's distribution network through a (220) kV interconnect.

Extending the GPP's capacity (which may be increased to 560 MVA) in the future only with prospect of running that on oil and gas imported through Egypt or produced from Gaza's sea would be a very likely option that will enhance electrical producing capacity while lowering power costs.

1.5 Distribution Substations in West Bank

In the West Bank, there are three distribution substations for IEC power sources that contribute to meet the power requirements of exist loads, mainly: Jenin substation (Jalameh), Turqumia substation and Nablus substation (Sarra).

The detailed description of these distribution substations is as the following:

1. Jenin Substation (Jalameh): The substation transforms high voltage (161 kV) to medium voltage (33 kV) and has a capacity of 135 MW, which may be upgraded in the future to reach 200 MW (180 MW) ,This is done to offer power to Jenin, its environs, and the industrial zone.

2. Turqumia Substation: the substation transforms high voltage (161 kV) to medium voltage (33 kV) with a capacity of 90 MW, which may be raised to 180 MW in the future ,The plant provides nutrition for the local community.
3. Nablus Substation (Sarah): The substation is to convert electricity from high voltage (161kV) on the way to medium voltage (33) kV, with a capacity of 40 MW will increased to 80MW and the total capacity for SARRA substation is 150MW can upgrade in future, to supply the city of Nablus and surrounding areas as shown in figure(B.24) in appendix (B).

1.6 Electrical Power Problems in Palestine

In Palestine, the electrical system consists of multiple independent electrical distribution systems that must be combined into a single power grid.

This circumstance leads to a slew of additional issues, including excessive technical losses, a scarcity of supply capacity, electrical problems, voltage drops, and so on Throughout the West Bank, there is indeed a huge need for the growth of distribution enterprises, which is still underway.

The primary electrical energy issues may be summed up as follows:

1. Electrical energy supply capacity is insufficient to fulfill current and future demands. This issue exists from both the Occupied West bank and Gaza Strip. However, it is a major issue inside this northern West Bank, particularly in the Nablus region.
2. Electrical networks are in desperate need of repair and growth.
3. The lack of producing capacity inside the West Bank, as well as the necessity to expand power capacity in Gaza.
4. Electricity costs are extremely high in comparison to regional and worldwide pricing.
5. High transmission in addition to distributed loss (mutually technical in addition to nontechnical), so which is seen as a significant and emerging issue.
6. Lack of a well-connected electrical power grid.

As mentioned previously, Because Nablus already reached the maximum level supply capacity, there seems to be a pressing need to expand it. Improvement of Nablus

electrical distribution network by adding a new connection point in Sarra village and two distribution sub-stations to feed the Network can:

1. Reduce peak demand.
2. Reduce the consumption of electricity from the IEC Network.
3. postpone attaining a demand that exceeds the maximum supply.

1.7 Problem statement for Nablus Electrical network

- Lack electrical power supplied to Nablus electrical network
- Electrical networks need major rehabilitation and development power system
- High transmission in addition to distribution losses (nontechnical and technical).
- Uneven distribution loads for network substation in the grid.
- Increasing electrical pressure in the eastern area of the city with the increased industrial and urban development.
- Weak infrastructure of the electrical network and possibility of absorbing the population and industrial increased in the future.
- Integrated and reliability for Nablus electrical network.

1.8 Methodology used in study to solve the problem

- In SARRA connection point, which is one of the connection points belonging to Nablus, the capacity of the substation is 150 MW, and the used capacity is 40 MW. In this study, the researcher aims to examine the analysis and improvement of Nablus electrical distribution network by adding a new connection point in SARRA village and two transfer sub-stations to feed the network.
- A transfer substation was added in two areas with a capacity of20 MW to each substation, namely: Nablus Al-Jadida and An-Najah National Hospital. In fact, the electric power capacity has been raised to 105 MW for the city of Nablus.
- The problem was solved significantly by providing new areas with electric power and redistributing the loads from other connection points located in the city of Nablus, especially in the eastern industrial area. In fact, loads there reach the peak rate of the consumed electric power, and new overhead and underground electric transmission lines have been established.
- Reconnect the all substation to be integrated grid (ring system).

Chapter Two

Analysis of the Situation of the Electrical Power in Nablus

2.1 Distribution and Supply Nablus Electrical System

Nablus electrical grid is supplied through electrical power as of five main IEC feeders:

1. Askar (East of Nablus)
2. Odala, which lacks a substation with a voltage of (33) kV and distributes electricity straight to distribution transformers with a voltage of 33/0.4 kV.
3. Quseen (Quseen Village connection).
4. Enap.
5. Sarra.

The capability of every one to connections points an in table (1) below:

Table (1)

Capacities for Each one Connections Points used for Nablus City Electrical Grid

Connection Point	Official Rated Capacity
Askar camp	20 MVA
Odala village	13 MVA
SARRA	40 MVA up to 150MVA
Quseen village	16 MVA
Inab barrier	5 MVA

North electrical distribution company (NEDCO) operate three 33/6.6 kV substations using transformers rated capacity at 10MVA and an automated tab-changing system less than load. four 33 kV and Nineteen 6.6 kV feeders distribute the power.

The Nablus area city is served by 6.6and 0.4 kV distribution transformers, at the same time as distant loads are served by 33 KV and 400 V distributed transformer.

That's key components or the network are represented in a one-line diagram of the system in the figure (B.4) in appendix (B).

In addition, the Nablus system has (353) distribution transformers, all of which are 33kV or 11-6.6kV and have a secondary voltage of 400 volts. Switchgear poles for outdoor and interior transformers are installed on 57 poles.

In this area, the impedance of all these transformers exceeds 4%. The large percentage of transformers have just a +/- 5% tap capacity, with 2.5 percent tap increments, and are normally designed to provide maximum voltage surge to low voltage.

Furthermore, in attendance are four distribution networks include:

- The Low voltage feeders and networks (564 km).
- The Medium underground 11 kV (97 km).
- The Medium subversive 33 kV (7.4 km).
- The Medium overhead 33 kV (114 km).

2.2 Power Consumption in Nablus

Nablus imports losses tremendous power every year causing a huge shortage in electrical power load necessary for the requirement of the city. Table (A.4) in appendix (A) depicts electrical energy supplies, demand payments from electrical power, and losses from 2012 - 2021..

Annually, the electrical power consumption (necessities) intended for Nablus city network grew through an standard of (5.1) percent. Figure (B.5) in appendix (B) shows distinction of demand powers imported in Nablus city electrical networks. The electrical necessities for Nablus city network can be demonstrated in figure (B.5) in appendix (B).

It is noted from figure (B.5) in appendix (B) that the highest power requirements were in 2020 exceeding (250) MWh while the lowest requirements were in 2014 reaching (150) MWh. This sharp increase is due to population increase as well as the increase of the number of buildings and commercial activities that need electrical power.

distinction in the power loss in Nablus city electrical system is an show in figure (B.6) in appendix (B).

2.3 Power Consumers in Nablus

The following A.(5) in appendices (A) displays the different types of energy customers and how many of each type there are in 2021.

2.4 Electrical Power Consumption by Sector

Table (A.6) in appendix (A) presents the total electricity power consumption by industry in the Nablus network in 2020.

Also, Figure (B.7) in appendix (B) presents a pie chart of power consumption by different industries in the Nablus electricity systems in the year 2021.

2.5 Load Profile Analysis for Nablus Network

Nablus electrical network feeds the villages surrounding it and three refugee camps extending over area of 35 km West-East and 27 km South-North. Still, only 80% from the part of the system is supplied from IEC because Before 1984, a portion of the network's infrastructure was fueled by a locally producing station inside the city's core. However, this station supplies a little part of the loads when the power is shut down from the IEC side, especially the hospitals, water pumps, substation, and other sensitive loads.

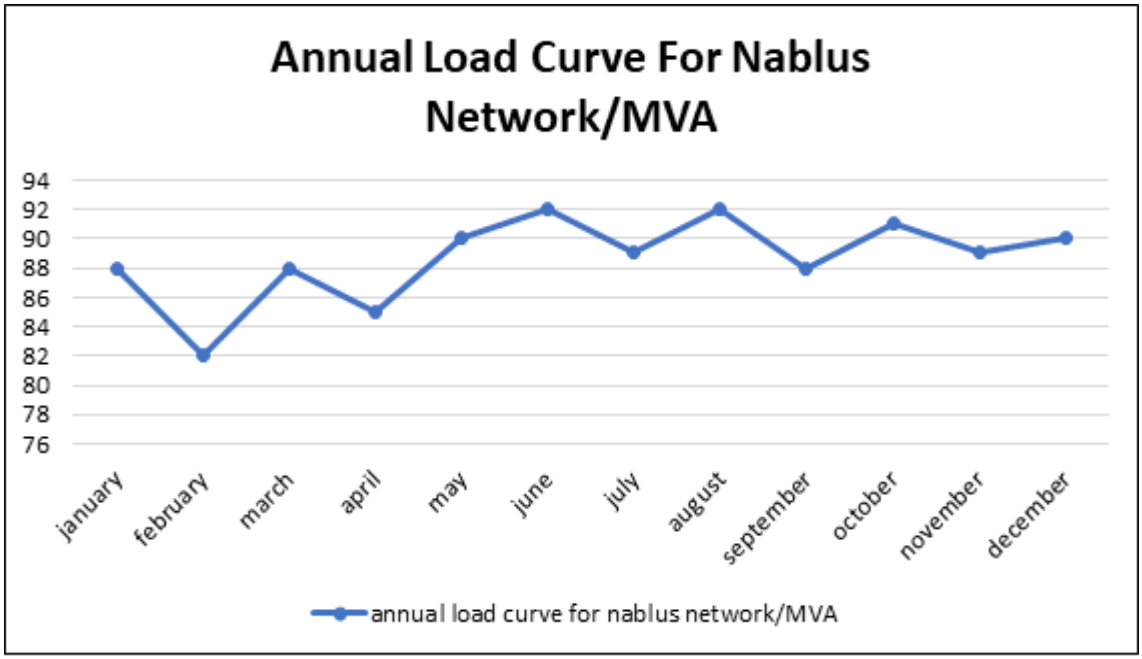
The load profile in Nablus network is an important variable that in the afternoon loads reach to peak demand especially in the industrial area (east city), however, in the evening it becomes the maximum load in the western area.

The load curve of Nablus network supports to predict the changing in load demand during time, so it benefits through the data giving to avoid reach to maximum demand and make electricity available any time without need to shut down on customers.

Figure (2) shows the latest details for annual load curve Nablus network 2020.

Figure 2

Annual Load Curve for Nablus Network 2020



This diagram shows the consumption of electricity from Nablus network in 2020, the changes in power consumed each month is noted, and the maximum peak power is in June in summer season and in December in winter season because the most load appliances is motor (air conditioning, Fan). However, the other value almost slightly increased through winter months.

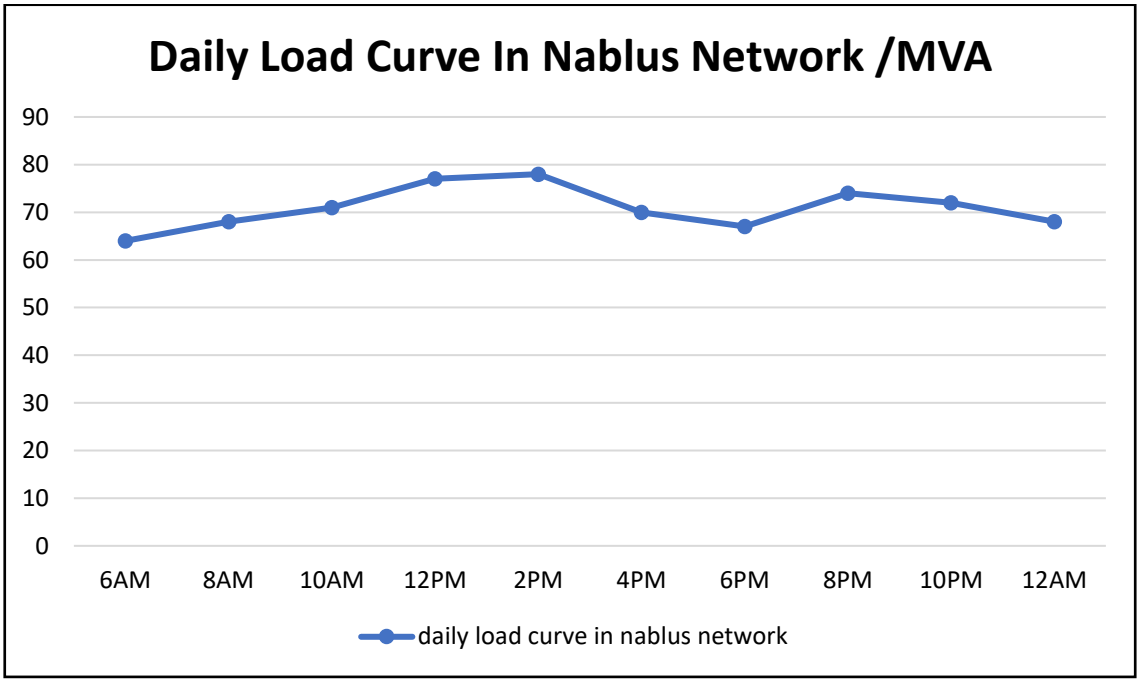
Power consumption from Nablus grid fluctuate through the day hours, and the maximum demand from customer from 11AM-1PM in east area in Nablus city and from

6PM – 7.5PM in west area in Nablus city.

Furthermore, figure (3) shows power consumption data for daily load curve.

Figure 3

The Daily Load Curve in Nablus Network 2021



As shown in the curve, the maximum peak power is 65MVA from the grid, this data is taken as a random daily reading through this year, but sometimes through day the reading value in the curve reaches to 80MVA, and the demand on the electricity increases because of customers especially in peak hours. This leads the supplier company(north electricity distribution company) to shut down electricity from some area at least 2 hours through day. The curve shows the increase in consumption power electrical per year increased slowly, the increase in the demand for electric power due to the increasing population growth and urban and industrial development in the city.

2.6 Nablus's Network Connection Points and Sub-Connections

2.6.1 Nablus's Network Connection Points

Connection points can be considered as junctions, the power transmitted through overhead line 161kv from IEC to the West Bank, so it is possible to arrange the connection point as substation. Consequently, the substation or connection point is a part of electrical distribution and transmission as part of the generating system. Substation's transformer executes many of more than a slight significant Electric power

may travel via many substations at varying levels of voltage between the producing station and the customer.

Transformers may be used at a substation to shift the level voltage from lower transmission voltages to high distribution voltage, either at the interface of two voltage transmission lines.

Electric power is transmitted at many voltage levels using various substations, which include transformers to alter voltage levels across high transmission voltages as lower distribution voltages, or at the junction of two transmission voltages.

They might well be owned by a major commercial and industrial user and operated by an electrical utility, or they may be unsupervised and rely on SCADA remote control and supervision.

Because of the increasing population density in cities and the development of industrial load, Nablus city requires a lot of electricity. As a result, network improvements are required to prevent power demand leakage, and the best solution for the problem is to increase the IEC's power capacity to cover the city's large-area needs.

In 2021, Nablus needs (95 MW) to cover all area and power consumption; some areas need special distribution transformers like east industrial area and Askar camp, Balata camp, An-Najah hospital. As for the new connection point, they will make the electrical network in Nablus more reliable.

Table (2) view the connection point existing in Nablus with two new two connection point:

Table 2

The List of Connection Points in Nablus

Connection Point Name	Rated Capacity
Enap	5MW
Askar	20MW
Sarra 1(Quseen)	20MW
Sarra 2	20MW
Al-Najah Hospital (New)	20MW
Nablus Al-Jadida (New)	20MW
Total	**105MW**

The previously mentioned connection points serve all area inside Nablus city.

Nablus grid includes also Hawara connection point but it is not effected in Nablus loads, the rated power of Hawara connection point is 20 MW, and just serve Hawara loads, so will be excluded from this studies.

2.6.1.1 Enap Connection Point

Enap connection point is considered the most important point in the west of Nablus including Bait Eiba, Dair Sharaf. It is connected with (65) distribution transformers with different capacities (400KVA, 630 KVA,250 KVA), and the total power provided is (2MW) as demonstrated in figure (B.8) in appendix (B).

The load consumption from Ennapconnection point is almostfull and sometimes in winter the power needs to increase.

2.6.1.2 Askar Connection Point

Askar connection point covers theeastern area including the industrial area, two camps, named: Askar and Balata as itsrated power is (20MW) in the last year. Still, this rate is not enoughto feed all area in peak hour espicially in industrial area, so the soluation lies load shadding for some area about 2 hour through day.

Furthermore, Askar connection point have (55) distribution transformersat rated (630KVA) because in Askar area the power consumption for loads is very high especially in Askar Camp the population density is high.

In this study, the researcher will increase the power capacity to Easter area from Nablus Al-Jadida connection point, leading to the reduction of the loadding on Askar distribution transformer as shown in figure (B.9) in appendix (B).

2.6.1.3 Sarra 1 Connection Point

In Sarra 1 connection point, the rated power is 20 MW, it feeds the central station in the Middle of Nablus covering Al-Balotat, Khalet Eleman, Faisel street, Ras Alain 2, Ras Alain 1, Al-Dahia. It also has 60 distribution transformers with different rating of KVA. This area also has a problem when the power consumption is increased, which requires to cut power in some areas through day by disconnect some load in the network. Adding

new Nablus Aljadida connection point will solve the problem and decrease the pressure on the distribution transformers by taking Ras Alain 1 and Ras Alain 2 loads, the loads consumption for SARRA 1 like view in figures (B.10) in apendix (B).

2.6.1.4 Sarra 2 Connection Point

Its power supply covers An- Najah substation area and Al-Karakon substation area, with rated power supply (20MW), and (17) distribution transformers for Al-Karakon substation as well as (32) distribution transformers for Al-Najah substation, and the loads consumption on SARRA 2 connection point is as shown in figure (B.11) in appendix (B).

2.6.1.5 An-Najah Hospital Connection Point

The new connection point is located near Sama Nablus in the north mountain, and the power is taken from Sarra substation with a rated capacity of 20MW, and the length of transmission line is 10.9KM ACSR, 33KV. Thus,the area covers power demand is Al-Najah hospital, Al-Quds open university as some loads will be transfered from Sarra 1 and Enab and Mujeer Aldeen connection points. There aretwo power transformers each one rated at10MW; the total load is expected to reach 15 MW and other will be reserved.

2.6.1.6 Nablus Al-Jadida Connection Point

The new connection point will extend from Sarra substation with a distance of 6.9 Km by using over head transmission line ACSR, 33KV with rated capacityof 20MW. It will also use two power transformers each one rated at 10 MW, 5MW andwill serve the east industrial area as well asnew housing project in Tell road. Also, two distribution transformers will be served with rated 250KVA and will take some large loads from other connection points to reduce loading on network as Askar,central connection point and Al-Toor andFatayer area.

I Distribution transformers, in addition to connection points, are installed in the electric power distribution system to provide receiving voltage transformation and scale down the voltage used throughout the distribution lines to the level utilized by the customer.

AC power distribution became possible with the creation of a practical, efficient transformer, and a system utilizing distribution transformers was shown.

Pole-mount transformers are those that are installed on a utility pole.

Distribution transformers are known as distribution tap pad-mount transformers because they are installed on concrete pads and secured in steel cases stipulation that allocation transformer be situated by earth stage or subversive.

Distribution transformers typically have ratings of less than 1000 kVA, while certain national standards allow for distribution transformers with values of up to 5000 kVA.

Because distribution transformers are powered 24 hours a day (even when they are not carrying any load), minimizing iron losses is critical in their design.

They are intended to perform at optimal efficiency at lesser loads since they are rarely used at full load Voltage regulation within those transformers should be maintained to a minimum to improve efficiency. As a result, they're made to have a low leakage reactance.

Loads of these transformers are shown in table (3).

Table 3

The Number Of Distribution Transformer In Each connection Point In Nablus Grid

Transformer capacity / KVA	**Transformer number / ENAP**	**Transformer number / ASKAR**	**Transformer number / SARRA 1**	**Transformer number / SARRA 2**
100	2	1	0	2
160	4	2	3	2
250	3	1	1	20
400	24	11	52	42
500	2	4	1	3
630	30	33	45	34
2000	1	3	0	0
TOTAL	**65**	**55**	**102**	**103**

Chapter Three

Substations Overview

3.1 Introduction

Substations provide interconnection between transmission and distribution systems and various voltage levels as they are connected to the electrical network through an overhead line. Also, they are classified into two classes Gas Insulated Substation (GIS), and Air Insulated Substation (AIS).

In the case of GIS, the gas Sulphur hexafluoride (SF6) is utilized to minimize phase to phase and phase to earth clearance; these types of substations are employed in cities with high land costs.

In the case of AIS, an open terminal configuration makes use of main equipment with terminals in the air k. As a result, substantial clearances between these terminals and the ground, as well as between terminals of various phases, are necessary ,This type of substation needs a big amount of area ,The vast majority of substations are AIS-only.

Components of substation generally comprise:

- Switchgear.
- Power transformers.
- Bus bars.
- Protection, control, and monitoring equipment.
- Substation lighting protective system.
- Substation earth System.
- Lightning arrestors.

Substations consist of three components:

- Primary system: It includes all equipment in use at the ostensibly voltage level system.
- Secondary System: It includes all of the equipment required for control, safety, measurement, including monitoring.

- Auxiliary Supply System: Supplemental supply systems include any equipment that allows protection, control, measure, and surveillance capabilities to function, such as air conditioning and DC supply.

There are two types of substations:

- Transmission Substation electricity is created at a producing station, and a substation is utilized to scale increase the voltage level during transmission between generating stations If the voltage level has to be raised even higher for lengthy transmission, a second substation is used to scale up the voltage.
- Distribution Substation: When power is transferred at a much more high voltage, it is incompatible with the customer side (domestic or industrial), and that's where the distributing substation comes into the picture.

It reduces the voltage to a distribution-safe level of 440 V, 3.3 kV, 6.6 kV, or 11 kV, depending on the kind of consumer.

The consumer might be a household or a business, the single bus system is used by small substations when supply continuity to customers is neither vital or needed.

It is simple and cost-effective, however in big substations, an extra bus bar (double bus bar) is employed in the system to prevent supply interruptions.

3.2 Transmission Line for Substations

This section is a demonstration of the transmission lines for substations, they can be summarized as the following:

An-Najah University Hospital Substation:

In Figure (B.25) in appendix (B) the transmission line is marked by the yellow line that the high population density is obvious. Consequently, when choosing the best road to extend the transmission line and avoid the building and private property, the length of transmission line from SARRA substation to An-Najah substation is about 10.6 km.

Underground cable is not an option in this case because it is more expensive than an overhead transmission line. Furthermore, digging the ground is difficult, especially in a straight line across Quseen village, so the project will take longer to complete.

Nablus Al-Jadida Substation:

In Figure (B.26) in appendix (B) the marked yellow line represents the road of transmission line for a new substation in Nablus Al-Jadida area. Furthermore, the implemented project on the real land is easier than the substation of An-Najah university hospital substation because the length between Sarra substation and Nablus Al-Jadida substation is 6.9 km.

Also, the nature of the topography in the area is easier in terms of work as the land is flat and there are not many obstacles such as building and private property. Consequently, this location is chosen in this area because there is an easy extension in the cable line from Sarra and the best road is from Sarra to the Eastern area. This is because it includes less obstacle to extend cable without across between building that will save money and time.

3.3 Elements Of the Network

Transmission Line Cable:

The transmission line cables from transformers to LT panel / Main feeder support is to be in use as follows (this data is taken by NEDCO):

- 630kVA transformers: 2 nos x 1C x 630 Sqmm, Al. Conductor, Armored XLPE insulated.
- 400kVA transformers: 1 C x 630 Sqmm, Al. Conductor, Armored XLPE insulated.
- 250kVA transformers: 3½ C x 400 Sqmm, Al. Conductor, Armored XLPE insulated.
- 160kVA transformers: 3½ C x 300 Sqmm, Al. Conductor, Armored XLPE insulated.
- 100kVA transformers: 3½ C x 150 Sqmm, Al. Conductor, Armored XLPE insulated.

The parameters for cable loading should be set at 70%, and the diversity of line cable as of the similar line cable channel should be there set at 80%. The LT cable feeder should have a maximum length of 250 meters and be linked in a ring major route. In addition, the most loads resting on the secondary feeder line support must be there limited on the path to 150 kW.

The entire system must be built to survive a 2.0 percent voltage drop from the transformer's 11 kV end to the end user's metering equipment.

Prior to the execution of work on site, Noida Power Company Limited (NPCL) must approve the design of all equipment and cable, as well as the electrical design.

The type of the overhead transmission line used in the network is ACSR which is an aluminum conductor with steel reinforcement) used in 33 kV lines. These cables comprise of inner strands of steel wire, surrounded by layers of aluminum conductors. The current is carried by the aluminum strands.

The steel conductors supply to the tensile strength and prevent creep, so the best cable should be used is ACSR JIS C3110-78 ($95mm^2$) to feed the both substation An-Najah university hospital and Nablus Al-Jadida, the specification for the feeder is as in table (A.7) in appendix (A).

Calculations of the feeder cable are as the following:

The length of cable needed to the project

The distance for both substation 10.5km+ 6.9km=17500 m

Total cable length = 17500 m * 3 wire = 52500 m

Total cost = 1.8 $/m * 52500 m = 94500$

Calculation of voltage drop and technical losses for transmission and distribution lines:

In transmission and distribution lines, here we are the type of loss: technical in addition to commercial loss.

The technical is loss of a distribution line are primarily determined by the type of electrical load, the size of the conductor, and the length of the line; however, commercial losses of a distribution line are caused by prohibited electrical power consumption that is not calculated, billed, or collected correctly, resulting in commercial losses to services.

Switchgear and The Protective Devices of the Network:

Switchgear is a type of electrical switch that is used to regulate, isolate, and safeguard electrical circuits and equipment. It belongs to the substation. Substation switchgear can be found on both the high and low voltage sides of big transformer units. As a switch, it performs the duties of transporting, creating, and breaking the usual load current. It will

carry out the functions of clearing the fault current, which will need the use of sensing devices such as current transformers (CT), potential transformers (PT), and various types of relays, depending on the application.

Additionally, in a power plant, switchgear is a location where various switching, measuring, as well as protective equipment are situated, and their job is to make or isolate different electrical auxiliaries, and electrical machines that feed electricity to various plant conscripts.

A switchgear consists of the following parts:

- Switches.
- Fuses.
- Isolators.
- Circuit breakers.
- Protective relays.
- Current transformers.
- Potential transformers.
- Conductors.

Circuit Breaker:

- How to choose CB:
  - $I_{C.B} \geq$ Ksafty * I max load.
  - $V_{C.B} \geq$ Vsystem.
  - I breaking capacity $\geq 1.2 * I_{S.C}$
- The Specifications of the Circuit Breaker that we have used are as follows:
  - Vr = 36 kV, Vp = 170 kV, Vd = 70kV
  - Ir = 1250 A,I_K = 25 kA ,T_k = 1sec,Ip = 62.5 kA

Where:

$I_{C.B}$: circuit breaker current,
$V_{C.B:}$ circuit breaker voltage,
$I_{S.C}$: Short circuit current,
Ir: Rated current C.B,
T_k: Time constant safety,
Vp: Peak Voltage C.B (RMS)
Vr: Rated Voltage C.B
Vd: derating voltage C.B
I_K :safety constant current
Ip: Peak current C.B (RMS)

Figure (B.27) in appendix (B)shows the switchgear devices and components as built in the substation.

Switchgears can be classified into three categories:

- Low voltage switchgear
- Medium voltage switchgear
- High voltage switchgear

Low voltage Switchgear: low voltage switchgear range from 1000 V to 1500 Volts. These include Air Circuit breakers, HRC fuses, earth leakage circuit breaker (ELCB), residual current circuit breaker (RCCB), and Isolators.

Medium Voltage Switchgear: Medium Voltage switchgear range from 3.3 Kilo Volts to 33 Kilo Volts. These include Oil Circuit breakers (minimum oil and bulk oil circuit breakers), and Vacuum Circuit breakers.

High voltage Switchgear: High voltage circuit breakers range from 36 Kilo Volts and above. These include SF6 circuit breakers.

Types of transformers used in Nablus network are as shown in table (A.7) in appendix (A), and specification for transformers is listed in figure (B.12) in appendix (B).

Calculations of An-Najah University Hospital and Nablus Al-Jadida Substations:

The decision for voltage level is to be taken as follows:

- The region must be served by a 33 kV feeder if the loads be identical or up to 2.5 MVA .and the land space for 33/11 kV is sufficient for such loads. The builder/society/authority will be responsible for allocating the sub-station.
- Used for loads stuck between 1.0 MVA to 2.50 MVA, enthusiastic 11kV feeder should be there ideal.
- Accessible 11kV provide for possibly will be tap from end to end Vacuum circuit breaker (V.C.B) as Ring main unit for loads less than 1 MVA (RMU). As a standard capacity in the inventory, the highest capacity of a distribution transformer that is permissible is 400 kVA. It is only permissible to have two transformers at one site. If

the number of transformers required increases, HT will be required to use subterranean wires to locate additional transformers.

Transformers must be controlled using either a VCB or a Ring Main Circuit. At 11 kV, the wires should include a metering arrangement. Numerical relays will be used to protect the incoming supply system. A LT main feeder pillar must be installed on the transformer's LT side. MCCB/SFU will safeguard the inbound traffic. The Ring Main Unit must be linked to the distribution pillar-box. The distribution pillar's incomer must feature a molded case circuit breaker (MCCB) or a switch fuse unit (SFU). The fuses on the outgoing must have a high rupturing capacity (HRC).

An- Najah University Hospital Transformer:

In An-Najah university hospital substation the length of the feeder is 10.6 KM from SARRA substation to An-Najah substation with a total new capacity of 20MVA that will use three distribution transformer one is rated at 33/11KV, 10MVA. This transformer will serve An-Najah hospital, and two distribution transformers are rated at 33/11KV 5MVA. The first one will serve the area around the hospital (Sama Nablus, Assera street, Alsekka street and Alain camp), the second transformer is also 5MVA and it will serve the Al-Quds Open University and the area around.

Transformers Calculations:

In table (4) view the specifications for transformers at a rated voltage of11KV, and a distance of 10.6Km.

Table 4

The total number of distribution transformers

Transformer capacity	Total number transformer	Iron losses	Copper losses	Average LT line losses
5MVA	2	240W	480W	132W
10MVA	1	350W	800W	600W

Max current is 315 A.

Unit sent out during to feeder (sending – end power) is 16204 KW.

Unit sold out during from feeder (receiving – end power) is 13204 KW.

Nominative load diversity factor for urban feeder is 1.5 and for rural feeder is 2.

Total connected load = number of connected transformers

Total connected load =(1*10) + (2*5) = 20MVA

Peak load = route square (3) * line to line voltage * max current ampere

= 1.732* 33K* 315 =17.98 MVA

Where:

Max ampere for transmission line = P / 1.73 *VcosØ

= 16204K / 1.73*33K*0.9

= 315A

Diversity factor (DF) = connected load / peak load[5]

= 20MVA / 17.39MVA = 1.150

load factor

= (unit power sent out KWH/1.7320*line voltage*max ampere*PF*8760)*1000 [4]

= (16204/(1.732 *33KV*315*0.8*8760)) *1000

= 0.12

loss load factor (LLF) = 0.8 (LF*LF) + (0.2 * LF)

= 0.8*(0.12*0.12) + (0.2*0.12) = 0.035[2]

Calculations for iron losses:

Total yearly iron losses in KWH = iron loss in watt* number of the TC on feeder*8760 / 1000[4].

Total annual iron loss (10MVA TC) = 350*1 *8760 / 1000 = 3066 KWH

Total annual iron loss (5MVA TC) = 240 *2 * 8760 / 1000 = 4204 KWH

Total annual iron loss = 3066 + 4204 = 7270 KWH

Calculation annual copper losses:

Total annual copper loss in KWH

= copper loss in watt* number of TC on feeder*LF^2*8760 / 1000[4]

Total annual copper loss(10MVA TC) = 800 *1 * 0.12 *0.12 *8760 / 1000 = 100 KWH

Total annual copper loss(5MVA TC)=480 *2 *0.12 *0.12 * 8760 / 1000 = 121 KWH

Total annual copper loss =100+121 = 221 KWH

HT line losses KWH

= 0.105*(connected load*2)length*resistance*LLF/(LDF*DF*DF*2)[3].

Where LDF is (loads distributed factors)

LDF= 2.0 for regularly circulated load on top of feeder

LDF >2.0 if load be twisted toward to the power transformers.

LDF 1 to 2 if loads be bitter in the direction of tail end of feeders

HT line losses = 0.105 (20*2)*10.6*0.22*0..035/(1.5*1.15*1.15*2)

=212KWH

Total LT line losses = 132*2 +600 *1 = 864W

Peak power loss = 3 (Sum LT lines losses) /(DF*2*1000)

= 3(864)/(1.15*1.15*1000) = 2

LT line losses KWH = (PPL * LLF *8760)

LT line losses KWH = 2*0.1361 * 8760 = 2384KWH

Totals technical's loss

= (HT lines losses) + (LT lines losses) + (annuals copper losses) + (annuals iron losses)

Total technical's losses = (0.864 + 2384 + 221 + 7270) = 9875.8KWH

Total losses(in KW) = (9875.8 /8760)*1000 =1127.3KW

% technical losses = (total loss) / unit sent out annually) * 100

= (1127.3/ 16204) *100 = 6.9%[4]

3.4 Voltage drop and voltage regulation for transmission line

Voltage regulation is to maintain fixed voltage under different load, Voltage regulation is a limiting factor to decide the size of either the conductor or type of insulation, the current value pass through Transmission line should be lower than rated current for transmission line to keep the voltage drop within permissible value, the high voltage circuit should be carried as far as possible so that secondary circuit have small voltage drop % voltage regulation = (1.06 *P * L* PF) / (LDF * RC * DF)[4].

Where:
RC:-is called regulator constant by unit (KVA-KM) for each 1% slump
DF: Diversity factor
LDF: load distribution factor

RC = (kV * KV * 10) / (RCOSØ + XSINØ) [4]

RC = (33*33* 10) / (0.27*0.8+0.33*0.6) = 26.3

%voltage regulation = (1.06 *20*10.6*0.8)/(1.5*26.3*1.15) = 6.19%

The voltage regulation in power distribution network should be not exceeded the maximum at any point of distribution line, in table (A.9) in appendix (A) show the values permitted.

The voltage disparity in 33KV and 11 KV feeder shouldn't go above the subsequent limit on the furthest end beneath peak loads state and standard system process regime:

- when above 33000V (-)0.12 to (+)0.10
- up to 33000V (-)0.09 to (+) 0.06
- low voltage from (-)0.06 to (+)0.4

required capacitor range size:

size capacitor upgrading of the control power factor is from COSØ1 to COSØ2 is:

capacitor An-Najah (KVAR) = KVA (sinØ1 – (cosØ1 / cosØ2)* sinØ2)

= 20(0.6 – (0.8/0.9)*0.43)= 4355KVAR

Optimum location of capacitor

L = (1-(KVARc / 2KVARL) * (2n -1) [4]

where:

L: distance in per unit along the line from substation

KVARc: size of capacitor bank

KVARL: KVAR loading of line

n: If the whole capacitance be is separated into extra than single bank the length of the lines , the value of n=1 is used. If all capacitance is to be put in one bank, the value of n=1 is used.

L(Najah) = (1 –(4355/2*20)*(2*1-1) = 0.89

voltage increase owing to capacitors setting up installed:

percent voltage rise = KVAR(capacitance) *L * X)/(10 * V *2) [4]

%voltage rise (Najah) = (4355 * 10.6 *0.33)/(10 *33*2) = 0.14 = 23%

The power consumption from An-Najah substation is 16204 KW max, and the max ampere is 315 A. The System has ACSR Conductor (3 * 95mm2), existing current through Capacity of ACSR line Conductor = 450Amp,also Resistance = 0.27920Ω and the Reactance = 0.330 Ω

voltage drop

= ((√3*(RCosØ+XsinØ)*I) / (number of conductor per phase *1000*length)[5]

load current at load = P / 1.732*volt*PF

= 16204 / 1.732 *33*0.9 = 314.9 A

Required No of conductor / Phase = 314.9 / 450 = 0.7 Amp = 1 No

Where the value 450 Ampere is ASCR rated Transmission line in table (9)

voltage drop = ((√3*(0.27 *0.9 + 0.33*0.43)*315) / (1*1000))*10.6) = 1240V

receiving end voltage = sending end voltage – voltage drop = 33000-1240 = 31760V

% Voltage Regulation= (Send ending Voltage - Receiving ending voltage) / Receiving ending Voltage) x100[5]

Percent Voltage regulation = (33000-31759) / 31759) *100 = 3.9%

Nablus Al-Jadida Transformer:

In Nablus Al-Jadida substation, the length of feeder 6.9 KM from Sarra station to Nablus Al-Jadida substation with total new capacity of 20MVA, will use 2 distribution transformer and 2 power transformer as shown in table (5).

Table 5

The Capacity of Nablus Al-Jadida Transformers

Transformer rate	Area
33/11KV, 10MVA	Industrial east area
33/11KV, 5MVA	Tell village road,alnoor district
33/11KV, 250KVA	Ras alainupper,altaawn
33/11KV, 250KVA	Altoor, fatayer

For the 11kv distribution line with length is 6.9 km and the total number of distribution transformers on feeder are as shown in table below.

Table 6

The Total Number of the Distribution Transformers

Transformer capacity	Total number transformer	Iron losses	Copper losses	Average LT line losses
10MVA	1	350W	800W	600W
5MVA	1	240W	480W	132W
250KVA	2	160W	250W	64W

Max current is 315 A.

Unit power sent out to loads during to feeders (sending power) is 16204 KW

Unit power sold out through from feeders (receiving power) is 15021KW

Nominative loads for diversity factor used for urban feeder is 1.50 furthermore for rural line feeder is 2.0

Total connected loads = number of connecting transformers

Total connected load = (1*10) + (1*5)+(2*250K) = 20MVA

Peak of load = root square (3) * line voltage * max ampere

= 1.732* 33K* 315 =17.98 MW

Diversity factor (DF) = connected load / peak load

= 20MVA / 17.39MVA = 1.15

Loads factor = (unit power sent out KWH/square root (3) * line to line voltage * maximum Ampere * PF * 8760)*1000

= 16204/ 1.732 *33KV*315*0.8*8760 = 0.120

loss load factor (LLF) = 0.8 (LF*LF)+(0.2*LF) = 0.8*(0.12*0.12)+(0.2*0.12)= 0.035

Calculation sum of total iron losses:

Total sum annuals iron losses in KWH = iron losses in watt* number of TC lying on feeders *8760 / 1000

Total annual iron loss (10MVA TC) = 350*1 *8760 / 1000 = 3066 KWH

Total annual iron loss (5MVA TC) = 240 *1 * 8760 / 1000 = 2102 KWH

Total annual iron loss (250KVA TC) = 160 *2 * 8760 / 1000 = 2803 KWH

Total annual iron loss = 3066 + 2012+2803 = 7881 KWH

Calculation annual copper losses:

Total annual copper loss in KWH

= copper loss in watt* number of TC on feeder*LF^2*8760 / 1000

Total annual copper loss (10MVA TC)

= 800 *1 * 0.12 *0.12 *8760 / 1000 = 100.9 KWH

Total annual copper loss (5MVA TC) = 480 *1 *0.12 *0.12 * 8760 / 1000 = 60.5 KWH

Total annual copper loss (250KVA TC) = 250 *2 *0.12 *0.12 * 8760 / 1000 = 63 KWH

Total annual copper loss =100.9 + 60.5 + 63 = 224.4 KWH

HT line losses KWH

= 0.105*(connected load*2)length*resistance*LLF/(LDF*DF*DF*2)

where the LDF is (loads of distributed factor)

LDF equal 2 for regularly distributed loads on feeders

LDF greater than two if loads is tilted in the direction of the power transformers

LDF equal value from one to if loads is twisted on the way to tail ending of feeders

HT line losses = 0.105(20*2)*6.9*0.22*0..035 / (1.5*1.15*1.15*2)=160KWHtotal LT line losses = (132*1)+(600 *1) +(64*2)= 860W

peak of power losses = 3 * (total of LT line losses) /(DF*DF*1000)

= 3(860)/(1.15*1.15*1000) = 2

LT line losses KWH = (PPL * LLF *8760)

LT line losses KWH = 2*0.1361 * 8760 = 2384KWH

Total technical losses = total HT line loss + total of LT line loss + annuals copper loss + annuals iron loss)

Total of technical for losses = (0.860 + 7881 + 224.4 + 2384) =10490KWH

Total losses(in KW) = (10490 /8760)*1000 =1197KW

% technical losses = (total loss)/unit sent out annually)*100 = (1197/16204) *100 = 7.3%

% voltage regulation = (1.06 *P * L* PF) / (LDF * RC * DF)

RC:-regulation constant (KVA-KM) per 1% drop

RC = (kV * KV * 10) / (RCOSØ + XSINØ)

RC=(33*33* 10) / (0.27*0.8+0.33*0.6)=26.3

%voltage regulation = (1.06 *20*6.9*0.8)/(1.5*26.3*1.15) = 2.5%

Required capacitor size:

Size capacitor improvement of the power factor from COSØ1 to COSØ2 is capacitor an Najah (KVAR) = KVA (sinØ1 – (cosØ1 / cosØ2)* sinØ2)

= 20(0.6 – (0.8/0.9)*0.43) = 4355KVAR

Power consumption from An-Najah substation is 16204KW max, and the max ampereis 315 A. The structure has ACSR Conductor (3 * 95 mm2), Current Capacity of ACSR Conductor = 450Amper, Resistance/ ohm = 0.2790 Ω and Reactance = 0.330 Ω

voltage drop

= ((√3*(RCosØ+XsinØ)*I) / (number of conductor per phase *1000*length)

load current at load = P / 1.732*volt*PF

= 16204 / 1.732 *33*0.9 = 314.9 A

Required No of conductor / Phase =314.9 / 450 =0.7 Amp = 1 No

voltage drop = ((√3*(0.27 *0.9 + 0.33*0.43)*315) / (1*1000))*6.9) = 807.8V

receiving end voltage = sending end voltage – voltage drop

= 33000-808.8 = 32191V

% Voltage Regulation

= (Sending end Volt-Receiving end volt)/Receiving end Volt) x100

% Voltage regulation = (33000-32191) / 32191) *100 = 2.45%

Underground Feeder:

Electrical power can be transferred and distributed via underground cables in addition to above lines. Of path, this subterranean connections include their possess set of reimbursement in addition to drawbacks. lesser voltage dips along with a worse likelihood of liability development are in the middle of the reimbursement, in totaling to

improved generally look and less intrusion with extra facilities. They include greater manufacture and setting up costs, despite the fact that, and be thus in employment someplace overhead line aren't practicable owing to realistic constraints or hazard. since affect, we make use of them in confident situation, such since tightly occupied metropolitan regions in addition to over sea (as underwater cable).

A typical subterranean cable will have a conductor or conductors that are coated by a variety of insulating and protective layers that are required for proper functioning. The building of underground wires is explained in figure (B.15) in appendix (B).

Underground cables are usually classified according to their Voltage ratings. They're grouped as follows:

1. Low tension cables which have a maximum voltage handling capacity of 1000V.
2. High tension cables which have a maximum voltage handling capacity of 11kV.
3. Super tension cables which have a maximum voltage handling capacity of 33kV.
4. Extra high-tension cables which have a maximum voltage handling capacity of 66kV.
5. Extra super voltage cables which are used for applications with voltage requirement above 132kV.

There are three phase underground cables, including:

1. Belted cables: As the name suggests, it has an additional layer of oil-impregnated paper which is wound around the insulated conductors. Such an arrangement is useful for low and medium voltage levels up to 11 kV.
2. Screened cables: Used only in particular applications with specialized construction, these Underground cables can be further divided as H-type and S.L-type cables.
3. Pressure cables: These are used when the voltage requirement exceeds 66kV and solid cables can't be used. Either pressurized gas or pressurized oil is used in these cables.

In this project, the researcher will use the overhead transmission line to feed substation in both areas, the built new transmission line inside Nablus city is difficult because of high population density and difficulty to build overhead network between building, so the best choice is to feed the area by using XLPE copper cable.

Type And Capacity of the Cable:

The price of cable rises in tandem with the increase in cross section. To determine the cable size, two factors must be considered: short circuit current and normal condition current carrying capability. Based on short circuit current, determine the minimum cross section area(A) necessary for a cable.

$$(A)=Ix\ (\sqrt{}\ t\ /\ K\ )mm2So,\ I = (K*A)/\sqrt{}t[6]$$

wherever I is the mistake of short circuit currents in kA, and (t) is time of error and K is stable (K=0.0940 intended for aluminum performer with XLPE lagging) & (K = 0.144 for copper instrumentalist XLPE lagging).

base on top of the equations we can compute correlate stuck between the cable line size and the fault short circuits current.

Table (A.10) in appendix (A) shows the specifications: area and size for XLPE feeder that be choose to feed the load in Nablus Electrical network.

Calculation of ground cable:

Voltage drop: mV/A/m = V / Z

Where,

mV/A/m = voltage drop in millivolts per ampere per meter length of cable route

Z=impedanceperconductorperkilometerofcableatmaximumnormaloperating

full load current (I) = S / √3 * V

= 20M / 1.732 * 33K = 350 Ampere

From catalog:

Proposed Cross section of the Cable Size 1C x 400 mm2

Soil Thermal Resistivity Native = 3.0 K.m/W.

Soil Ambient Temperature = 40°C

Mode of Laying = Trefoil Formation

Depth of burial = 1 m

Axial distance between cables = 0.4 m

The selected 33 kV,1C, 400 mm2 cable can transfer 350 A (laid directly, ground temperature 20°C, q = 1.5 Km/W, depth of laying 0.8 m, laid in trefoil touching). This information is obtained from the cable manufacturer catalogue.

Calculation of the cable current carrying capacity for the given site conditions is performed as follows:

Variation in ground temperature coefficient = 0.86

Rating factor for depth of laying = 0.97

Rating factor for variation in thermal resistivity of soil and grouping (aspercable Manufacturer catalogue) = 0.55

Cable current carrying capacity (I) = 755*0.86*0.97*0.55 = 346 A

Number of runs per phase = 2450/346 = 7.08

Required number of runs per phase = 7

The calculation above indicated that 7 runs per phase of 33 kV, 1C, 631 mm2 cable

Will be needed to transfer 140 MVA on 33 kV voltage level.

Rating factors for variation in ground temperature and variation of Installation depth.

Are obtained from the cable manufacturer catalogues. Alternatively they can be found.

In IEC 60502 standard.

Voltage Drop Calculation:

Voltage drop is calculated as follows:

Voltage drop = I * L * mV

Where, I(A) = operating current, L(km) = cable length

mV (V/A/km) = nominal voltage drop = 0.06712

Nominal voltage drop is taken from the cable manufacturer catalogues.

Distribution Substation of An-Najah University Hospital:

The new cable from SARRA substation to An-Najah hospital substation as show in figure(4) below in yellow line, the transmission line used is an overhead 33KV with a distribution transformers rated at 10 MVA, and other two distribution transformers rated at 5MVA, the first one serves Al-Quds open university and surrounding area, the cable feeder used is an underground cable: XLPE 1C 400mm^2 along the distance 550 meter as shown in red line in figure (4) below, and another distribution transformer rated at 5MVA serves (Sama Nablus, Assera street, Alsekka street, and upper part Alain Camp),The feeder is an underground cable: XLPE 1C 400mm^2 used also with a distance of 890 meter and the route cable as show in picture green line as in Figure (B.28) in appendix (B).

Cable Calculation:

Voltage drop(Al Quds University) = I * L * mV

= 350 *.550 * 0.06712 = 12.9V

Voltage drop (Alseka street) = I * L * mV

= 350 *.890 * 0.06712 = 20.9V

Nablus Al-Jadida distribution Substation:

In the case of Nablus Al-Jadida the overhead transmission line extends from SARRA substation to Nablus Al-Jadida substation with rated 33kV 20MVA, a length of 6.9 km and contain four distribution transformers distributed on 4 area as shown in table (7).

Table 7

Distribution Nablus Al-Jadida Substation

Distribution transformer rated	Area served	length feeder	feeder line color in picture
10MVA	Eastern industrial area	5.7Km	Blue
5MVA	Alnoor distinct, tell village street	400m	Green
250KVA	Upper altaawen area	600m	Red
250KVA	Altor, upper fatayer area	1.12Km	Purple

All feeders used in the four areas are of type XLPE 1C 400mm^2 copper.

Note: the distribution transformer rated at 5MVA is chosen for Tell village street because there will be a residential project in the mountain upper tell village street planned in coming soon, so we need to serve this area.

In Figure (B.29) in appendix (B) the locations for new substations in Nablus Aljadida marked in image by different color.

Calculation Of feeder voltage drop:

Voltage drop(east industrial area) = I * L * mV

= 350 *5.7 * 0.06712 = 133.9V

Voltage drop(upper Altaawen area) = I * L * mV

= 350 *.6 * 0.06712 = 14V

Voltage drop(Altoor, Fatayer area) = I * L * mV

= 350 *1.12 * 0.06712 = 26.3V

Voltage drop (tell street) = I * L * mV

= 350 *.4 * 0.06712 = 9.3V

Electrical Transient Analyzer Program (ETAP):

ETAP is a power systems engineering software application that allows them to generate a "electrical digital twin" and evaluate electrical power system dynamics, transients, and protection.

Power flow analysis of a system is calculated by modeling the system with help equation.

ETAP can use four algorithm to calculate the parameter of load flow kW kVAR.

These algorithms are:

- Newton Rap son.
- Newton Rap son technique.

- Fast method decoupled.
- Accelerate gauss saidle.

In order to base information in the Nablus network, power system model captures an electrical digital equivalent consisting of the a power system network model that comprises system connection, topology, electrical device characteristics, historical response of the system, and actual operations data.

In the case of Nablus network the researcher will study load flow for the grid before enhancement, then he will add a new connection point and then the load flow study will be repeated to see the different in results as real value. The algorithm used in calculation is Newton Raphson method.

On Etap Nablus grid will be divide, to seven electrical grids based on power transformers that are: (Enap, Askar, Aljuneed, Wadi Altufah, AlKarakon, Central station, Mujeer Aldeen and after adding anew connection points will become nine substations (An-Najah hospital, Nablus Al-Jadida),the researcher uses 720 distribution transformers to serve all loads with different capacities.

Furthermore, in Nablus grid, all connection points are connected as a ring loop system that makes the grid better. The advantages of using the ring connection in Nablus network are as follows:

- Very arranged network where every device has access to the token and the opportunity to transmit.
- Performs better than a bus topology under heavy network load.
- Does not require a central node to manage the connectivity between the substation.
- It's simple to install and reconfigure since adding or deleting a device only needs shifting two connections, thanks to the point-to-point line design of devices with a device on either side (each device is linked to its immediate neighbor).
- Point-to-point line configuration makes it easy to identify and isolate faults.
- Because switching occurs at a high level, ring protection reconfiguration for line faults of bidirectional rings may be very quick, and traffic does not need to be rerouted individually.

Chapter Four

Results

4.1 Analysis and Discussion of the Results of Nablus Substation Grid

Nablus grid system contains seven substations with 350 distribution transformers that the amount for all substation in peak load is 65 MW. Furthermore, all substations are connected as ring system connection allowing to serve all area by electrical power. If faults happen, one of the substations will cut off the electrical power, so the ring connection will solve this fault by changing the power supply from another substation currently , the other new substation (an-Najah and Aljadida substation) almost have half capacity not used so we can use it reserved to feed other substation if happen fault. as represented in figure (B.16) in appendix (B).

Furthermore, Enap grid point value components including busses, load and losses are summarized in table (A.11) in appendix (A) .

Wadi Altuffah Substation:

Concerning Wadi Al-Tufah substation, the values of the capacity of consumed power is 6.14 MW and 2.94 Mvar. Also, the curent amper consumed is 105A, butthe electrical power in Wadi Al-Tufah substaion almost exceed the limmted power permit. Consequently, the other substation in Nablus grid takes some load to reduce the loading on the transformer semphasizing that Wadi Al-Tufah substaion's main problem is thelack of power in Nablus grid. the loads connected in almost time in peak load and the Al-Ain camp area include high population density, so the new substation of An-Najah hospital and Nablus Al-Jadidawill cover some load from Wadi Al-Tufah substation. Figure (B.17) in appendix (B) shows Wadi Al-Tufah's load flow before adding new substations.

Central Substation:

As for the central substaion, the total amount of supply capacity are 11.07 MW, and 4.168 Mvar and the cuurent load sometimes exceeds the load range capacity of consumed power, Consequently, the New Substation of An-Najah hospital will take four loads to reduce the power consumed from central substation as shown in figure (B.18) in appendix (B).

Al-Junaid substation:

Also, Al-Junaid substation serves the western area and AN-najah university; the total capacity provided is 3.84 MW, and 1.747 Mvar and the amper consumed is 73.8 A. The substation works normally and the connected loads don't exceed the capacity, so the new substation does not need to share loads as shown in figure (B.19) in appendix (B).

Al-Karakon substation:

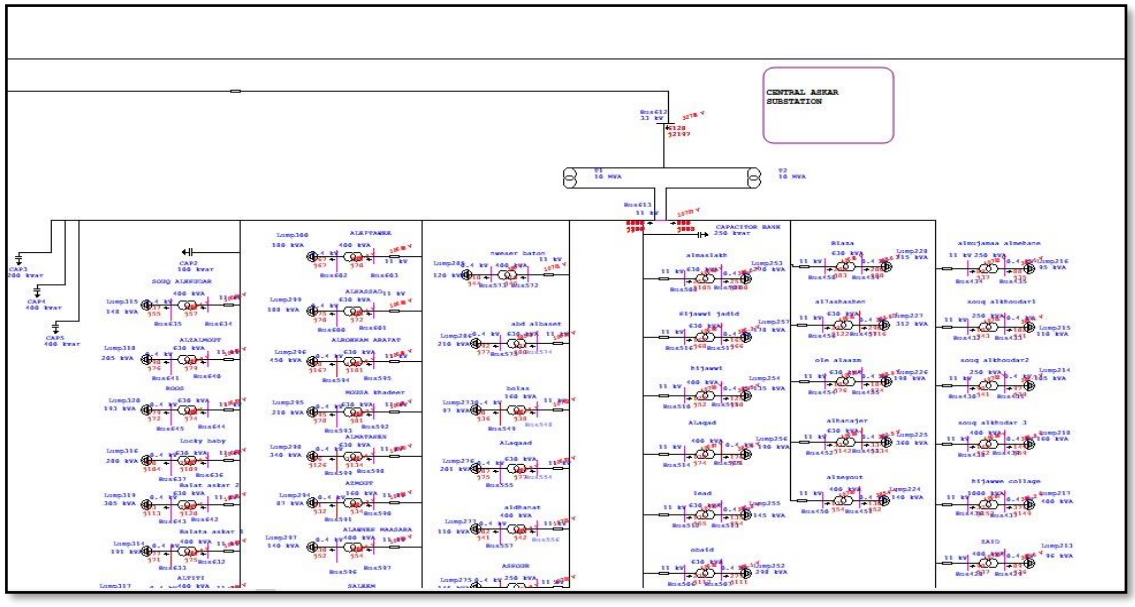
The results of Al-Karakon substation showed that the rated power provided is 9.05 MW, and 3.97 Mvar and the consumed amper is 172.9 A. In this case, the new substation in Nablus Al-Jadida will take 8 loads from Al-Karkon substation to reduce the power consumption from it as shown in figure (B.20) in appendix (B).

Central Askar substation:

The results of central Askar substation show that the total amount value for electrical power provided is 12.4 MW, 4.24 Mvar and the current ampere is 229.4A. The consumed power is at its peak load and reaches to maximum especially last year that the industrial area and two camps (Askar and Balata) consume power from Askar substation. Consequently, the new connection point in Nablus Al-Jadida will serve the load from Askar substation especially in industrial area, 15 distribution transformers will be moved to new substation as shown in figure (4).

Figure 4

Distribution Transformers and Loads Connected on Askar Substation

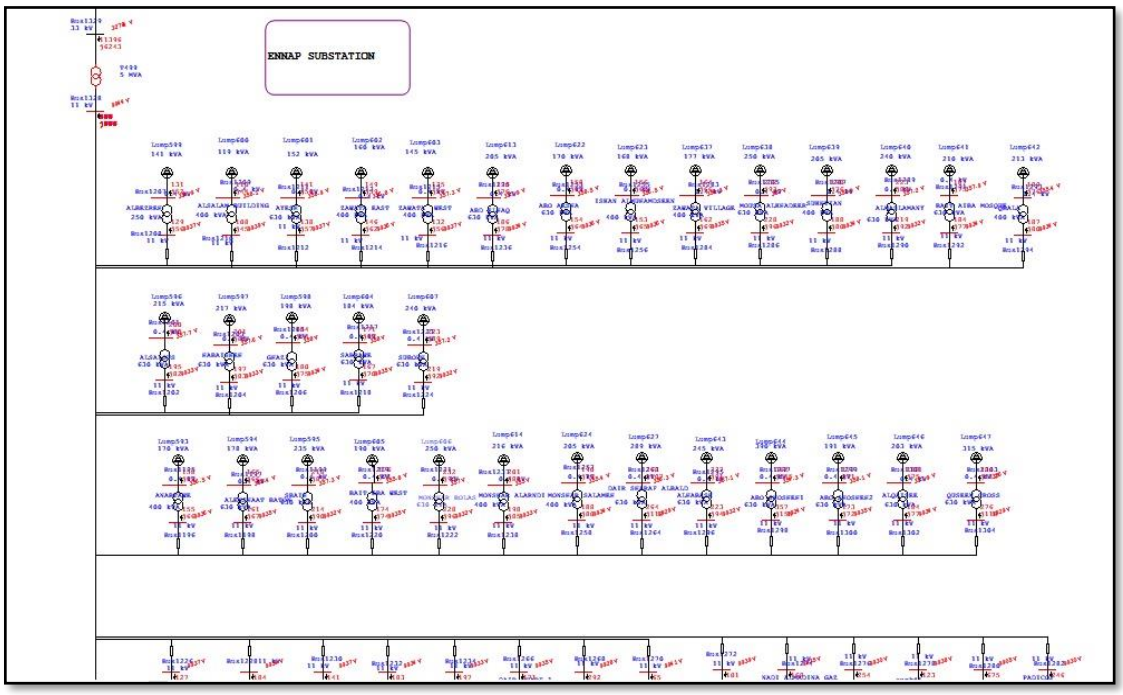


Enap substation:

The results of Enap substation show that the total value of power provide is 12.4 MW, and 5.4 Mvar and total current is 234.8 A. In other words, the capacity value of consumed power exceeds the rated from Enap connection point, so it will move the load from Enap substation to An Najah substation to reduce the loading in peak hour as shown in figure (5).

Figure 5

The loads and distribution transformers in Enap substation

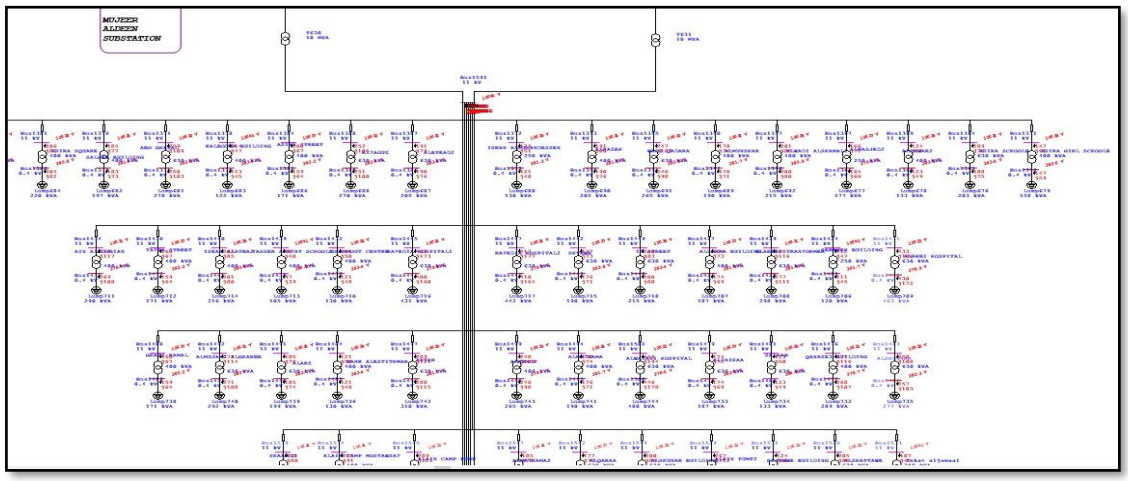


Mujeer Aldeen substation:

As for Mujeer Aldeen substation, the rated electrical power provided is 12.8 MW, and 5.41Mvar and total ampere current is 243.9 A. In other words, Nablus Al-Jadida substation will take 10 loads from Mujeer Aldeen substation and that will decrease its consumed power as shown in figure (6) below.

Figure 6

The Loads and Distribution Transformers Connected in Mujeer Aldeen Substation



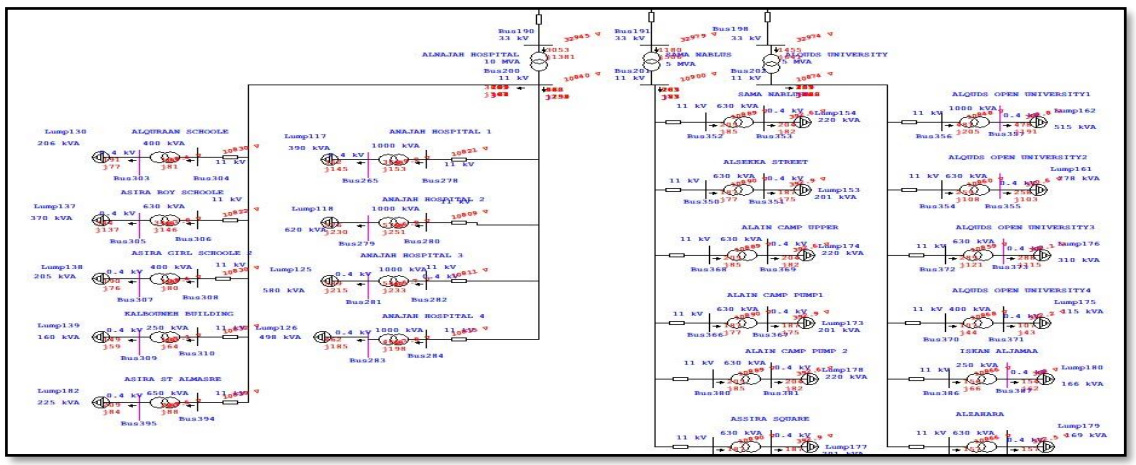
4.2 Network After Adding New Connection Points

Figure (B.21) in appendix (B) shows Nablus network grid after adding the new substations (An-Najah hospital and Nablus Al-Jadida).

The adding of new substations provided development to the Nablus grid it enhanced the quality of the performance of the points. For example, in An-Najah hospital substation, the totalelectrical power value is 5.68 MW, and 2.513 Mvar and the total current is 110 A. Furthermore, the load is taken tothe new substation of An-Najah hospital from other connection point in Nablus Network.That will make the grid better and reliable as shown in figure (7).

Figure 7

The new loads and distribution tranformers of An-Najah hospital after addingdistribution transformers



Furthermore, the transformers' feed is switched from one connection point to another, as shown in table (8).

Table 8

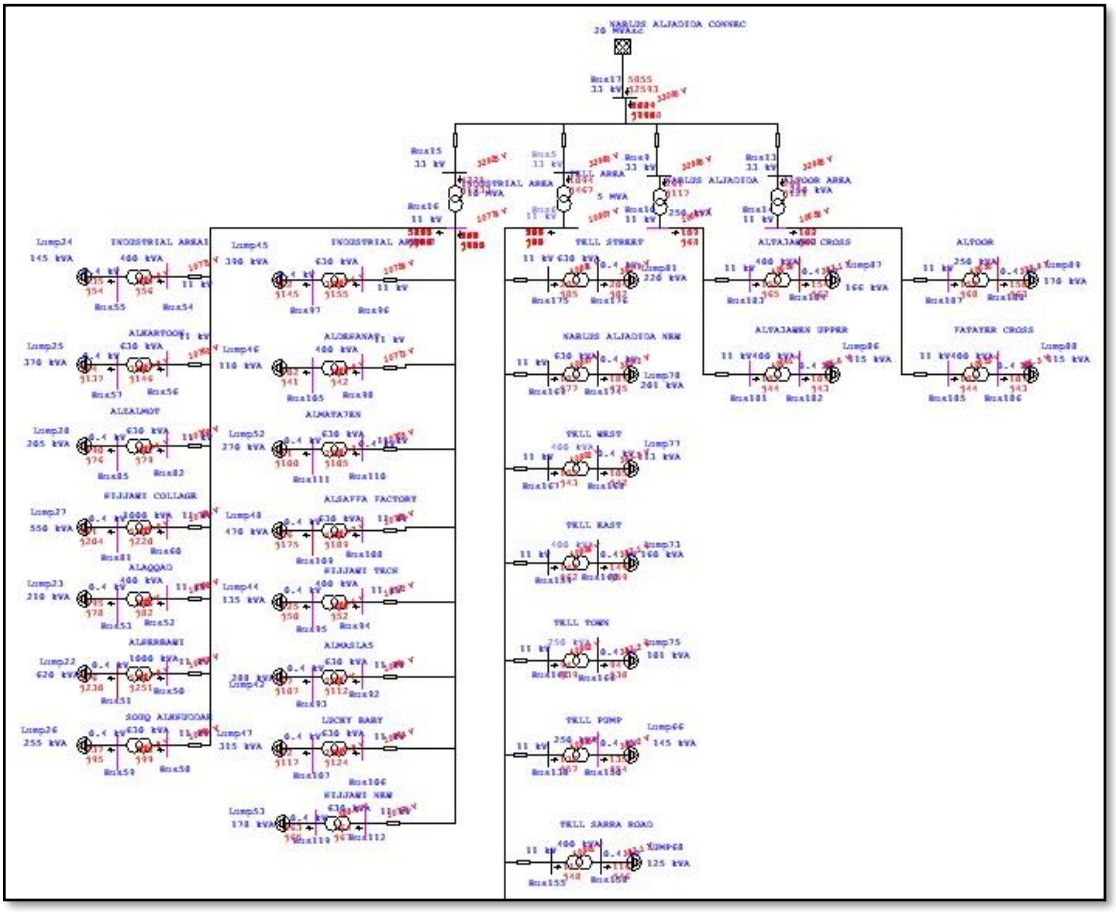
Transformers change feed from connection to a new connection point at An-Najah hospital point

An-Najah Hospital Substation			
Transformer	**Rated KVA**	**Rated load KVA**	**From substation (Old substation before relocation)**
An-Najah Hospital1	1000	390	-
An-Najah Hospital2	1000	620	-
An-Najah Hospital3	1000	580	-
An-Najah Hospital4	1000	498	-
Alquran Schoole	400	206	-
Asira Boy School	630	370	-
Asira Girl School	400	205	-
Kalbouneh Building	250	160	Mujeer Aldeen Substation
Asira Street Almasre	650	225	Mujeer Aldeen Substation
Asirra Square	630	201	Mujeer Aldeen Substation
Alain Camp Pump1	630	201	Mujeer Aldeen Substation
Alain Camp Pump2	630	220	Mujeer Aldeen Substation
Alain Camp Upper	630	320	Mujeer Aldeen Substation
Sama Nablus /Alkhazan	630	220	Mujeer Aldeen Substation
Alzahraa Factory	630	310	Wadi Altuffah Substation
Iskan Aljamaa	250	166	Wadi Altufah Substation
Alqud University1	1000	515	Mujeer Aldeen Substation
Alqud University2	630	310	Mujeer Aldeen Substation
Alqud University3	630	278	Mujeer Aldeen Substation
Alqud University4	400	115	Mujeer Aldeen Substation

Regarding Nablus Al-Jadida substation,the load power supplied load are 5.855 MW, and 2.59 Mvar and current ampere is 125 A with 27 distribution transformersmoved now to a new substation and serve the area as shown in figure (8).

Figure 8

The New Loads Connected To Nablus Al-Jadida Substation



Furthermore, the change feed power from old substation to new Nablus Al-Jadida substation is shown in table (9).

Table 9

The Change Feed Power From Old Substation To New Nablus Al-Jadida Substation

Nablus Al-Jadida Transformer			
Transformer	**Rated KVA**	**Rated load KVA**	**From substation (Old substation before relocation)**
Alsafa factor	630	470	ASKAR SUBSTATION
Industrail area1	400	145	ASKAR SUBSTATION
Industrial area2	630	390	ASKAR SUBSTATION
Hijawwi collage	1000	550	ASKAR SUBSTATION
Hijjawi	400	135	ASKAR SUBSTATION
Alaqqad	400	190	ASKAR SUBSTATION
Almaslkh	630	288	ASKAR SUBSTATION
Alherbawi	1000	620	ASKAR SUBSTATION
Souq alkhudar	630	255	ASKAR SUBSTATION
Lucky baby	630	315	ASKAR SUBSTATION
Alzalmout	630	205	ASKAR SUBSTATION
Hijjawi new	630	178	ASKAR SUBSTATION
Almata7en	630	270	ASKAR SUBSTATION
Aldehanat	400	110	ASKAR SUBSTATION
Alkarton	630	370	ASKAR SUBSTATION
Tell street	630	220	Karakon SUBSTATION
Nablus aljadida new	630	201	Karakon SUBSTATION
Tell west	400	113	Karakon SUBSTATION
Tell east	400	160	Karakon SUBSTATION
Tell town	400	101	Karakon SUBSTATION
Tell pump	250	145	Karakon SUBSTATION
Tell sarra road	400	125	Karakon SUBSTATION
Al eza3a	250	105	Karakon SUBSTATION
Altoor	250	170	CENTRAL SUBSTATION
FATAYER CROSS	400	115	CENTRAL SUBSTATION
ALTAWEN UPER	400	115	CENTRAL SUBSTATION
ALTAWEN CROSS	400	166	CENTRAL SUBSTATION

If the values are compared between the period before adding new substations and after it, there is a great and significant difference in Nablus grid that it is possible to save power reservation for 10 years forward as shown in table below.

Table 10

Results for upgrade Nablus network

Substatin name	Rated Power /Before		Rated power /After		Rated current /Before	Rated current /After	Rated factor /Before	Rated factor /After
	MW	MVAR	MW	MVAR				
Enap	12.2	5.4	10.54	4.55	234.8A	200.8A	91.4%	92%
Al-Junaid	3.84	1.747	3.84	1.747	73.8A	73.8A	91.6%	91%
Al-Karakon	9.09	3.97	7.763	3.393	172.9A	148.2A	91.6%	92.1%
Askar	12.4	4.24	9.47	2.86	229.4A	173.1A	89%	92.7%
Wadi-Altufah	6.14	2.94	2.8	1.85	105A	58.8A	91.2%	91.7%
Central	11.07	4.16	10.57	3.9A	207A	194A	91.5%	91.8%
Mujeer Al-deen	12.8	5.41	11.4	4.78	243.9A	217A	92.1%	93.3%

Chapter Five
Feasibility Study

The feasibility study for Nablus network enhancement need to adding two new connection points should consider the financial issues. This project will need a large budget to be implemented. However, this project will benefit Nablus grid as the project will refund in short time. The improvement system grid will increase the efficiency of the network components. Consequently, the component and equipment quantity need to use in building as new electrical grid system as shown in table (A.12) in appendix (A).

5.1 Transformers

Nablus grid need by adding new transformers for two connection points,

Table (A.12) in appendix (A) shows. The Requirements specification for type transformers used to improvement Nablus Grid .

Total cost of transformers

$$= (1*12000)+(1*7000)+(2*4800)+(1*12000)+(2*7000) = 54600\$$$

5.2 Transmission line and cable

The length of the transmission line from Sarra substation to a new connection point is 6.9 KM to Nablus Al-Jadida, and 10.6 KM to An-Najah hospital, and the type of the cable line used is overhead ACSR 120 mm^2 and the specification are shown in figure (9).

Figure 9

The Specifications of the overhead T.L ACSR 120 mm^2

CHARACTERISTICS	
Construction characteristics	
Conductor material	Aluminum
Type of cable	Cherry
Dimensional characteristics	
Approximate weight	402 kg/km
Conductor cross-section	120 mm²
Nominal overall diameter	14.3 mm
Stranding (No./mm)	6/4.75
Stranding No./mm Steel	7/1.60
Electrical characteristics	
Conductor AC resistance at 50 Hz	0.367 Ohm/km
Inductive reactance at 50Hz	0.256 Ohm/km
Max. DC resistance of the conductor at 20°C	0.271 Ohm/km
Mechanical characteristics	
Calculated breaking load	33.4 kN
Elongation coefficient	19.9 10E-6/°C
Final modulus of elasticity (MPA)	80000

Total cost cable (ACSR)/$ = long cable (meter) * 2.5$/m

= (10.6 + 6.9) * 2.5 = 43750 $

To feed the load we used underground cable XLPE 1C 400mm2 copper

Cable Cost(XLPE An-Najah) /$ = length of cable (meter) * 4$

= (550 + 890) * 4 = 5760 $

Cable Cost(XLPE Aljadida) /$ = length of cable (meter) * 4$

= (5700 + 600 + 1120 + 400) * 4 = 31280 $

Total cost of XLPE cable = 5760 + 31280 = 37040 $

Total cost of (ACSR, XLPE) = 37040 + 43750 = 80790$

5.3 Transmission Tower

The tower choice for 33KV with specifications as shown in table (A.13) in appendix (A).

Price for tower1 ton cost 1200$

For one tower the total cost 1500$

Number of towers = distance / span between tower [8]

Where: the span between tower for 33Kv according the specification in Table (A.2) in appendix (A) is 50meter.

Number of towers (An-Najah) = 10600m / 50m =212 tower

Number of towers (Nablus Al-Jadida) = 6900 m/ 50m =138 tower

Total number towers = 212 + 138 =350 tower

Total cost towers = 350 * 1500 =525000$

5.4 Switchgear

The KYN61-36 air-insulated metal-clad switchgear (hence referred to as switchgear) that will be utilized at the new connection point at An-Najah, Nablus Al-Jadida substation is a type of MV switchgear. It's a withdraw able module type panel, and it's equipped with a FARADY Electric Company VD4-36E, VD4-36 vacuum circuit breaker. It may also be equipped with isolation, PT, and fuses, among other features. It is designed for three-phase AC 50/60 Hz power systems and is primarily used for electrical power transmission and distribution, as well as circuit protection and monitoring.

Switchgear parameters are demonstrated in table (A.14) in appendix (A).

Two switchgears are needed with same parameters, the cost of each one is 17000$

The total cost of switchgears = 2 * 17000 = 34000$

Installation and operational cost:

To build the new grid we need budget for contractor company to build tower and transmission line (overhead and underground cable), in North electrical distribution company (NEDCO) contact with SATCO contractor to execute the project and maintenance.

Total cost for contractor = 250000$

Total cost for project = Total cost for contractor + total cost switch gear + Total cost tower + total cost cable + total transformer cost

= 25000 + 34000 + 525000 + 80970 + 54600=719570 $

5.5 Economic feasibility for improving the Nablus electrical network

The result between before and after adding the new substation in Etap shows that there is a decreased in the voltage drop and apparent losses. However, when adding a new

connection point, losses of the network decreased from 8.9% to 7.5%. Also, the power factor was improved to over 92% which will reduce any penalties paid to "IEC" on both "NEDCO" Company and consumers as well due to adding a new connection point.

The losses value before improving the Nablus electrical network is 1210 kW, now the losses after enhancement the grid is 1002kW, so the losses value in the network decreased about 208KW.

Saving in power = losses before – losses after = 1210 – 1002 = 208kW

Saving in power / annual = saving in power * 8760h/year

= 208 * 8760 = 1822 MWh / year

Saving in cost / annual = saving in power /annual * price for kW /NIS

= 1822* 0.58 = 1056800 NIS / year = 320240 $ /year

Pay pack period = initial investment / Saving in cost = 719570 / 320240 = 2.24 year

The existing load of this network is 65 MW, but the availability of recent two connection points is 95 MW. So, now we are in the safe side. Payback period time needed to the cost for the project is about 3 year, because the value of the annual profit from the project is 320240 $/year , and the new network will feed the new growth of load for the period from now to 2030, depending on the annual increase of the loads to cover the demand in the city.

5.6 Conclusions

After improve Nablus electrical network the enhancement on the grid appeared significantly, the grid become more reliability and the change happen for many thing start in Increased the power capacity for Nablus electrical network from 65 MW to 105 MW.

Adding new two substations (An-Najah hospital, Nablus Aljadida) to the grid that’s leads to upgrade the network the loads in Nablus electrical grid divide as random not equal as the substation capacity can carry the load so in this study to make the grid more sustainable.

Redistribution the load in the grid to decreased the pressure on other substation by take some load from old substation to new two substation, the connection between old substation un trusted so Re connect the substation as ring system connection to be more reliability for the grid, and Supplied new area by power and save the reserve power for expanding development in the future.

Upgrade the infrastructure by add new substation and transmission line and Solve the shortage in electrical power in eastern area.

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Appendices

Appendix A

Tables

Table A.1

Imported Power Sources in 2019 [10]

Source / Month	Electricity (MW/h)	Diesel (1000 L)	Gasoline (1000 L)
January	597608	67601	25618
February	517696	61488	23174
March	553711	56913	23031
April	466427	64209	24731
May	481043	61787	26587
June	514426	56215	25764
July	549272	69872	29219
August	555955	62065	26979
September	515335	65799	26490
October	485208	62933	25604
November	454272	58563	23361
December	558151	65442	25054
Total	**6249104**	**752887**	**305612**

(Source: shorturl.at/gvBI3).

Table A.2

Electrical energy sources in Palestine (2020)

Power Source	Power (MWh)	Percentage
Israel	4,649,932	82.4%
Jordan	345923	6.13%
Egypt	238,704	4.23%
Gaza Power Station	410,312	7.27%
Total	**5,643,122**	**100%**

Table A.3

Require and debit in Electrical Power in Gaza[17]

supply	**obtainable power (MW)**
IEC	122
Egypt	18
Gaza Power Station	61
Total	198
require & debit	
Demand	265-275
Deficit	≈ 26%

Table A.4

The Electrical Power bring in in addition the Invoiced Electrical power and Loss for the Year From 2012 – 2021

Year	**electrical power generate &imported (KW/h)**	**electrical energy invoiced (KW/h)**	**losses**	**losses percentage**
2012	167675335	150603904	17071431	10.18%
2013	162916987	146341888	16575099	10.17%
2014	134831580	127597857	7233723	5.37%
2015	165266580	145807641	19458939	11.77%
2016	176486550	151317014	25169536	14.26%
2017	191525830	170283858	21241972	11.09%
2018	209490820	180222582	29268238	13.97%
2019	226844510	196417456	30427054	13.41%
2020	236821270	209714328	27106942	11.45%

Table A.5

numeral of customers in singular clients categories inside the year 2020

Year	**Residential**	**Staircase**	**Commercial**	**Industrial**	**Institutions**	**Total**
2020	39794	2180	8547	1340	779	52640

Table A.6

Electrical power expenditure in Nablus network by sector during the year 2020

Name of sector	**Energy Consumed (kWh)**	**Percentage of the total consumption**
Residential	102,231,048	49.42%
Villages/connection points	12,057,167	6.83%
Commercial	17,347,191	8.39%
Industrial	30,423,024	14.71%
Street lighting	5,127,673	2.48%
Institutions	18,119,719	8.76%
Pumping system	21,553,866	10.42%
Total	**206,859,688**	**100%**

Table A.7

The Specifications of the ACSR Transmission Line

Aluminum Conductors Steel Reinforced J/SC3110-78

Normal Area	Strang No/da		Calculated area		Overall meters		Breaking load	Weight	DC release at 20C
	Alum	Steal	Alum	Steal	Alum	Steal			
mm^2	mm	mm	mm^2	mm^2	mm	mm	N	kg/m	ohm/m
25	6/2.3	1/2.3	24.93	4.155	6.9	2.3	8894.6	100.7	1.15
32	6/2.6	1/2.6	31.85	5.3	7.8	2.6	11180	128.6	0.899
58	6/3.5	1/3.5	57.73	9.621	10.5	3.5	19417	233.1	0.497
95	6/4.5	1/4.5	95.4	15.9	13.5	4.5	31185	573.2	0.301
120	30/2.3	7/2.3	124.7	29.09	16.1	69	45329	573.7	0.233
160	30/2.6	7/2.6	159.3	37.16	18.2	7.8	68450	732.8	0.182
200	30/2.9	7/3.2	198.2	46.24	20.3	8.7	84729	911.7	0.147
240	30/3.2	7/3.1	241.3	56.29	22.4	9.6	100130	1110	0.12
330	26/4.0	7/3.5	325.8	52.84	25.3	9.3	107380	1320	0.0888
410	26/4.5	7/3.5	413.4	67.35	28.5	10.5	136410	1673	0.0702
610	54/3.8	7/3.8	612.4	79.38	34.2	11.4	179950	2320	0.0474
810	45/4.8	7/3.2	814.5	5629	38.4	9.0	181230	2700	0.0358

Table A.8

The transformer types used in Nablus network

Types	Capacity(KVA)	Voltage level	Impedance (%)
ARDAN	250	6.6-0.4	5.07
	400	6.6-0.4	4.07
	630	6.6-0.4	4.05
ELCO	250	6.6-0.4	4.37
	400	6.6-0.4	4.2
	630	6.6-0.4	4.07
TRAVO	250	6.6-0.4	4.06
IMEFY	630	33-0.4	4.38
	400	33-0.4	4.16
	250	33-0.4	4.28

Table A.9

Permissible voltage regulation (As per REC)

Maximum Voltage Regulation at any Point of Distribution Line			
Part of Distribution System	**Urban Area (%)**	**Suburban Area (%)**	**Rural Area (%)**
Up to Transforms	2.5	2.5	2.5
Up to Secondary Main	3	2	0.0
Up to Service Drop	0.5	0.5	0.5
Total	**6.0**	**5.0**	**3.0**

Table A.10

Size and short circuit current for cable XLPE

Duration of short circuit current	Area of Alu conductor	Short circuit current I (kA) = (K*A)/ √ t	Area of Cu conductor	Short circuit current I (kA) = (K*A)/ √ t
Time (t)	Area (A)	I=(0.094 x A)/√(t)	Area (A)	I=(0.144 x A)/√(t)
second	sq mm	kA	sq mm	kA
1	10	0.94	10	1.44
1	16	1.50	16	2.30
1	25	2.35	25	3.60
1	35	3.29	35	5.04
1	50	4.70	50	7.20
1	70	6.58	70	10.08
1	95	8.93	95	13.68
1	120	11.28	120	17.28
1	150	14.1	150	21.60
1	185	17.39	185	26.64
1	240	22.56	240	34.56
1	300	28.2	300	43.20
1	400	37.6	400	57.60
1	500	47.0	500	72.00
1	630	59.22	630	90.72
1	800	75.2	800	115.20
1	1000	94.0	1000	144.00

Table A.11

The value in Etap is calculated for grid components including busses, load and losses

Buses	721
Branches	724
Loads	353
Load MW	64.3
Load Mvar	26.85
Loss MW	1.21
Loss Mvar	6.96
Mismatch MW	6.147
Mismatch Mvar	4.13

Table A.12

The Requirements for improvement Nablus Grid

Nablus Al-Jadida substation				
Transformer type	**Rated capacity**	**Quantity**	**Specification**	**Price / one**
Power	10MVA, 33/11KV	1	ARDAN	12000$
Power	5MVA,33/11KV	1	ELCO	7000$
Distribution	250KVA, 33/11KV	2	ARDAN	4800$
AN Najah hospital substation				
Power	10MVA, 33/11KV	1	ARDAN	12000$
Power	5MVA,33/11KV	2	ELCO	7000$

Table A.13

Transmission tower specifications

Material	Steel Q235Bgalvanized
Quality control	ISO / GB
Voltage grade	33 / 66 KV
Color	Silver
Connection	Bolts and nuts
Usage	Power transmission and distribution
Welding standard	AWSD 1.1
Galvanized stander	ASTM123
Wind pressure	120KM/Hr
High	13m
Weight	1250kg

Table A.14

Switchgear parameters

No.	Item		Unit	Parameters
1	Rated Voltage		kV	36[1] 40.5[1]
2	Rated Frequency		Hz	50/60
3	Rated Insulation Level	1 min power frequency withstand voltage(Valid)	kV	95
		Lightening impulse withstand voltage(Peak)		185
4	Rated Current		A	630 1250 1600 2000 2500 3150
5	Rated Short Circuit Breaking Current[2]		kA	25, 31.5
6	Rated Short Circuit Making Current(Peak)		kA	63, 80
7	Rated Short-time Withstand Current (4s)[2]		kA	25, 31.5
8	Rated Peak Withstand Current		kA	63, 80
9	Auxiliary Control Circuit Rated Voltage[3]		Cycle	DC110, DC220, AC220

Appendices B
Figures

Figure B.1

The Total Power Consumption in Palestine and Neighboring Countries

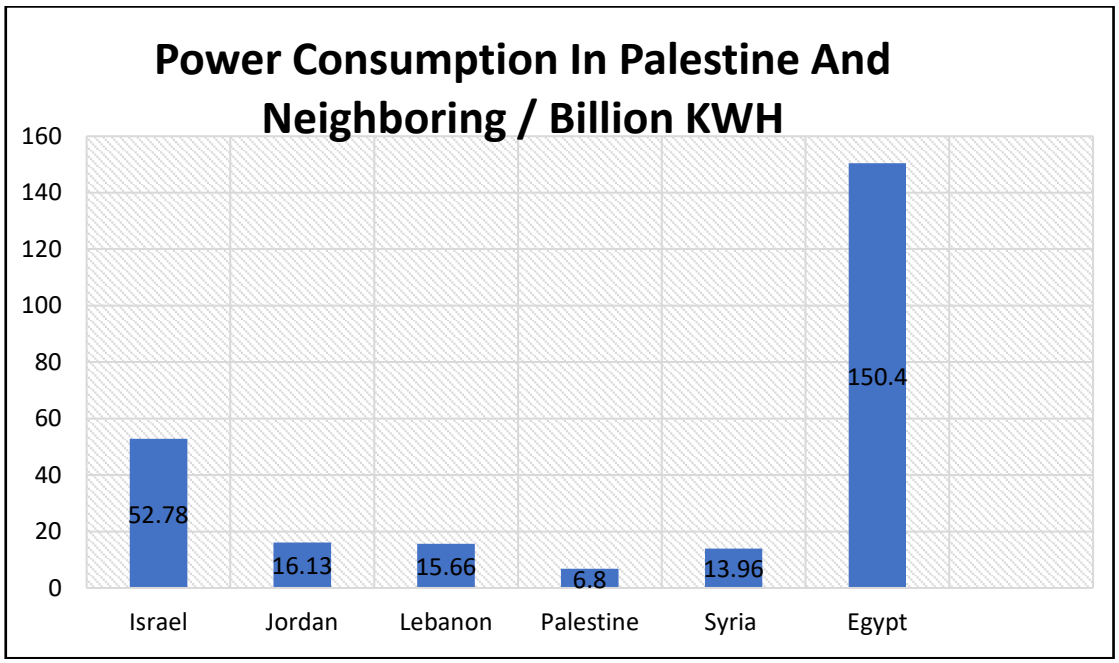
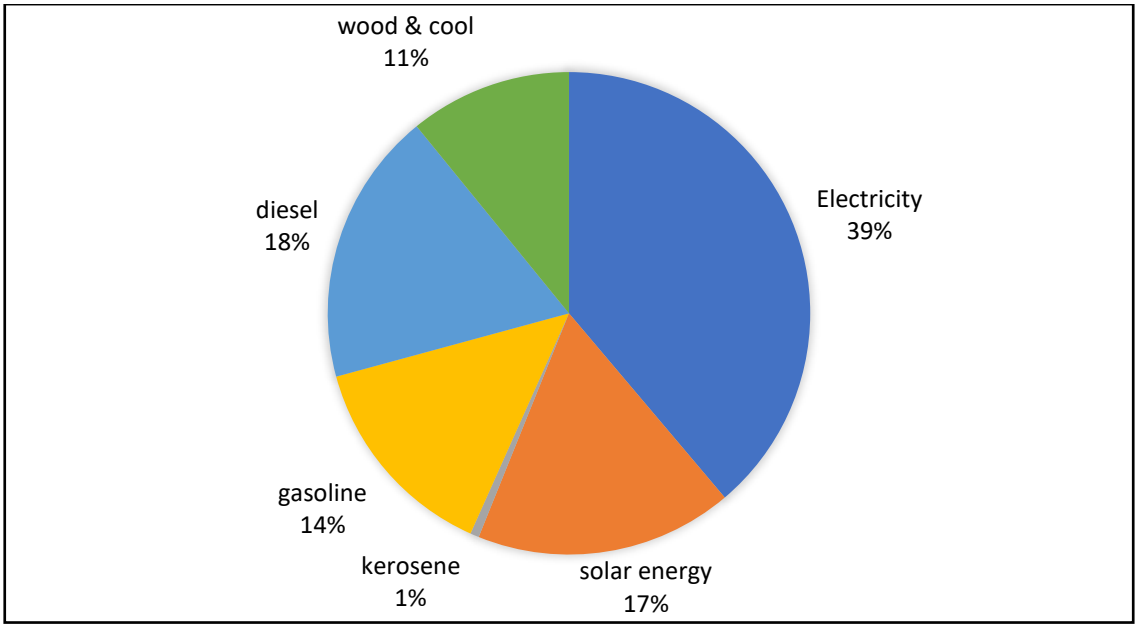


Figure B.2

Breakdown of total final energy consumption in 2020 by source of energy in Palestine[13]



Source: shorturl.at/jtvM5.

Figure B.3

Electrical Power Consumption/Capita in 2020

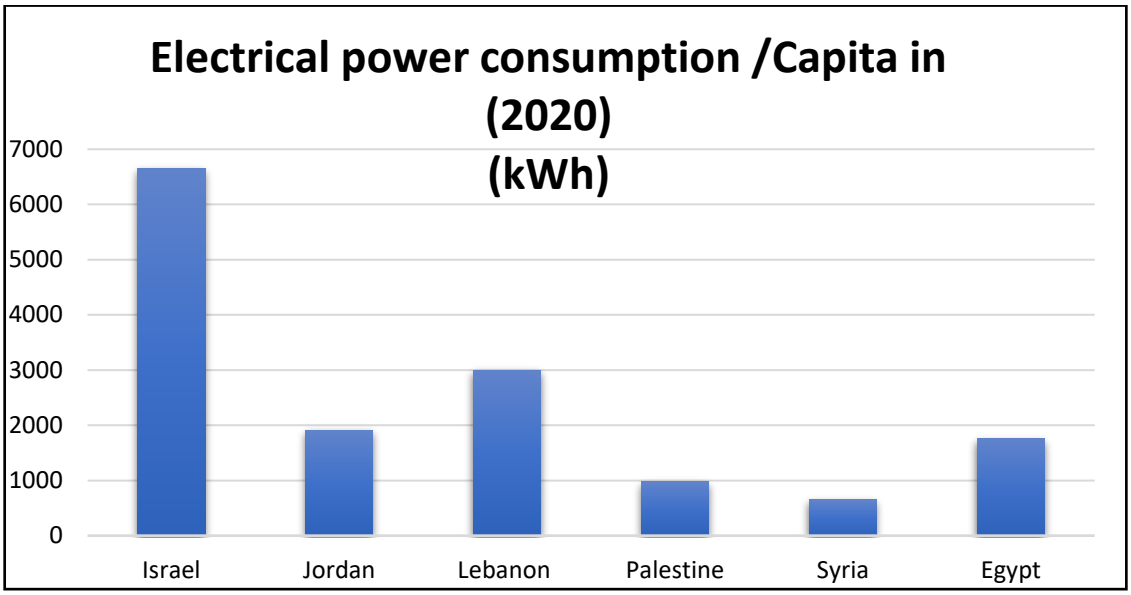


Figure B.4

One Line Diagram of The Main Parts of The Nablus Electrical Network

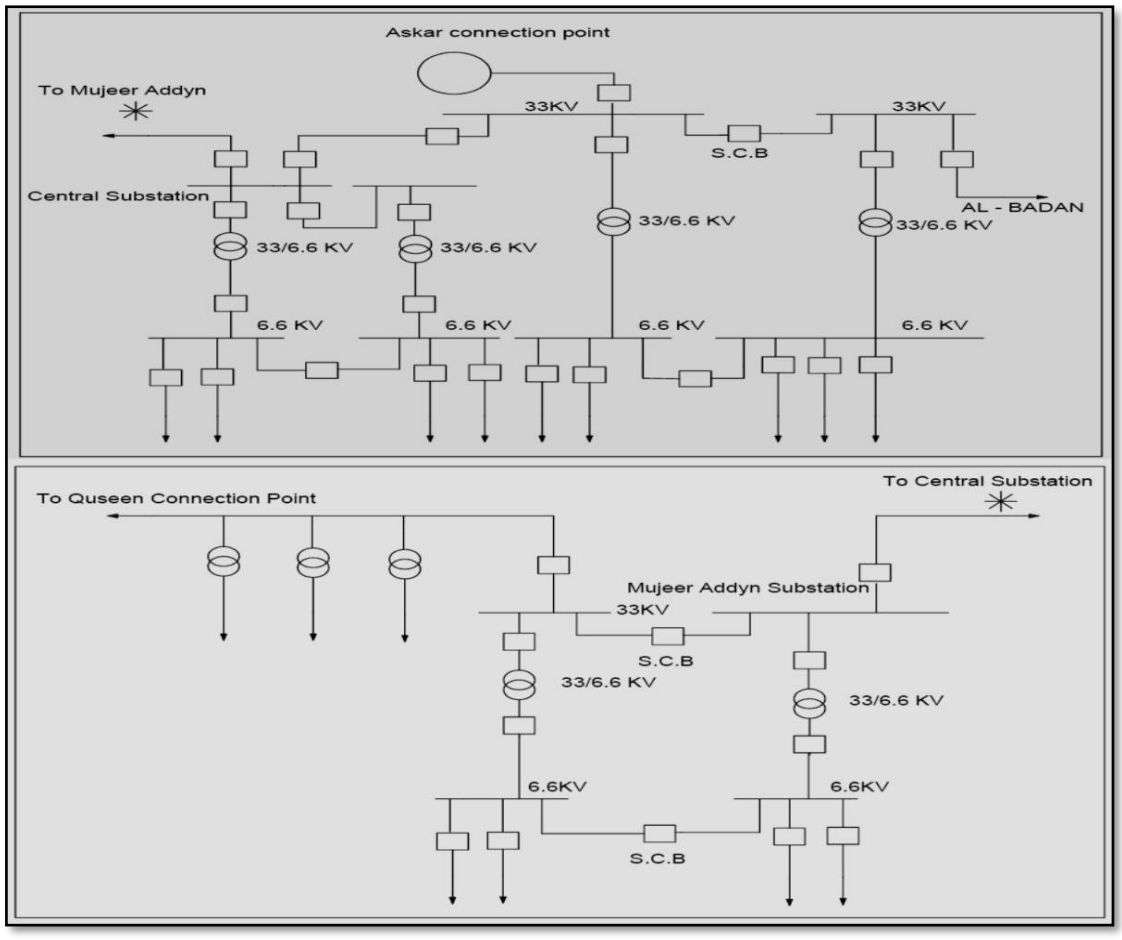


Figure B.5

The Electrical Requirements for Nablus Network

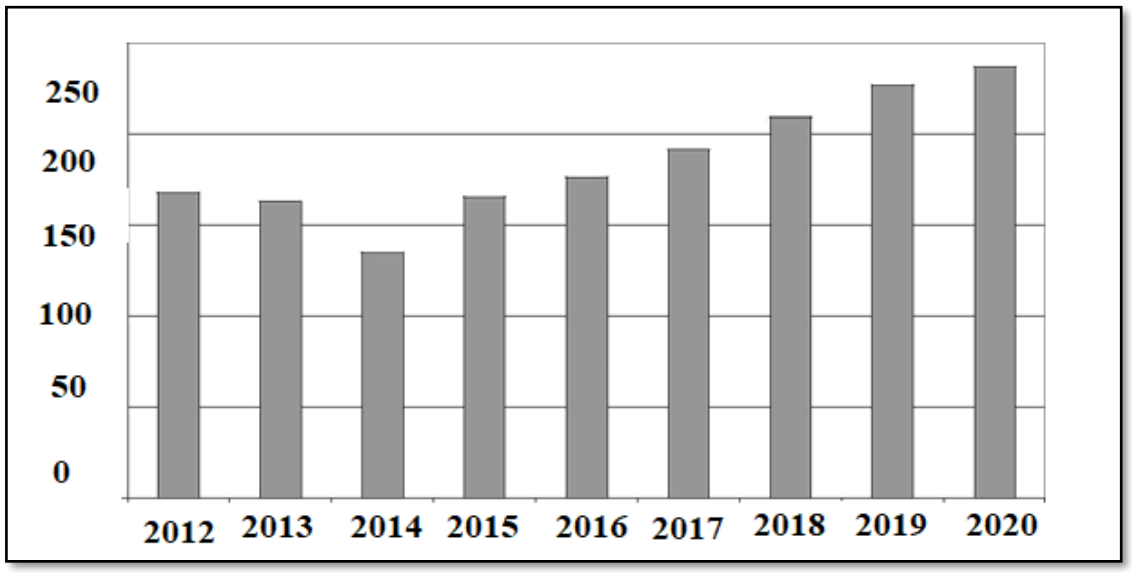


Figure B.6

Variation in the power losses in Nablus electrical network during the years 2013-2021

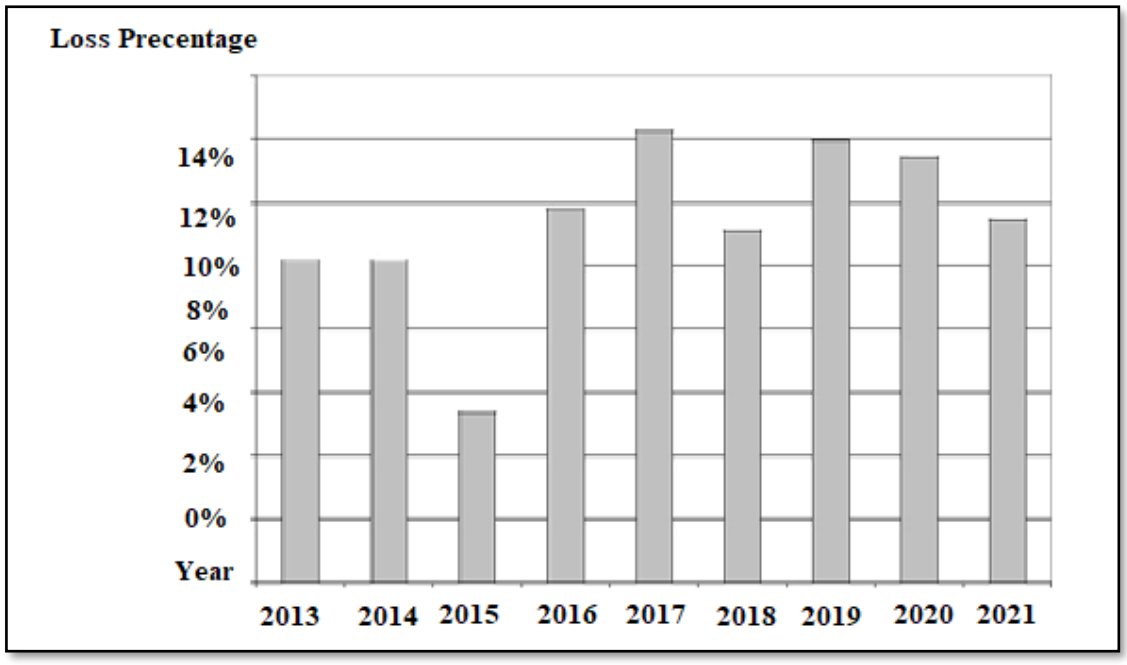


Figure B.7

Pie Diagram of Power Consumption of The Different Sectors During Year 2021 in Nablus Electrical Network

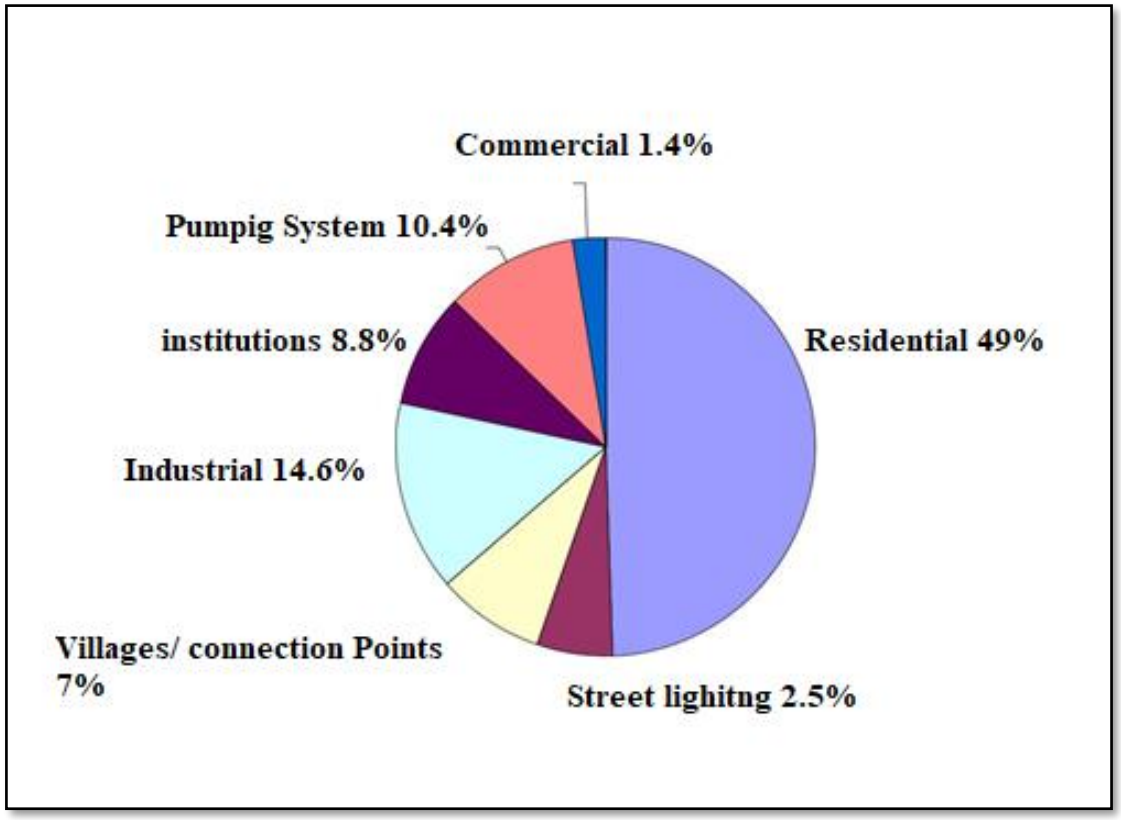


Figure B.8

Demonstrates Enap Connection Point Loads

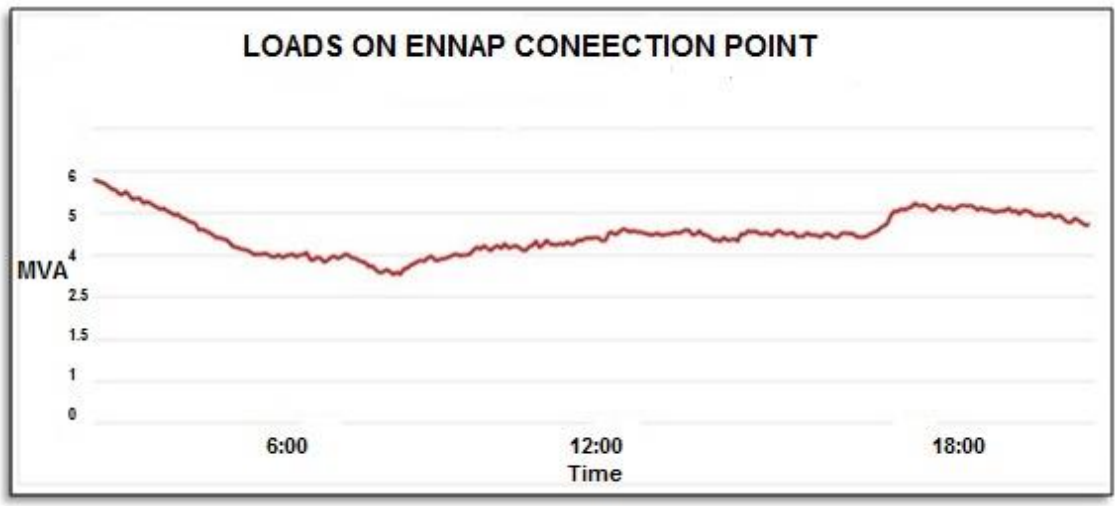


Figure B.9

Demonstrates ASKAR Connection Point Loads

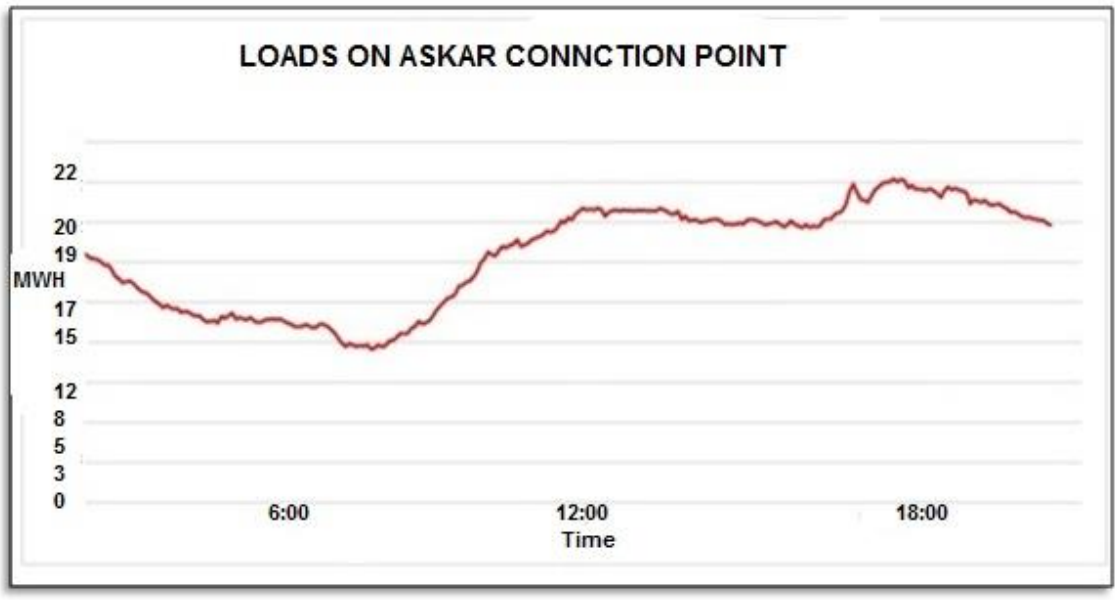


Figure B.10

Demonstrates Sarra1 Connection Point Loads

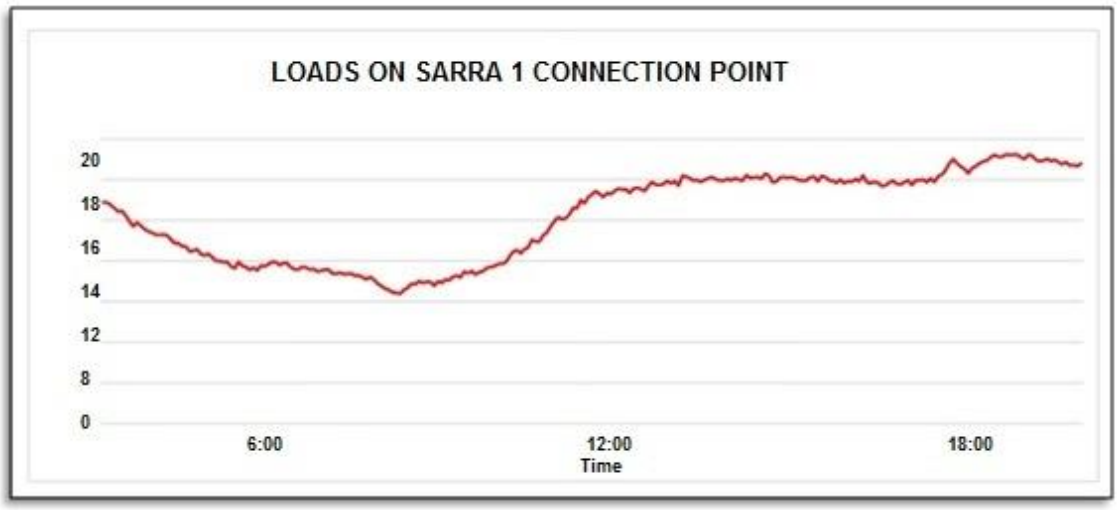


Figure B.11

Demonstrates Sarra2 Connection Point Loads

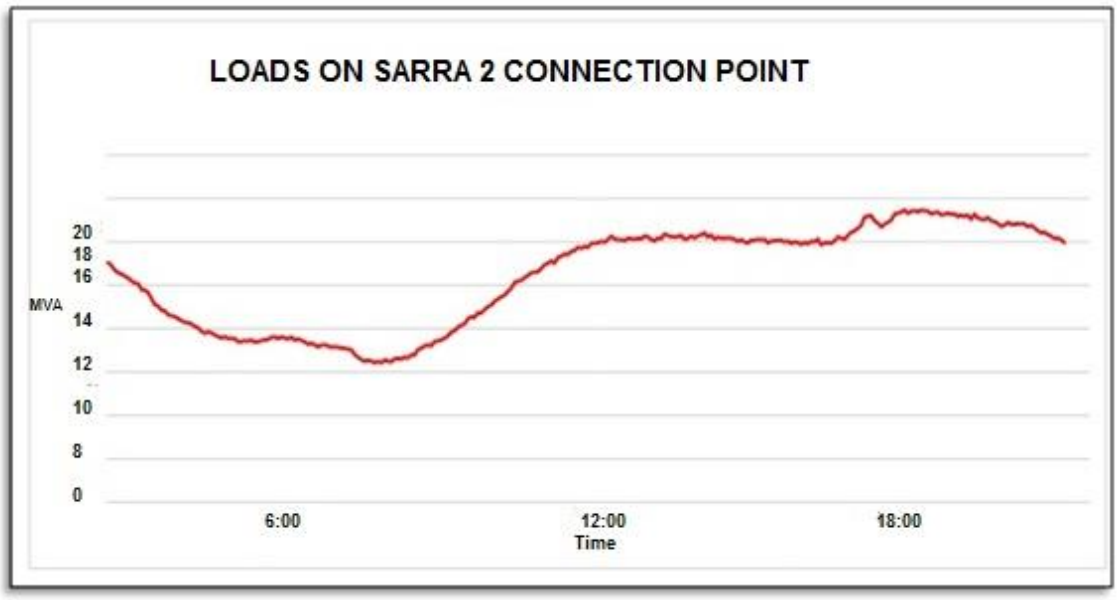


Figure B.12

Specifications and types of transformers

				Loss(kW)				Weight (kg)			(mm)			Gauge	
Rated Capacity	Voltage Group(KV)		Connection Method		(75)	No-load current	Impedance Voltage				(L)	(W)	(H)		
(kVA)	HV	LV		No-load	Load	%	%	Machine	Oil	Gross	Dimension			Vertical	Horizontal
50				0.21	1.21	2		195	205	590	1000	950	1450	550	550
100				0.29	2.02	1.8		320	240	790	1080	1000	1600	550	550
125				0.34	2.38	1.7		395	270	950	1100	1030	1630	660	660
160				0.36	2.83	1.6		460	285	1020	1130	1060	1630	660	660
200				0.43	3.33	1.5		555	325	1170	1190	1060	1670	660	660
250				0.51	3.96	1.4		630	340	1340	1260	1160	1700	660	660
315	38.5		Dyn11	0.61	4.77	1.4		720	400	1530	1280	1240	1790	660	660
400	36.5	0.4	Yd11	0.73	5.76	1.3	6.5	830	490	1780	1960	880	1900	820	820
500	35		Dyn5	0.86	6.93	1.2		930	510	1960	2020	940	1920	820	820
630	33		Yyn0	1.04	8.28	1.1		1085	600	2290	2070	1010	2010	820	820
800				1.23	9.9	1		1270	660	2640	2240	1040	2150	820	820
1000				1.44	12.15	1		1495	735	3100	2300	1200	2150	820	820
1250				1.76	14.67	0.9		1775	830	3630	2450	1280	2250	1070	1070
1600				2.12	17.55	0.8		2140	935	4235	2220	1510	2350	1070	1070
2000				2.61	21.5	0.8		2535	1035	4910	2310	1740	2440	1070	1070
2500				3.15	23	0.8		3140	1190	5840	2370	1840	2490	1070	1070
(Note): (Tapping range of high voltage) ±5%; ±2×2.5%.															

FigureB.13

Line feeder for load An-Najah University substation

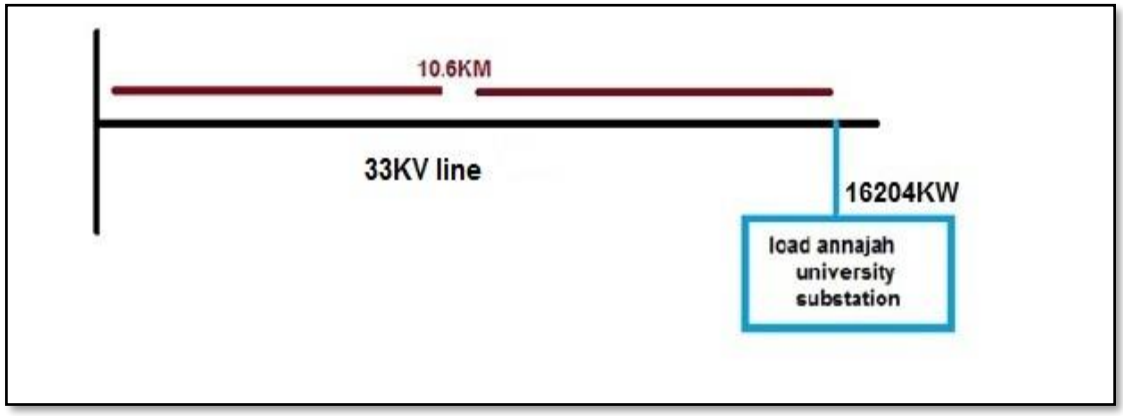


Figure B.14

Line feeder for loads Nablus Aljadida substation

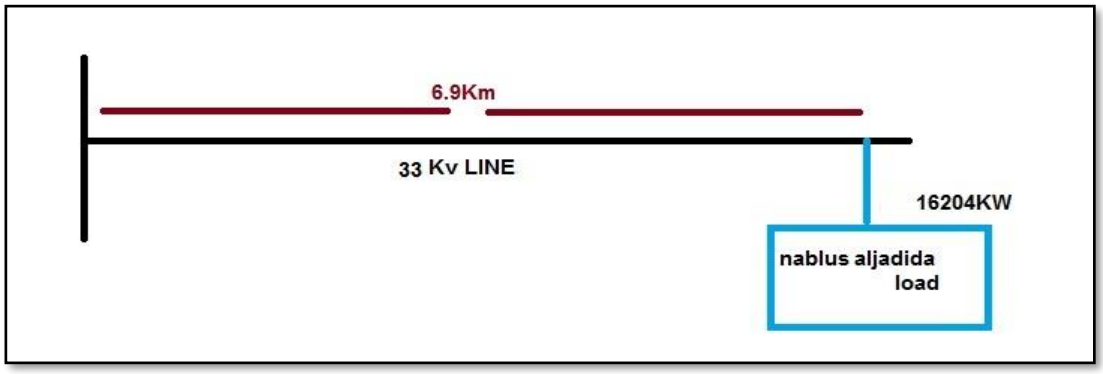


Figure B.15

Types of Underground Cables

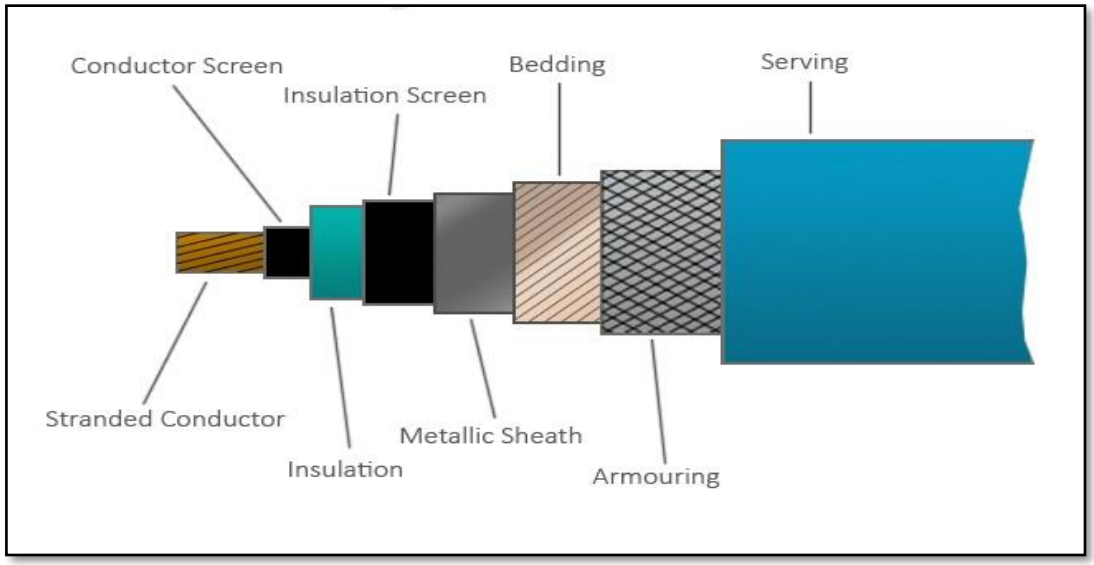


Figure B.16

Nablus Electrical Grid Before Adding The New Connection Point

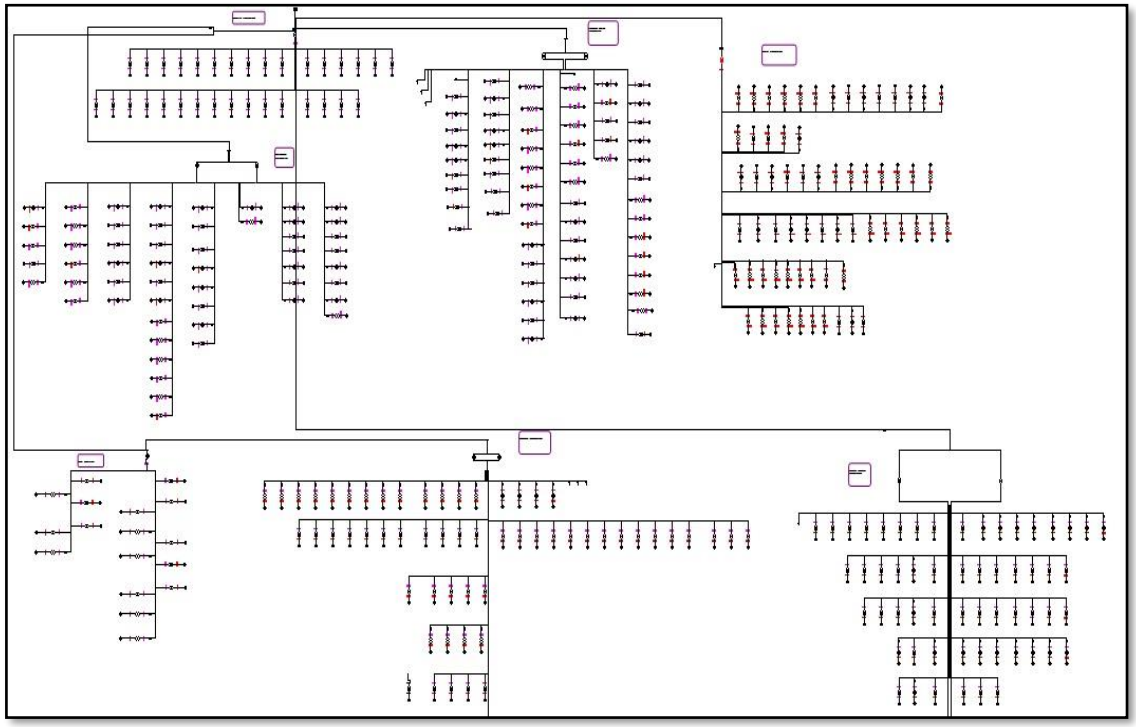


Figure B.17

Wadi Al-Tufah's Load Flow Before Adding New Substations

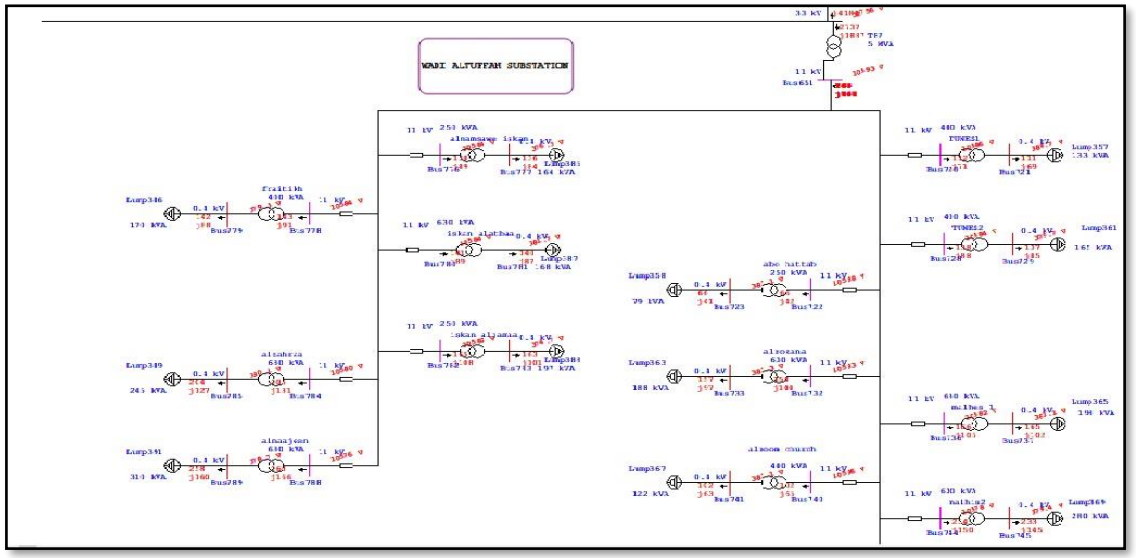


Figure B.18

The Distribution Transformer And Load On Central Substation

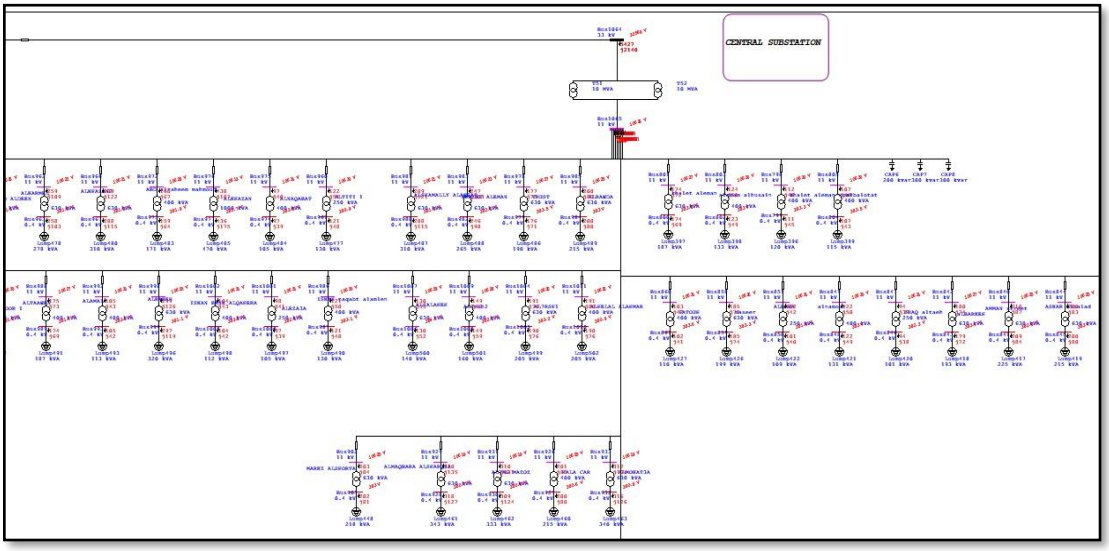


Figure B.19

The loads and distribution transformers connected in Al-Junaid substation

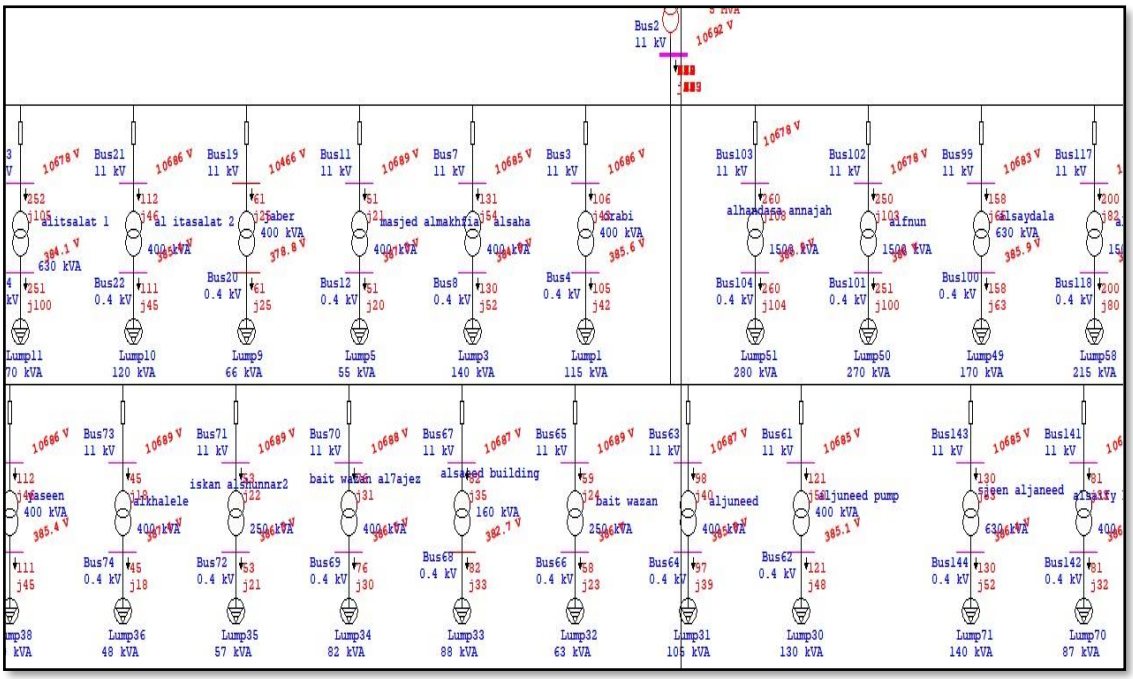


Figure B.20

The Distribution Transformer And Load Connected In Alkarakon substation

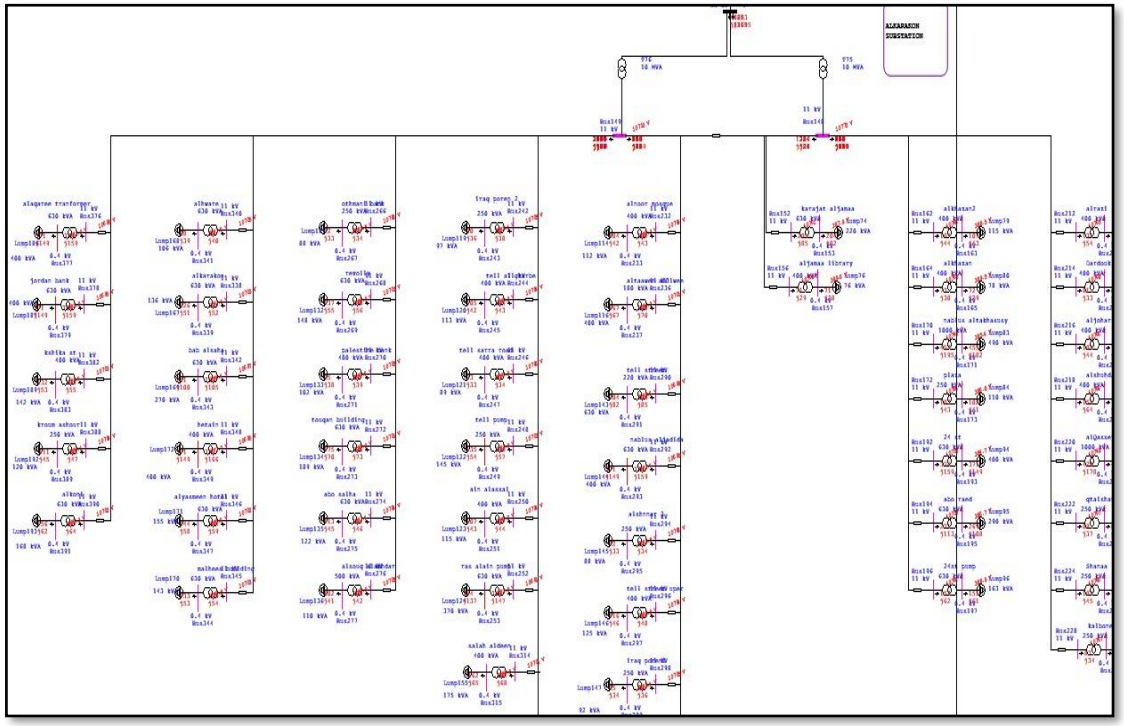


Figure B.21

Nablus network grid after adding new substations (An-Najah hospital and Nablus Al-Jadida)

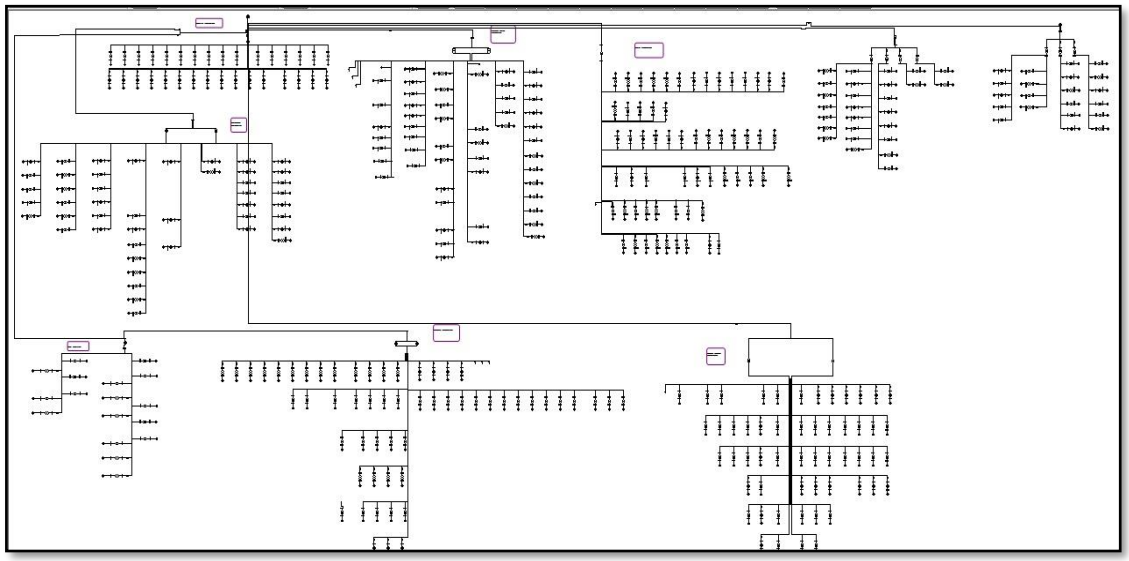


Figure B.22

The Specifications of the overhead T.L ACSR 120 mm^2

CHARACTERISTICS	
Construction characteristics	
Conductor material	Aluminum
Type of cable	Cherry
Dimensional characteristics	
Approximate weight	402 kg/km
Conductor cross-section	120 mm²
Nominal overall diameter	14.3 mm
Stranding (No./mm)	6/4.75
Stranding No./mm Steel	7/1.60
Electrical characteristics	
Conductor AC resistance at 50 Hz	0.367 Ohm/km
Inductive reactance at 50Hz	0.256 Ohm/km
Max. DC resistance of the conductor at 20°C	0.271 Ohm/km
Mechanical characteristics	
Calculated breaking load	33.4 kN
Elongation coefficient	19.9 10E-6/°C
Final modulus of elasticity (MPA)	80000

Figure B.23

The geographical for company electrical distribution

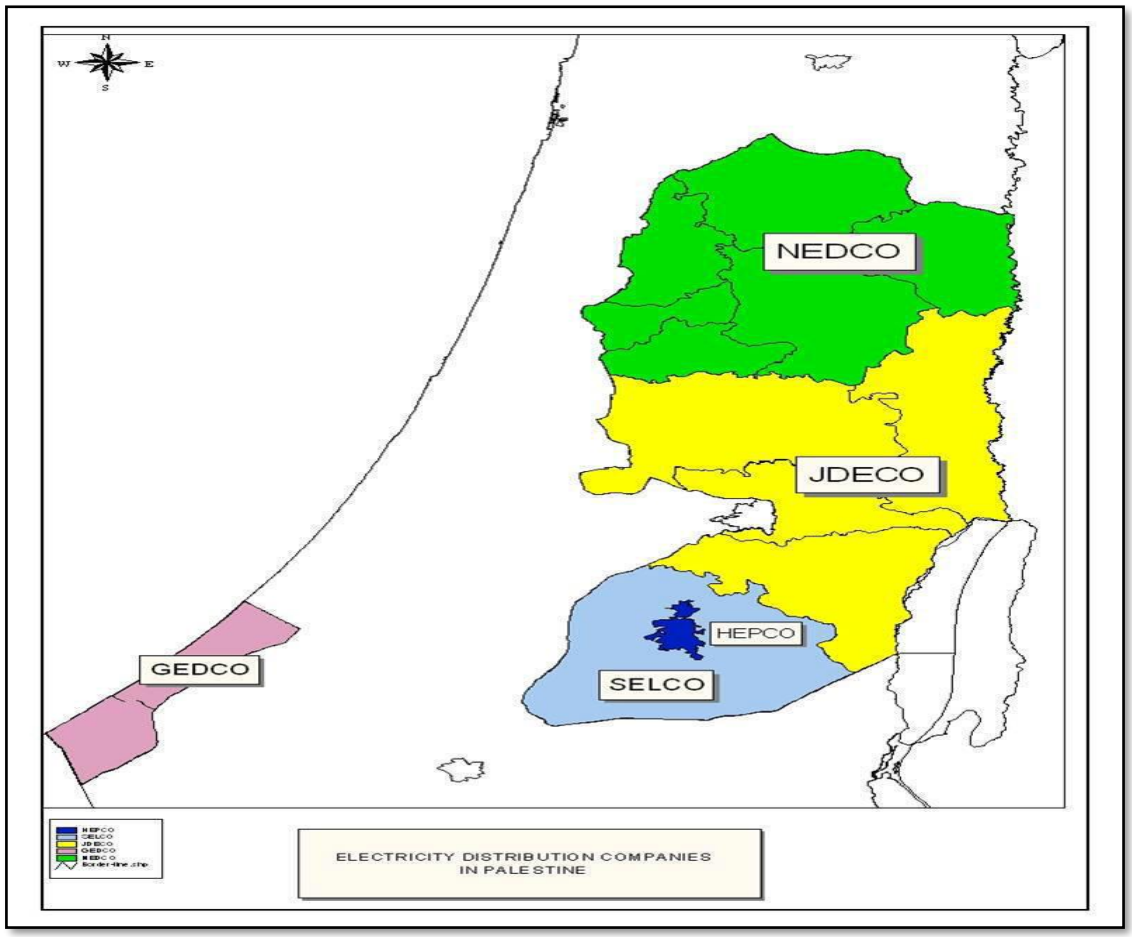


Figure B.24

Supply the city of Nablus and surrounding areas

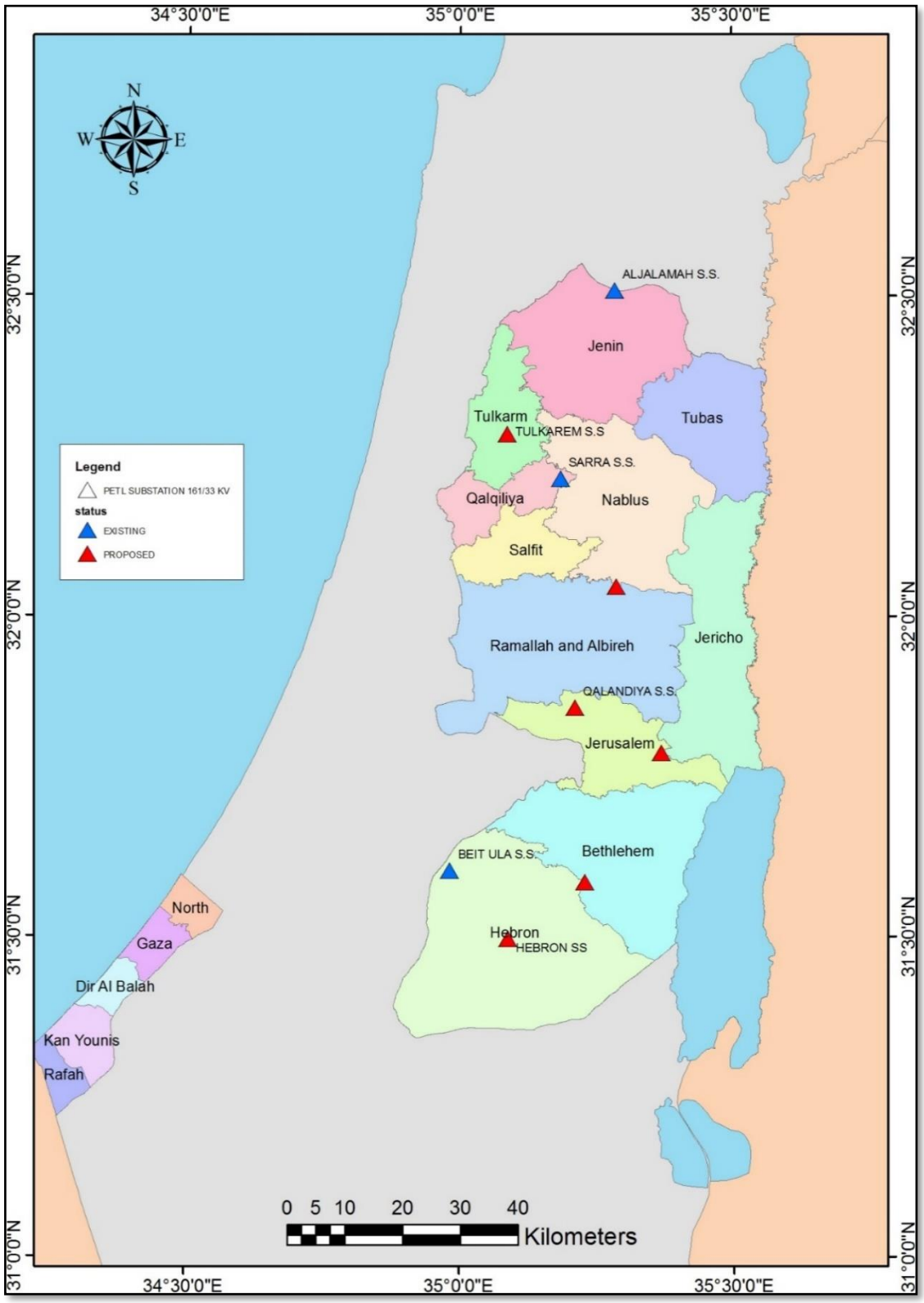


Figure B.25

Overhead Line Transmission to An-Najah University

Figure B.26

The Overhead Transmission Line To Nablus Al-Jadida

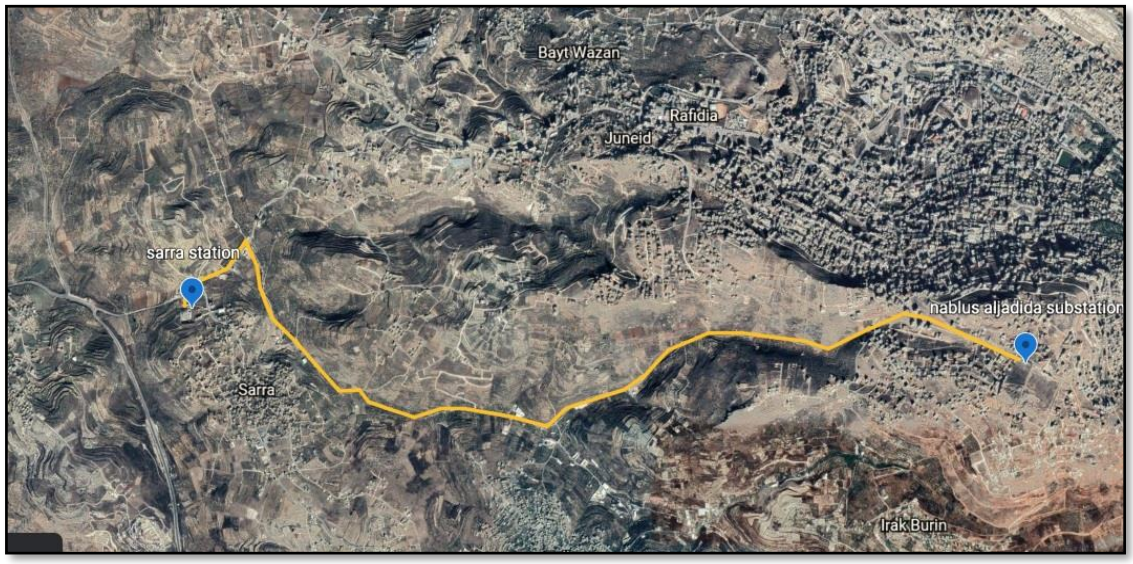


Figure B.27

Switchgear of substations

Figure B.28

Geographical extend cable line for An-Najah hospital substation

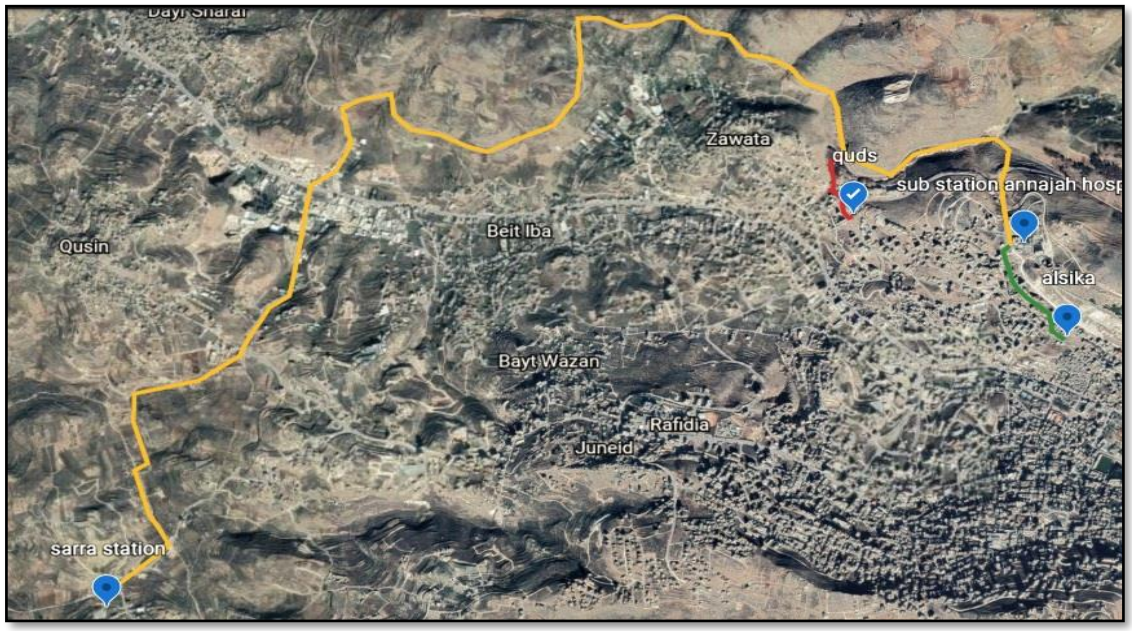
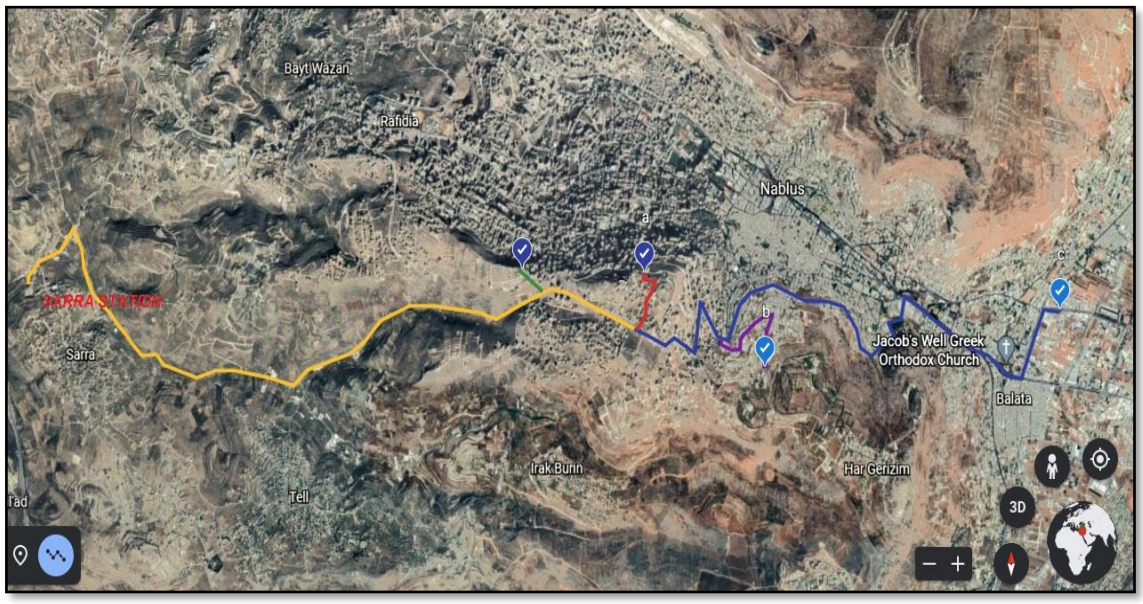


Figure B.29

Geographical extend cable line for An-Najah hospital substation



Appendices C

Charts

Project:		ETAP		Page:	1
Location:		6.0.0		Date:	24-10-2021
Contract:				SN:	12345678
Engineer:				Revision:	Base
Filename:	nablus grid before		Study Case: LF	Config.:	Normal

LOAD FLOW REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* Bus1	33.000	100.000	0.0	64.324	26.856	0	0	Bus147	9.050	3.970	172.9	91.6	
								Bus612	12.406	4.248	229.4	94.6	
								Bus650	6.14	2.94	105.3	91.6	
								Bus1329	12.283	5.404	234.8	91.5	
								Bus1590	12.848	5.418	243.9	92.1	
								Bus2	3.840	1.747	73.8	91.0	
# Bus2	11.000	97.203	-3.1	0	0	-0.128	-0.086	Bus3	0.108	0.043	6.3	92.9	
								Bus7	0.133	0.053	7.7	92.8	
								Bus11	0.053	0.020	3.1	93.5	
								Bus19	0.062	0.027	3.6	91.9	
								Bus21	0.114	0.045	6.6	92.9	
								Bus23	0.254	0.105	14.8	92.5	
								Bus33	0.170	0.068	9.9	92.7	
								Bus35	0.142	0.057	8.2	92.9	
								Bus38	0.167	0.067	9.7	92.8	
								Bus39	0.086	0.033	5.0	93.2	
								Bus61	0.123	0.049	7.2	92.8	
								Bus63	0.100	0.040	5.8	93.0	
								Bus65	0.061	0.023	3.5	93.3	
								Bus67	0.084	0.034	4.9	92.7	
								Bus70	0.078	0.030	4.5	93.2	
								Bus71	0.055	0.021	3.2	93.4	
								Bus73	0.047	0.017	2.7	93.7	
								Bus75	0.177	0.072	10.3	92.7	
								Bus77	0.114	0.045	6.6	92.9	
								Bus79	0.076	0.030	4.4	93.1	
								Bus83	0.109	0.043	6.3	92.9	
								Bus87	0.105	0.041	6.1	93.0	
								Bus99	0.160	0.064	9.3	92.8	
								Bus102	0.253	0.103	14.8	92.6	
								Bus103	0.263	0.107	15.3	92.6	
								Bus113	0.169	0.068	9.8	92.9	
								Bus115	0.120	0.048	7.0	93.0	
								Bus117	0.202	0.081	11.8	92.8	
								Bus139	0.067	0.026	3.9	93.2	
								Bus141	0.083	0.032	4.8	93.1	

Bus		Voltage		Generation		Load		Load Flow					XFM
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus143	0.132	0.053	7.7	92.9	
								Bus145	0.080	0.031	4.7	93.2	
								Bus1	-3.819	-1.493	221.4	93.1	
Bus3	11.000	97.151	-3.1	0	0	0.002	0.000	Bus2	-0.108	-0.043	6.3	92.8	
								Bus4	0.106	0.043	6.2	92.5	
Bus4	0.400	96.394	-3.7	0	0	0.105	0.042	Bus3	-0.105	-0.042	169.8	92.8	
Bus7	11.000	97.139	-3.1	0	0	0.002	0.000	Bus2	-0.133	-0.054	7.7	92.7	
								Bus8	0.131	0.054	7.6	92.4	
Bus8	0.400	96.202	-3.8	0	0	0.130	0.052	Bus7	-0.130	-0.052	210.1	92.8	
Bus11	11.000	97.177	-3.1	0	0	0.002	0.000	Bus2	-0.053	-0.020	3.1	93.3	
								Bus12	0.051	0.021	3.0	92.7	
Bus12	0.400	96.813	-3.4	0	0	0.051	0.020	Bus11	-0.051	-0.020	82.1	92.8	
Bus19	11.000	95.152	-4.8	0	0	0	0	Bus2	-0.061	-0.025	3.6	92.6	
								Bus20	0.061	0.025	3.7	92.6	
Bus20	0.400	94.704	-5.2	0	0	0.061	0.025	Bus19	-0.061	-0.025	100.7	92.8	
Bus21	11.000	97.148	-3.1	0	0	0.002	0.000	Bus2	-0.114	-0.046	6.6	92.8	
								Bus22	0.112	0.046	6.5	92.5	
Bus22	0.400	96.347	-3.7	0	0	0.111	0.045	Bus21	-0.111	-0.045	179.8	92.8	
Bus23	11.000	97.080	-3.1	0	0	0.002	0.000	Bus2	-0.254	-0.105	14.8	92.4	
								Bus24	0.252	0.105	14.8	92.3	
Bus24	0.400	96.020	-4.0	0	0	0.251	0.100	Bus23	-0.251	-0.100	405.8	92.8	
Bus33	11.000	97.121	-3.1	0	0	0.002	0.000	Bus2	-0.170	-0.069	9.9	92.7	
								Bus34	0.168	0.069	9.8	92.5	
Bus34	0.400	96.419	-3.7	0	0	0.167	0.067	Bus33	-0.167	-0.067	269.5	92.8	
Bus35	11.000	97.135	-3.1	0	0	0.002	0.000	Bus2	-0.142	-0.057	8.2	92.8	
								Bus36	0.140	0.057	8.2	92.5	
Bus36	0.400	96.551	-3.6	0	0	0.139	0.056	Bus35	-0.139	-0.056	224.3	92.8	
Bus37	0.400	96.435	-3.7	0	0	0.164	0.066	Bus38	-0.164	-0.066	264.2	92.8	
Bus38	11.000	97.122	-3.1	0	0	0.002	0.000	Bus2	-0.167	-0.067	9.7	92.7	
								Bus37	0.164	0.068	9.6	92.5	
Bus39	11.000	97.162	-3.1	0	0	0.002	0.000	Bus2	-0.086	-0.034	5.0	93.1	
								Bus40	0.084	0.034	4.9	92.6	
Bus40	0.400	96.813	-3.4	0	0	0.084	0.033	Bus39	-0.084	-0.033	134.3	92.8	
Bus61	11.000	97.143	-3.1	0	0	0.002	0.000	Bus2	-0.123	-0.050	7.2	92.7	
								Bus62	0.121	0.050	7.1	92.4	
Bus62	0.400	96.274	-3.7	0	0	0.121	0.048	Bus61	-0.121	-0.048	194.9	92.8	
Bus63	11.000	97.155	-3.1	0	0	0.002	0.000	Bus2	-0.100	-0.040	5.8	92.9	
								Bus64	0.098	0.040	5.7	92.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus64	0.400	96.455	-3.6	0	0	0.098	0.039	Bus63	-0.098	-0.039	157.2	92.8	
Bus65	11.000	97.174	-3.1	0	0	0.002	0.000	Bus2	-0.061	-0.024	3.5	93.1	
								Bus66	0.059	0.024	3.4	92.5	
Bus66	0.400	96.502	-3.6	0	0	0.059	0.023	Bus65	-0.059	-0.023	94.3	92.8	
Bus67	11.000	97.162	-3.1	0	0	0.002	0.000	Bus2	-0.084	-0.034	4.9	92.6	
								Bus68	0.082	0.035	4.8	92.1	
Bus68	0.400	95.676	-4.2	0	0	0.082	0.033	Bus67	-0.082	-0.033	132.7	92.8	
Bus69	0.400	96.622	-3.5	0	0	0.076	0.030	Bus70	-0.076	-0.030	122.1	92.8	
Bus70	11.000	97.165	-3.1	0	0	0.002	0.000	Bus2	-0.078	-0.031	4.5	93.1	
								Bus69	0.076	0.031	4.4	92.6	
Bus71	11.000	97.176	-3.1	0	0	0.002	0.000	Bus2	-0.055	-0.021	3.2	93.2	
								Bus72	0.053	0.022	3.1	92.6	
Bus72	0.400	96.570	-3.5	0	0	0.053	0.021	Bus71	-0.053	-0.021	85.2	92.8	
Bus73	11.000	97.181	-3.1	0	0	0.002	0.000	Bus2	-0.047	-0.018	2.7	93.5	
								Bus74	0.045	0.018	2.6	92.7	
Bus74	0.400	96.862	-3.3	0	0	0.045	0.018	Bus73	-0.045	-0.018	71.6	92.8	
Bus75	11.000	97.117	-3.1	0	0	0.002	0.000	Bus2	-0.177	-0.072	10.3	92.7	
								Bus76	0.175	0.072	10.2	92.4	
Bus76	0.400	96.384	-3.7	0	0	0.175	0.070	Bus75	-0.175	-0.070	281.6	92.8	
Bus77	11.000	97.148	-3.1	0	0	0.002	0.000	Bus2	-0.114	-0.046	6.6	92.8	
								Bus78	0.112	0.046	6.5	92.5	
Bus78	0.400	96.347	-3.7	0	0	0.111	0.045	Bus77	-0.111	-0.045	179.8	92.8	
Bus79	11.000	97.166	-3.1	0	0	0.002	0.000	Bus2	-0.076	-0.030	4.4	92.9	
								Bus80	0.074	0.030	4.3	92.4	
Bus80	0.400	96.322	-3.7	0	0	0.073	0.029	Bus79	-0.073	-0.029	118.4	92.8	
Bus83	11.000	97.150	-3.1	0	0	0.002	0.000	Bus2	-0.109	-0.044	6.4	92.8	
								Bus84	0.107	0.044	6.3	92.5	
Bus84	0.400	96.383	-3.7	0	0	0.107	0.043	Bus83	-0.107	-0.043	172.3	92.8	
Bus87	11.000	97.152	-3.1	0	0	0.002	0.000	Bus2	-0.105	-0.042	6.1	92.8	
								Bus88	0.103	0.042	6.0	92.5	
Bus88	0.400	96.419	-3.6	0	0	0.102	0.041	Bus87	-0.102	-0.041	164.7	92.8	
Bus99	11.000	97.125	-3.1	0	0	0.002	0.000	Bus2	-0.160	-0.065	9.3	92.7	
								Bus100	0.158	0.065	9.3	92.5	
Bus100	0.400	96.464	-3.7	0	0	0.158	0.063	Bus99	-0.158	-0.063	254.4	92.8	
Bus101	0.400	96.497	-3.7	0	0	0.250	0.100	Bus102	-0.250	-0.100	402.7	92.9	
Bus102	11.000	97.080	-3.1	0	0	0.003	0.000	Bus2	-0.253	-0.103	14.8	92.6	
								Bus101	0.250	0.103	14.6	92.5	
Bus103	11.000	97.076	-3.1	0	0	0.002	0.000	Bus2	-0.262	-0.107	15.3	92.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus218	0.155	0.063	9.0	92.6	
								Bus220	0.421	0.178	24.5	92.1	
								Bus222	0.090	0.036	5.2	92.8	
								Bus224	0.109	0.044	6.3	92.6	
								Bus228	0.084	0.034	4.9	92.9	
								Bus149	1.314	0.326	72.5	97.1	
								Bus147	-4.272	-1.517	242.9	94.2	
# Bus149	11.000	97.368	-2.3	0	0	-0.148	-0.051	Bus232	0.106	0.042	6.2	92.9	
								Bus236	0.170	0.070	9.9	92.6	
								Bus242	0.092	0.037	5.4	92.9	
								Bus244	0.107	0.043	6.2	92.9	
								Bus246	0.085	0.033	4.9	93.1	
								Bus248	0.138	0.057	8.0	92.5	
								Bus250	0.109	0.043	6.3	92.9	
								Bus252	0.348	0.146	20.4	92.2	
								Bus266	0.084	0.033	4.9	93.0	
								Bus268	0.140	0.056	8.1	92.9	
								Bus270	0.097	0.038	5.6	93.0	
								Bus272	0.178	0.072	10.3	92.7	
								Bus274	0.115	0.046	6.7	93.0	
								Bus276	0.104	0.041	6.0	93.0	
								Bus290	0.207	0.084	12.0	92.6	
								Bus292	0.376	0.159	22.0	92.1	
								Bus294	0.084	0.033	4.9	93.0	
								Bus296	0.118	0.047	6.9	92.9	
								Bus298	0.088	0.035	5.1	92.9	
								Bus300	0.096	0.038	5.6	92.8	
								Bus314	0.165	0.068	9.6	92.6	
								Bus316	0.137	0.055	7.9	92.9	
								Bus318	0.184	0.074	10.7	92.7	
								Bus320	0.128	0.051	7.4	92.8	
								Bus322	0.089	0.035	5.2	93.1	
								Bus324	0.255	0.106	14.9	92.3	
								Bus338	0.128	0.051	7.4	92.9	
								Bus340	0.100	0.039	5.8	93.1	
								Bus342	0.254	0.105	14.8	92.5	
								Bus345	0.135	0.054	7.8	92.9	
								Bus346	0.146	0.058	8.5	92.9	
								Bus348	0.379	0.165	22.3	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus376	0.377	0.159	22.1	92.1	
								Bus378	0.377	0.159	22.1	92.1	
								Bus382	0.134	0.054	7.8	92.8	
								Bus388	0.114	0.046	6.6	92.7	
								Bus390	0.158	0.064	9.2	92.8	
								Bus148	-1.307	-0.321	72.6	97.1	
								Bus147	-4.650	-2.125	275.6	91.0	
Bus152	11.000	97.831	-2.2	0	0	0.001	0.000	Bus148	-0.206	-0.085	12.0	92.5	
								Bus153	0.205	0.085	11.9	92.4	
Bus153	0.400	96.978	-2.8	0	0	0.204	0.082	Bus152	-0.204	-0.082	327.5	92.8	
Bus156	11.000	97.896	-2.1	0	0	0.001	0.000	Bus148	-0.072	-0.028	4.1	93.0	
								Bus157	0.071	0.029	4.1	92.6	
Bus157	0.400	97.395	-2.5	0	0	0.071	0.028	Bus156	-0.071	-0.028	112.7	92.8	
Bus162	11.000	97.879	-2.2	0	0	0.001	0.000	Bus148	-0.108	-0.044	6.3	92.7	
								Bus163	0.107	0.044	6.2	92.5	
Bus163	0.400	97.117	-2.7	0	0	0.107	0.043	Bus162	-0.107	-0.043	171.0	92.8	
Bus164	11.000	97.895	-2.1	0	0	0.001	0.000	Bus148	-0.074	-0.029	4.3	93.0	
								Bus165	0.073	0.030	4.2	92.6	
Bus165	0.400	97.381	-2.5	0	0	0.072	0.029	Bus164	-0.072	-0.029	115.7	92.8	
Bus170	11.000	97.708	-2.2	0	0	0.001	0.000	Bus148	-0.458	-0.194	26.7	92.1	
								Bus171	0.457	0.195	26.7	92.0	
Bus171	0.400	96.351	-3.5	0	0	0.455	0.182	Bus170	-0.455	-0.182	734.1	92.8	
Bus172	11.000	97.881	-2.1	0	0	0.001	0.000	Bus148	-0.104	-0.042	6.0	92.6	
								Bus173	0.103	0.043	6.0	92.3	
Bus173	0.400	96.707	-3.0	0	0	0.102	0.041	Bus172	-0.102	-0.041	164.2	92.8	
Bus192	11.000	97.749	-2.2	0	0	0.001	0.000	Bus148	-0.375	-0.159	21.9	92.1	
								Bus193	0.374	0.159	21.8	92.0	
Bus193	0.400	96.174	-3.4	0	0	0.371	0.149	Bus192	-0.371	-0.149	600.4	92.8	
Bus194	11.000	97.799	-2.2	0	0	0.001	0.000	Bus148	-0.272	-0.113	15.8	92.3	
								Bus195	0.271	0.113	15.7	92.2	
Bus195	0.400	96.668	-3.1	0	0	0.269	0.108	Bus194	-0.269	-0.108	433.1	92.8	
Bus196	11.000	97.857	-2.2	0	0	0.001	0.000	Bus148	-0.153	-0.062	8.8	92.7	
								Bus197	0.152	0.062	8.8	92.5	
Bus197	0.400	97.228	-2.7	0	0	0.151	0.061	Bus196	-0.151	-0.061	242.1	92.8	
Bus212	11.000	97.867	-2.2	0	0	0.001	0.000	Bus148	-0.132	-0.054	7.6	92.6	
								Bus213	0.131	0.054	7.6	92.4	
Bus213	0.400	96.938	-2.8	0	0	0.130	0.052	Bus212	-0.130	-0.052	208.5	92.8	
Bus214	11.000	97.891	-2.1	0	0	0.001	0.000	Bus148	-0.082	-0.033	4.7	92.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus215	0.081	0.033	4.7	92.6	
Bus215	0.400	97.317	-2.5	0	0	0.081	0.032	Bus214	-0.081	-0.032	129.1	92.8	
Bus216	11.000	97.879	-2.2	0	0	0.001	0.000	Bus148	-0.108	-0.044	6.3	92.7	
								Bus217	0.107	0.044	6.2	92.5	
Bus217	0.400	97.117	-2.7	0	0	0.107	0.043	Bus216	-0.107	-0.043	171.0	92.8	
Bus218	11.000	97.856	-2.2	0	0	0.001	0.000	Bus148	-0.155	-0.064	9.0	92.5	
								Bus219	0.154	0.064	9.0	92.3	
Bus219	0.400	96.757	-2.9	0	0	0.153	0.061	Bus218	-0.153	-0.061	246.2	92.8	
Bus220	11.000	97.727	-2.2	0	0	0.001	0.000	Bus148	-0.421	-0.177	24.5	92.1	
								Bus221	0.420	0.178	24.5	92.1	
Bus221	0.400	96.484	-3.3	0	0	0.418	0.167	Bus220	-0.418	-0.167	673.2	92.8	
Bus222	11.000	97.887	-2.1	0	0	0.001	0.000	Bus148	-0.090	-0.036	5.2	92.7	
								Bus223	0.089	0.037	5.1	92.4	
Bus223	0.400	96.877	-2.9	0	0	0.088	0.035	Bus222	-0.088	-0.035	141.6	92.8	
Bus224	11.000	97.878	-2.1	0	0	0.001	0.000	Bus148	-0.109	-0.045	6.3	92.5	
								Bus225	0.107	0.045	6.2	92.3	
Bus225	0.400	96.650	-3.0	0	0	0.107	0.043	Bus224	-0.107	-0.043	171.8	92.8	
Bus228	11.000	97.890	-2.1	0	0	0.001	0.000	Bus148	-0.084	-0.034	4.9	92.7	
								Bus229	0.083	0.034	4.8	92.4	
Bus229	0.400	96.944	-2.8	0	0	0.083	0.033	Bus228	-0.083	-0.033	132.5	92.8	
Bus232	11.000	97.317	-2.3	0	0	0.002	0.000	Bus149	-0.106	-0.042	6.2	92.8	
								Bus233	0.104	0.043	6.1	92.5	
Bus233	0.400	96.572	-2.9	0	0	0.104	0.042	Bus232	-0.104	-0.042	167.5	92.8	
Bus236	11.000	97.286	-2.3	0	0	0.002	0.000	Bus149	-0.170	-0.070	9.9	92.5	
								Bus237	0.168	0.070	9.8	92.3	
Bus237	0.400	96.078	-3.2	0	0	0.167	0.067	Bus236	-0.167	-0.067	270.5	92.8	
Bus242	11.000	97.324	-2.3	0	0	0.002	0.000	Bus149	-0.092	-0.037	5.4	92.8	
								Bus243	0.091	0.038	5.3	92.4	
Bus243	0.400	96.285	-3.1	0	0	0.090	0.036	Bus242	-0.090	-0.036	145.4	92.8	
Bus244	11.000	97.317	-2.3	0	0	0.002	0.000	Bus149	-0.107	-0.043	6.2	92.8	
								Bus245	0.105	0.043	6.1	92.5	
Bus245	0.400	96.564	-2.9	0	0	0.105	0.042	Bus244	-0.105	-0.042	169.0	92.8	
Bus246	11.000	97.328	-2.3	0	0	0.002	0.000	Bus149	-0.085	-0.033	4.9	93.0	
								Bus247	0.083	0.034	4.8	92.6	
Bus247	0.400	96.737	-2.7	0	0	0.083	0.033	Bus246	-0.083	-0.033	132.9	92.8	
Bus248	11.000	97.302	-2.3	0	0	0.002	0.000	Bus149	-0.138	-0.057	8.0	92.4	
								Bus249	0.136	0.057	7.9	92.1	
Bus249	0.400	95.735	-3.4	0	0	0.135	0.054	Bus248	-0.135	-0.054	218.6	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus250	11.000	97.316	-2.3	0	0	0.002	0.000	Bus149	-0.109	-0.044	6.3	92.8	
								Bus251	0.107	0.044	6.3	92.5	
Bus251	0.400	96.550	-2.9	0	0	0.107	0.043	Bus250	-0.107	-0.043	172.0	92.8	
Bus252	11.000	97.199	-2.4	0	0	0.002	0.000	Bus149	-0.348	-0.146	20.4	92.2	
								Bus253	0.346	0.147	20.3	92.1	
Bus253	0.400	95.737	-3.5	0	0	0.344	0.137	Bus252	-0.344	-0.137	557.8	92.8	
Bus266	11.000	97.328	-2.3	0	0	0.002	0.000	Bus149	-0.084	-0.034	4.9	92.8	
								Bus267	0.082	0.034	4.8	92.4	
Bus267	0.400	96.387	-3.0	0	0	0.082	0.033	Bus266	-0.082	-0.033	131.8	92.8	
Bus268	11.000	97.301	-2.3	0	0	0.002	0.000	Bus149	-0.140	-0.056	8.1	92.8	
								Bus269	0.138	0.056	8.0	92.5	
Bus269	0.400	96.727	-2.8	0	0	0.137	0.055	Bus268	-0.137	-0.055	221.0	92.8	
Bus270	11.000	97.322	-2.3	0	0	0.002	0.000	Bus149	-0.097	-0.039	5.6	92.9	
								Bus271	0.095	0.039	5.5	92.5	
Bus271	0.400	96.643	-2.8	0	0	0.095	0.038	Bus270	-0.095	-0.038	152.4	92.8	
Bus272	11.000	97.283	-2.3	0	0	0.002	0.000	Bus149	-0.178	-0.072	10.4	92.7	
								Bus273	0.176	0.073	10.3	92.5	
Bus273	0.400	96.547	-2.9	0	0	0.176	0.070	Bus272	-0.176	-0.070	282.7	92.8	
Bus274	11.000	97.313	-2.3	0	0	0.002	0.000	Bus149	-0.115	-0.046	6.7	92.9	
								Bus275	0.114	0.046	6.6	92.6	
Bus275	0.400	96.841	-2.7	0	0	0.113	0.045	Bus274	-0.113	-0.045	182.0	92.8	
Bus276	11.000	97.318	-2.3	0	0	0.002	0.000	Bus149	-0.104	-0.041	6.0	92.9	
								Bus277	0.103	0.042	6.0	92.6	
Bus277	0.400	96.734	-2.7	0	0	0.102	0.041	Bus276	-0.102	-0.041	164.2	92.8	
Bus290	11.000	97.269	-2.3	0	0	0.002	0.000	Bus149	-0.207	-0.084	12.1	92.6	
								Bus291	0.205	0.085	12.0	92.4	
Bus291	0.400	96.410	-3.0	0	0	0.204	0.082	Bus290	-0.204	-0.082	329.5	92.8	
Bus292	11.000	97.185	-2.4	0	0	0.002	0.000	Bus149	-0.376	-0.159	22.0	92.1	
								Bus293	0.374	0.159	22.0	92.0	
Bus293	0.400	95.601	-3.6	0	0	0.371	0.149	Bus292	-0.371	-0.149	603.9	92.8	
Bus294	11.000	97.328	-2.3	0	0	0.002	0.000	Bus149	-0.084	-0.034	4.9	92.8	
								Bus295	0.082	0.034	4.8	92.4	
Bus295	0.400	96.387	-3.0	0	0	0.082	0.033	Bus294	-0.082	-0.033	131.8	92.8	
Bus296	11.000	97.311	-2.3	0	0	0.002	0.000	Bus149	-0.118	-0.048	6.9	92.8	
								Bus297	0.117	0.048	6.8	92.5	
Bus297	0.400	96.478	-2.9	0	0	0.116	0.046	Bus296	-0.116	-0.046	187.1	92.8	
Bus298	11.000	97.326	-2.3	0	0	0.002	0.000	Bus149	-0.088	-0.035	5.1	92.8	
								Bus299	0.086	0.036	5.0	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus299	0.400	96.342	-3.0	0	0	0.085	0.034	Bus298	-0.085	-0.034	137.9	92.8	
Bus300	11.000	97.322	-2.3	0	0	0.002	0.000	Bus149	-0.096	-0.039	5.6	92.7	
								Bus301	0.094	0.039	5.5	92.3	
Bus301	0.400	96.240	-3.1	0	0	0.094	0.038	Bus300	-0.094	-0.038	151.5	92.8	
Bus314	11.000	97.289	-2.3	0	0	0.002	0.000	Bus149	-0.165	-0.068	9.6	92.5	
								Bus315	0.164	0.068	9.6	92.3	
Bus315	0.400	96.114	-3.2	0	0	0.163	0.065	Bus314	-0.163	-0.065	262.8	92.8	
Bus316	11.000	97.303	-2.3	0	0	0.002	0.000	Bus149	-0.137	-0.055	7.9	92.8	
								Bus317	0.135	0.055	7.9	92.5	
Bus317	0.400	96.740	-2.8	0	0	0.135	0.054	Bus316	-0.135	-0.054	216.5	92.8	
Bus318	11.000	97.280	-2.3	0	0	0.002	0.000	Bus149	-0.183	-0.075	10.7	92.6	
								Bus319	0.182	0.075	10.6	92.4	
Bus319	0.400	96.521	-2.9	0	0	0.181	0.072	Bus318	-0.181	-0.072	291.7	92.8	
Bus320	11.000	97.307	-2.3	0	0	0.002	0.000	Bus149	-0.128	-0.052	7.4	92.7	
								Bus321	0.126	0.052	7.4	92.4	
Bus321	0.400	96.405	-3.0	0	0	0.125	0.050	Bus320	-0.125	-0.050	202.2	92.8	
Bus322	11.000	97.326	-2.3	0	0	0.002	0.000	Bus149	-0.089	-0.035	5.2	93.0	
								Bus323	0.088	0.036	5.1	92.6	
Bus323	0.400	96.701	-2.8	0	0	0.087	0.035	Bus322	-0.087	-0.035	140.4	92.8	
Bus324	11.000	97.245	-2.3	0	0	0.002	0.000	Bus149	-0.254	-0.106	14.9	92.3	
								Bus325	0.253	0.106	14.8	92.2	
Bus325	0.400	95.788	-3.4	0	0	0.251	0.100	Bus324	-0.251	-0.100	406.9	92.8	
Bus338	11.000	97.307	-2.3	0	0	0.002	0.000	Bus149	-0.128	-0.051	7.5	92.9	
								Bus339	0.127	0.052	7.4	92.6	
Bus339	0.400	96.780	-2.8	0	0	0.126	0.051	Bus338	-0.126	-0.051	203.0	92.8	
Bus340	11.000	97.320	-2.3	0	0	0.002	0.000	Bus149	-0.100	-0.040	5.8	93.0	
								Bus341	0.099	0.040	5.7	92.6	
Bus341	0.400	96.910	-2.7	0	0	0.099	0.039	Bus340	-0.099	-0.039	158.0	92.8	
Bus342	11.000	97.245	-2.3	0	0	0.002	0.000	Bus149	-0.254	-0.105	14.8	92.5	
								Bus343	0.252	0.105	14.7	92.3	
Bus343	0.400	96.095	-3.2	0	0	0.251	0.100	Bus342	-0.251	-0.100	405.6	92.8	
Bus344	0.400	96.702	-2.8	0	0	0.132	0.053	Bus345	-0.132	-0.053	212.9	92.8	
Bus345	11.000	97.304	-2.3	0	0	0.002	0.000	Bus149	-0.135	-0.054	7.8	92.9	
								Bus344	0.133	0.054	7.7	92.6	
Bus346	11.000	97.298	-2.3	0	0	0.002	0.000	Bus149	-0.146	-0.059	8.5	92.8	
								Bus347	0.144	0.059	8.4	92.5	
Bus347	0.400	96.644	-2.8	0	0	0.144	0.058	Bus346	-0.144	-0.058	231.6	92.8	
Bus348	11.000	97.182	-2.4	0	0	0.002	0.000	Bus149	-0.379	-0.165	22.3	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus349	0.377	0.166	22.2	91.5	
Bus349	0.400	94.419	-4.3	0	0	0.371	0.149	Bus348	-0.371	-0.149	611.4	92.8	
Bus376	11.000	97.185	-2.4	0	0	0.002	0.000	Bus149	-0.377	-0.159	22.1	92.1	
								Bus377	0.375	0.159	22.0	92.0	
Bus377	0.400	95.463	-3.6	0	0	0.371	0.149	Bus376	-0.371	-0.149	604.8	92.8	
Bus378	11.000	97.185	-2.4	0	0	0.002	0.000	Bus149	-0.377	-0.159	22.1	92.1	
								Bus379	0.375	0.159	22.0	92.0	
Bus379	0.400	95.463	-3.6	0	0	0.371	0.149	Bus378	-0.371	-0.149	604.8	92.8	
Bus382	11.000	97.304	-2.3	0	0	0.002	0.000	Bus149	-0.134	-0.054	7.8	92.7	
								Bus383	0.133	0.055	7.7	92.4	
Bus383	0.400	96.355	-3.0	0	0	0.132	0.053	Bus382	-0.132	-0.053	212.8	92.8	
Bus388	11.000	97.313	-2.3	0	0	0.002	0.000	Bus149	-0.114	-0.047	6.6	92.6	
								Bus389	0.112	0.047	6.6	92.2	
Bus389	0.400	96.023	-3.2	0	0	0.111	0.045	Bus388	-0.111	-0.045	180.4	92.8	
Bus390	11.000	97.292	-2.3	0	0	0.002	0.000	Bus149	-0.158	-0.064	9.2	92.7	
								Bus391	0.157	0.064	9.1	92.5	
Bus391	0.400	96.582	-2.8	0	0	0.156	0.062	Bus390	-0.156	-0.062	251.2	92.8	
Bus416	11.000	97.289	-3.1	0	0	-0.004	0.001	Bus613	-0.099	-0.045	5.9	91.0	
								Bus417	0.103	0.044	6.1	92.0	
Bus417	0.400	95.421	-4.4	0	0	0.102	0.041	Bus416	-0.102	-0.041	166.4	92.8	
Bus418	0.400	95.959	-4.1	0	0	0.074	0.030	Bus419	-0.074	-0.030	120.2	92.8	
Bus419	11.000	97.303	-3.1	0	0	-0.004	0.001	Bus613	-0.070	-0.032	4.2	90.8	
								Bus418	0.075	0.031	4.4	92.2	
Bus420	11.000	97.152	-3.1	0	0	-0.005	0.001	Bus613	-0.379	-0.165	22.3	91.7	
								Bus421	0.384	0.164	22.5	92.0	
Bus421	0.400	95.526	-4.4	0	0	0.381	0.152	Bus420	-0.381	-0.152	619.5	92.8	
Bus422	0.400	95.344	-4.6	0	0	0.417	0.167	Bus423	-0.417	-0.167	680.4	92.8	
Bus423	11.000	97.133	-3.2	0	0	-0.004	0.001	Bus613	-0.417	-0.182	24.6	91.7	
								Bus422	0.421	0.181	24.7	91.9	
Bus424	11.000	97.288	-3.1	0	0	-0.004	0.001	Bus613	-0.103	-0.045	6.1	91.6	
								Bus425	0.107	0.044	6.3	92.5	
Bus425	0.400	96.521	-3.7	0	0	0.107	0.043	Bus424	-0.107	-0.043	172.1	92.8	
Bus426	0.400	96.604	-3.7	0	0	0.157	0.063	Bus427	-0.157	-0.063	253.4	92.8	
Bus427	11.000	97.263	-3.1	0	0	-0.004	0.001	Bus613	-0.154	-0.066	9.0	91.9	
								Bus426	0.158	0.065	9.2	92.5	
Bus428	11.000	97.296	-3.1	0	0	-0.004	0.001	Bus613	-0.085	-0.038	5.0	91.4	
								Bus429	0.090	0.037	5.2	92.6	
Bus429	0.400	96.658	-3.6	0	0	0.089	0.036	Bus428	-0.089	-0.036	143.5	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus430	11.000	97.292	-3.1	0	0	-0.004	0.001	Bus613	-0.094	-0.042	5.5	91.3	
								Bus431	0.098	0.041	5.7	92.3	
Bus431	0.400	96.165	-3.9	0	0	0.098	0.039	Bus430	-0.098	-0.039	157.6	92.8	
Bus432	11.000	97.289	-3.1	0	0	-0.004	0.001	Bus613	-0.098	-0.044	5.8	91.3	
								Bus433	0.103	0.043	6.0	92.3	
Bus433	0.400	96.108	-3.9	0	0	0.102	0.041	Bus432	-0.102	-0.041	165.2	92.8	
Bus434	11.000	97.296	-3.1	0	0	-0.004	0.001	Bus613	-0.084	-0.038	5.0	91.2	
								Bus435	0.089	0.037	5.2	92.4	
Bus435	0.400	96.279	-3.8	0	0	0.088	0.035	Bus434	-0.088	-0.035	142.5	92.8	
Bus436	11.000	97.158	-3.1	0	0	-0.005	0.001	Bus613	-0.368	-0.158	21.7	91.9	
								Bus437	0.373	0.157	21.9	92.2	
Bus437	0.400	96.050	-4.2	0	0	0.371	0.149	Bus436	-0.371	-0.149	601.2	92.8	
Bus438	11.000	97.267	-3.1	0	0	-0.004	0.001	Bus613	-0.145	-0.063	8.5	91.7	
								Bus439	0.149	0.062	8.7	92.4	
Bus439	0.400	96.195	-3.9	0	0	0.149	0.059	Bus438	-0.149	-0.059	240.2	92.8	
Bus450	11.000	97.276	-3.1	0	0	-0.004	0.001	Bus613	-0.126	-0.055	7.4	91.7	
								Bus451	0.131	0.054	7.6	92.4	
Bus451	0.400	96.340	-3.8	0	0	0.130	0.052	Bus450	-0.130	-0.052	209.8	92.8	
Bus452	11.000	97.175	-3.1	0	0	-0.005	0.001	Bus613	-0.332	-0.143	19.6	91.8	
								Bus453	0.337	0.142	19.8	92.1	
Bus453	0.400	95.630	-4.2	0	0	0.334	0.134	Bus452	-0.334	-0.134	543.4	92.8	
Bus454	11.000	97.250	-3.1	0	0	-0.005	0.001	Bus613	-0.180	-0.077	10.6	91.9	
								Bus455	0.185	0.076	10.8	92.4	
Bus455	0.400	96.479	-3.8	0	0	0.184	0.074	Bus454	-0.184	-0.074	296.4	92.8	
Bus456	11.000	97.198	-3.1	0	0	-0.005	0.001	Bus613	-0.287	-0.123	16.9	91.9	
								Bus457	0.291	0.122	17.1	92.2	
Bus457	0.400	95.970	-4.1	0	0	0.290	0.116	Bus456	-0.290	-0.116	469.3	92.8	
Bus458	11.000	97.242	-3.1	0	0	-0.005	0.001	Bus613	-0.196	-0.084	11.5	91.9	
								Bus459	0.200	0.083	11.7	92.4	
Bus459	0.400	96.403	-3.8	0	0	0.200	0.080	Bus458	-0.200	-0.080	322.0	92.8	
Bus462	11.000	97.128	-3.2	0	0	-0.005	0.001	Bus613	-0.427	-0.187	25.2	91.6	
								Bus463	0.432	0.186	25.4	91.9	
Bus463	0.400	95.290	-4.6	0	0	0.428	0.171	Bus462	-0.428	-0.171	698.9	92.8	
Bus466	11.000	97.246	-3.1	0	0	-0.005	0.001	Bus613	-0.188	-0.081	11.1	91.9	
								Bus467	0.193	0.080	11.3	92.4	
Bus467	0.400	96.438	-3.8	0	0	0.192	0.077	Bus466	-0.192	-0.077	310.1	92.8	
Bus494	11.000	97.240	-3.1	0	0	-0.005	0.001	Bus613	-0.201	-0.086	11.8	91.9	
								Bus495	0.205	0.085	12.0	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus495	0.400	96.381	-3.8	0	0	0.204	0.082	Bus494	-0.204	-0.082	329.6	92.8	
Bus496	11.000	97.247	-3.1	0	0	-0.005	0.001	Bus613	-0.187	-0.080	11.0	91.9	
								Bus497	0.191	0.079	11.2	92.4	
Bus497	0.400	96.448	-3.8	0	0	0.190	0.076	Bus496	-0.190	-0.076	306.9	92.8	
Bus498	11.000	97.274	-3.1	0	0	-0.004	0.001	Bus613	-0.131	-0.057	7.7	91.7	
								Bus499	0.135	0.056	7.9	92.4	
Bus499	0.400	96.304	-3.8	0	0	0.135	0.054	Bus498	-0.135	-0.054	217.4	92.8	
Bus500	11.000	97.253	-3.1	0	0	-0.005	0.001	Bus613	-0.173	-0.074	10.2	91.9	
								Bus501	0.178	0.073	10.4	92.5	
Bus501	0.400	96.509	-3.7	0	0	0.177	0.071	Bus500	-0.177	-0.071	285.8	92.8	
Bus502	11.000	97.161	-3.1	0	0	-0.005	0.001	Bus613	-0.360	-0.156	21.2	91.8	
								Bus503	0.365	0.155	21.4	92.0	
Bus503	0.400	95.617	-4.4	0	0	0.362	0.145	Bus502	-0.362	-0.145	588.8	92.8	
Bus504	11.000	97.288	-3.1	0	0	-0.004	0.001	Bus613	-0.103	-0.045	6.1	91.6	
								Bus505	0.107	0.044	6.3	92.5	
Bus505	0.400	96.521	-3.7	0	0	0.107	0.043	Bus504	-0.107	-0.043	172.1	92.8	
Bus506	11.000	97.204	-3.1	0	0	-0.005	0.001	Bus613	-0.274	-0.118	16.1	91.9	
								Bus507	0.278	0.117	16.3	92.2	
Bus507	0.400	96.033	-4.1	0	0	0.277	0.111	Bus506	-0.277	-0.111	448.0	92.8	
Bus508	11.000	97.217	-3.1	0	0	-0.005	0.001	Bus613	-0.247	-0.106	14.5	91.9	
								Bus509	0.252	0.105	14.7	92.3	
Bus509	0.400	96.159	-4.0	0	0	0.251	0.100	Bus508	-0.251	-0.100	405.4	92.8	
Bus510	11.000	97.278	-3.1	0	0	-0.004	0.001	Bus613	-0.122	-0.053	7.2	91.6	
								Bus511	0.126	0.052	7.4	92.4	
Bus511	0.400	96.377	-3.8	0	0	0.125	0.050	Bus510	-0.125	-0.050	202.3	92.8	
Bus512	11.000	97.274	-3.1	0	0	-0.005	0.001	Bus613	-0.130	-0.056	7.7	91.8	
								Bus513	0.135	0.055	7.9	92.5	
Bus513	0.400	96.712	-3.6	0	0	0.135	0.054	Bus512	-0.135	-0.054	216.6	92.8	
Bus514	11.000	97.253	-3.1	0	0	-0.004	0.001	Bus613	-0.173	-0.075	10.2	91.7	
								Bus515	0.178	0.074	10.4	92.3	
Bus515	0.400	95.975	-4.0	0	0	0.176	0.071	Bus514	-0.176	-0.071	285.8	92.8	
Bus516	11.000	97.259	-3.1	0	0	-0.005	0.001	Bus613	-0.161	-0.069	9.5	91.9	
								Bus517	0.166	0.068	9.7	92.5	
Bus517	0.400	96.567	-3.7	0	0	0.165	0.066	Bus516	-0.165	-0.066	266.2	92.8	
Bus518	11.000	97.297	-3.1	0	0	-0.004	0.001	Bus613	-0.082	-0.037	4.9	91.2	
								Bus519	0.087	0.036	5.1	92.4	
Bus519	0.400	96.306	-3.8	0	0	0.086	0.034	Bus518	-0.086	-0.034	138.9	92.8	
Bus548	11.000	97.295	-3.1	0	0	-0.004	0.001	Bus613	-0.086	-0.040	5.1	90.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus549	0.091	0.038	5.3	92.1	
Bus549	0.400	95.655	-4.3	0	0	0.090	0.036	Bus548	-0.090	-0.036	146.4	92.8	
Bus550	11.000	97.171	-3.1	0	0	-0.005	0.001	Bus613	-0.341	-0.148	20.1	91.8	
								Bus551	0.346	0.147	20.3	92.1	
Bus551	0.400	95.708	-4.3	0	0	0.344	0.137	Bus550	-0.344	-0.137	558.1	92.8	
Bus552	11.000	97.273	-3.1	0	0	-0.004	0.001	Bus613	-0.131	-0.058	7.8	91.4	
								Bus553	0.136	0.057	8.0	92.1	
Bus553	0.400	95.706	-4.2	0	0	0.135	0.054	Bus552	-0.135	-0.054	218.7	92.8	
Bus554	11.000	97.249	-3.1	0	0	-0.005	0.001	Bus613	-0.183	-0.078	10.7	91.9	
								Bus555	0.187	0.077	10.9	92.4	
Bus555	0.400	96.465	-3.8	0	0	0.187	0.075	Bus554	-0.187	-0.075	300.9	92.8	
Bus556	11.000	97.290	-3.1	0	0	-0.004	0.001	Bus613	-0.098	-0.043	5.8	91.5	
								Bus557	0.103	0.042	6.0	92.5	
Bus557	0.400	96.557	-3.6	0	0	0.102	0.041	Bus556	-0.102	-0.041	164.5	92.8	
Bus558	11.000	97.287	-3.1	0	0	-0.004	0.001	Bus613	-0.103	-0.046	6.1	91.3	
								Bus559	0.108	0.045	6.3	92.3	
Bus559	0.400	96.051	-4.0	0	0	0.107	0.043	Bus558	-0.107	-0.043	172.9	92.8	
Bus560	11.000	97.289	-3.1	0	0	-0.004	0.001	Bus613	-0.098	-0.044	5.8	91.3	
								Bus561	0.103	0.043	6.0	92.3	
Bus561	0.400	96.108	-3.9	0	0	0.102	0.041	Bus560	-0.102	-0.041	165.2	92.8	
Bus562	11.000	97.217	-3.1	0	0	-0.005	0.001	Bus613	-0.247	-0.106	14.5	91.9	
								Bus563	0.252	0.105	14.7	92.3	
Bus563	0.400	96.159	-4.0	0	0	0.251	0.100	Bus562	-0.251	-0.100	405.4	92.8	
Bus564	11.000	97.278	-3.1	0	0	-0.004	0.001	Bus613	-0.122	-0.053	7.2	91.6	
								Bus565	0.126	0.052	7.4	92.4	
Bus565	0.400	96.377	-3.8	0	0	0.125	0.050	Bus564	-0.125	-0.050	202.3	92.8	
Bus566	11.000	97.256	-3.1	0	0	-0.005	0.001	Bus613	-0.168	-0.072	9.9	91.9	
								Bus567	0.172	0.071	10.1	92.5	
Bus567	0.400	96.536	-3.7	0	0	0.172	0.069	Bus566	-0.172	-0.069	276.8	92.8	
Bus568	11.000	97.121	-3.2	0	0	-0.005	0.001	Bus613	-0.443	-0.192	26.1	91.8	
								Bus569	0.448	0.191	26.3	92.0	
Bus569	0.400	95.784	-4.4	0	0	0.446	0.178	Bus568	-0.446	-0.178	723.4	92.8	
Bus570	11.000	97.259	-3.1	0	0	-0.004	0.001	Bus613	-0.161	-0.070	9.5	91.7	
								Bus571	0.165	0.069	9.7	92.3	
Bus571	0.400	96.071	-4.0	0	0	0.164	0.066	Bus570	-0.164	-0.066	266.0	92.8	
Bus572	11.000	97.286	-3.1	0	0	-0.004	0.001	Bus613	-0.106	-0.046	6.2	91.6	
								Bus573	0.110	0.045	6.4	92.5	
Bus573	0.400	96.497	-3.7	0	0	0.110	0.044	Bus572	-0.110	-0.044	177.1	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus574	11.000	97.246	-3.1	0	0	-0.005	0.001	Bus613	-0.188	-0.081	11.1	91.9	
								Bus575	0.193	0.080	11.3	92.4	
Bus575	0.400	96.438	-3.8	0	0	0.192	0.077	Bus574	-0.192	-0.077	310.1	92.8	
Bus590	11.000	97.300	-3.1	0	0	-0.004	0.001	Bus613	-0.077	-0.035	4.6	90.9	
								Bus591	0.081	0.034	4.8	92.2	
Bus591	0.400	95.833	-4.1	0	0	0.081	0.032	Bus590	-0.081	-0.032	131.1	92.8	
Bus592	11.000	97.245	-3.1	0	0	-0.005	0.001	Bus613	-0.191	-0.082	11.2	91.9	
								Bus593	0.196	0.081	11.4	92.4	
Bus593	0.400	96.426	-3.8	0	0	0.195	0.078	Bus592	-0.195	-0.078	314.5	92.8	
Bus594	0.400	95.344	-4.6	0	0	0.417	0.167	Bus595	-0.417	-0.167	680.4	92.8	
Bus595	11.000	97.133	-3.2	0	0	-0.004	0.001	Bus613	-0.417	-0.182	24.6	91.7	
								Bus594	0.421	0.181	24.7	91.9	
Bus596	0.400	96.342	-3.8	0	0	0.130	0.052	Bus597	-0.130	-0.052	209.3	92.8	
Bus597	11.000	97.276	-3.1	0	0	-0.004	0.001	Bus613	-0.126	-0.055	7.4	91.7	
								Bus596	0.130	0.054	7.6	92.4	
Bus598	11.000	97.185	-3.1	0	0	-0.005	0.001	Bus613	-0.313	-0.135	18.4	91.8	
								Bus599	0.318	0.134	18.6	92.1	
Bus599	0.400	95.844	-4.2	0	0	0.316	0.126	Bus598	-0.316	-0.126	512.1	92.8	
Bus600	0.400	96.525	-3.7	0	0	0.174	0.070	Bus601	-0.174	-0.070	280.5	92.8	
Bus601	11.000	97.255	-3.1	0	0	-0.004	0.001	Bus613	-0.171	-0.073	10.0	91.9	
								Bus600	0.175	0.072	10.2	92.5	
Bus602	0.400	96.051	-4.0	0	0	0.167	0.067	Bus603	-0.167	-0.067	270.1	92.8	
Bus603	11.000	97.258	-3.1	0	0	-0.004	0.001	Bus613	-0.164	-0.071	9.6	91.7	
								Bus602	0.168	0.070	9.8	92.3	
Bus608	11.000	97.286	-3.1	0	0	-0.004	0.001	Bus613	-0.106	-0.046	6.2	91.6	
								Bus609	0.110	0.045	6.4	92.5	
Bus609	0.400	96.497	-3.7	0	0	0.110	0.044	Bus608	-0.110	-0.044	177.1	92.8	
Bus610	11.000	97.286	-3.1	0	0	-0.004	0.001	Bus613	-0.106	-0.046	6.2	91.6	
								Bus611	0.110	0.045	6.4	92.5	
Bus611	0.400	96.497	-3.7	0	0	0.110	0.044	Bus610	-0.110	-0.044	177.1	92.8	
# Bus612	33.000	99.382	-0.2	0	0	0.084	-0.202	Bus1	-12.340	-4.191	229.4	94.7	
								Bus613	6.128	2.197	114.6	94.1	
								Bus613	6.128	2.197	114.6	94.1	
# Bus613	11.000	97.338	-3.1	0	0	0.059	-1.539	Bus416	0.099	0.045	5.8	91.1	
								Bus419	0.070	0.032	4.2	91.0	
								Bus420	0.380	0.165	22.3	91.7	
								Bus423	0.418	0.182	24.6	91.7	
								Bus424	0.103	0.045	6.0	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus427	0.154	0.066	9.0	92.0	
								Bus428	0.085	0.037	5.0	91.6	
								Bus430	0.094	0.042	5.5	91.4	
								Bus432	0.098	0.044	5.8	91.4	
								Bus434	0.084	0.037	5.0	91.4	
								Bus436	0.369	0.158	21.6	91.9	
								Bus438	0.145	0.063	8.5	91.8	
								Bus450	0.126	0.055	7.4	91.7	
								Bus452	0.333	0.143	19.5	91.8	
								Bus454	0.180	0.077	10.6	92.0	
								Bus456	0.287	0.123	16.9	91.9	
								Bus458	0.196	0.084	11.5	92.0	
								Bus462	0.428	0.187	25.2	91.6	
								Bus466	0.189	0.081	11.1	92.0	
								Bus494	0.201	0.086	11.8	92.0	
								Bus496	0.187	0.080	10.9	92.0	
								Bus498	0.131	0.057	7.7	91.8	
								Bus500	0.174	0.074	10.2	92.0	
								Bus502	0.361	0.156	21.2	91.8	
								Bus504	0.103	0.045	6.0	91.7	
								Bus506	0.274	0.118	16.1	91.9	
								Bus508	0.248	0.106	14.5	91.9	
								Bus510	0.122	0.053	7.1	91.7	
								Bus512	0.131	0.056	7.7	91.9	
								Bus514	0.173	0.075	10.2	91.8	
								Bus516	0.161	0.069	9.5	92.0	
								Bus518	0.082	0.037	4.8	91.4	
								Bus548	0.087	0.039	5.1	91.1	
								Bus550	0.342	0.148	20.1	91.8	
								Bus552	0.131	0.058	7.7	91.5	
								Bus554	0.183	0.078	10.7	92.0	
								Bus556	0.098	0.043	5.8	91.7	
								Bus558	0.103	0.046	6.1	91.5	
								Bus560	0.098	0.044	5.8	91.4	
								Bus562	0.248	0.106	14.5	91.9	
								Bus564	0.122	0.053	7.1	91.7	
								Bus566	0.168	0.072	9.8	92.0	
								Bus568	0.444	0.192	26.1	91.8	
								Bus570	0.161	0.070	9.5	91.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus572	0.106	0.046	6.2	91.7	
								Bus574	0.189	0.081	11.1	92.0	
								Bus590	0.077	0.035	4.6	91.1	
								Bus592	0.191	0.082	11.2	92.0	
								Bus595	0.418	0.182	24.6	91.7	
								Bus597	0.126	0.055	7.4	91.8	
								Bus598	0.314	0.135	18.4	91.8	
								Bus601	0.171	0.073	10.0	92.0	
								Bus603	0.164	0.071	9.6	91.8	
								Bus608	0.106	0.046	6.2	91.7	
								Bus610	0.106	0.046	6.2	91.7	
								Bus632	0.180	0.074	10.5	92.5	
								Bus634	0.140	0.056	8.1	92.8	
								Bus636	0.263	0.109	15.4	92.4	
								Bus638	0.132	0.053	7.7	92.8	
								Bus640	0.193	0.078	11.2	92.7	
								Bus642	0.287	0.119	16.7	92.4	
								Bus644	0.182	0.073	10.6	92.7	
								Bus646	0.267	0.113	15.6	92.1	
								Bus648	0.171	0.069	9.9	92.8	
								Bus612	-6.105	-1.839	343.8	95.7	
								Bus612	-6.105	-1.839	343.8	95.7	
Bus632	11.000	97.251	-3.1	0	0	0.002	-0.001	Bus613	-0.180	-0.074	10.5	92.5	
								Bus633	0.179	0.075	10.4	92.3	
Bus633	0.400	95.966	-4.0	0	0	0.177	0.071	Bus632	-0.177	-0.071	287.3	92.8	
Bus634	11.000	97.271	-3.1	0	0	0.002	-0.001	Bus613	-0.140	-0.057	8.1	92.7	
								Bus635	0.138	0.057	8.1	92.4	
Bus635	0.400	96.281	-3.8	0	0	0.137	0.055	Bus634	-0.137	-0.055	222.0	92.8	
Bus636	11.000	97.211	-3.1	0	0	0.002	-0.001	Bus613	-0.263	-0.109	15.4	92.4	
								Bus637	0.261	0.109	15.3	92.3	
Bus637	0.400	96.112	-4.0	0	0	0.260	0.104	Bus636	-0.260	-0.104	420.6	92.8	
Bus638	11.000	97.274	-3.1	0	0	0.002	-0.001	Bus613	-0.132	-0.053	7.7	92.7	
								Bus639	0.131	0.054	7.6	92.4	
Bus639	0.400	96.339	-3.8	0	0	0.130	0.052	Bus638	-0.130	-0.052	209.8	92.8	
Bus640	11.000	97.245	-3.1	0	0	0.002	-0.001	Bus613	-0.193	-0.078	11.2	92.6	
								Bus641	0.191	0.079	11.2	92.4	
Bus641	0.400	96.446	-3.8	0	0	0.190	0.076	Bus640	-0.190	-0.076	306.9	92.8	
Bus642	11.000	97.199	-3.1	0	0	0.002	-0.001	Bus613	-0.286	-0.119	16.7	92.4	
								Bus643	0.285	0.120	16.7	92.2	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus643	0.400	96.000	-4.1	0	0	0.283	0.113	Bus642	-0.283	-0.113	458.7	92.8	
Bus644	11.000	97.251	-3.1	0	0	0.002	-0.001	Bus613	-0.181	-0.074	10.6	92.7	
								Bus645	0.180	0.074	10.5	92.5	
Bus645	0.400	96.499	-3.7	0	0	0.179	0.072	Bus644	-0.179	-0.072	288.8	92.8	
Bus646	11.000	97.208	-3.1	0	0	0.002	-0.001	Bus613	-0.267	-0.113	15.6	92.1	
								Bus647	0.265	0.113	15.6	92.0	
Bus647	0.400	95.285	-4.5	0	0	0.263	0.105	Bus646	-0.263	-0.105	428.3	92.8	
Bus648	11.000	97.256	-3.1	0	0	0.002	-0.001	Bus613	-0.171	-0.069	9.9	92.7	
								Bus649	0.169	0.070	9.9	92.5	
Bus649	0.400	96.550	-3.7	0	0	0.169	0.067	Bus648	-0.169	-0.067	271.5	92.8	
# Bus650	33.000	99.262	-0.1	0	0	0.060	-0.082	Bus1	-13.810	-5.994	265.3	91.7	
								Bus1064	11.012	4.189	207.7	93.5	
								Bus651	2.737	1.887	58.6	82.3	
# Bus651	11.000	96.301	-2.4	0	0	-0.115	-0.053	Bus720	0.115	0.070	7.3	85.3	
								Bus722	0.069	0.042	4.4	85.7	
								Bus728	0.141	0.088	9.1	85.0	
								Bus732	0.161	0.099	10.3	85.1	
								Bus736	0.169	0.105	10.8	85.0	
								Bus740	0.105	0.064	6.7	85.4	
								Bus744	0.238	0.149	15.3	84.6	
								Bus748	0.140	0.087	9.0	85.0	
								Bus756	0.206	0.138	13.5	83.0	
								Bus758	0.263	0.166	16.9	84.5	
								Bus760	0.163	0.101	10.4	85.1	
								Bus776	0.141	0.089	9.1	84.6	
								Bus778	0.146	0.090	9.3	85.0	
								Bus780	0.144	0.088	9.2	85.2	
								Bus782	0.169	0.107	10.9	84.3	
								Bus784	0.208	0.130	13.4	84.8	
								Bus788	0.263	0.166	16.9	84.5	
								Bus650	-2.724	-1.727	175.8	84.5	
Bus720	11.000	96.237	-2.4	0	0	0.003	0.000	Bus651	-0.114	-0.071	7.3	85.1	
								Bus721	0.112	0.071	7.2	84.5	
Bus721	0.400	95.186	-2.9	0	0	0.111	0.069	Bus720	-0.111	-0.069	198.0	85.0	
Bus722	11.000	96.263	-2.4	0	0	0.003	0.000	Bus651	-0.069	-0.042	4.4	85.6	
								Bus723	0.066	0.042	4.3	84.5	
Bus723	0.400	95.265	-2.9	0	0	0.066	0.041	Bus722	-0.066	-0.041	117.5	85.0	
Bus728	11.000	96.222	-2.4	0	0	0.003	0.000	Bus651	-0.141	-0.088	9.1	84.9	
								Bus729	0.138	0.088	8.9	84.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus729	0.400	94.915	-3.0	0	0	0.137	0.085	Bus728	-0.137	-0.085	246.0	85.0	
Bus732	11.000	96.212	-2.4	0	0	0.003	0.000	Bus651	-0.160	-0.099	10.3	85.0	
								Bus733	0.158	0.100	10.2	84.5	
Bus733	0.400	95.323	-2.9	0	0	0.157	0.097	Bus732	-0.157	-0.097	279.6	85.0	
Bus736	11.000	96.207	-2.4	0	0	0.003	0.000	Bus651	-0.169	-0.105	10.8	84.9	
								Bus737	0.166	0.105	10.7	84.5	
Bus737	0.400	95.271	-2.9	0	0	0.165	0.102	Bus736	-0.165	-0.102	294.6	85.0	
Bus740	11.000	96.242	-2.4	0	0	0.003	0.000	Bus651	-0.105	-0.065	6.7	85.2	
								Bus741	0.102	0.065	6.6	84.5	
Bus741	0.400	95.279	-2.8	0	0	0.102	0.063	Bus740	-0.102	-0.063	181.5	85.0	
Bus744	11.000	96.168	-2.4	0	0	0.003	0.000	Bus651	-0.237	-0.150	15.3	84.6	
								Bus745	0.234	0.150	15.2	84.3	
Bus745	0.400	94.838	-3.1	0	0	0.233	0.145	Bus744	-0.233	-0.145	417.6	85.0	
Bus748	11.000	96.223	-2.4	0	0	0.003	0.000	Bus651	-0.140	-0.087	9.0	84.9	
								Bus749	0.137	0.087	8.8	84.4	
Bus749	0.400	94.932	-3.0	0	0	0.136	0.084	Bus748	-0.136	-0.084	243.0	85.0	
Bus756	11.000	96.183	-2.4	0	0	0.003	0.000	Bus651	-0.206	-0.139	13.6	83.0	
								Bus757	0.203	0.139	13.4	82.6	
Bus757	0.400	93.330	-4.9	0	0	0.203	0.126	Bus756	-0.203	-0.126	368.9	85.0	
Bus758	11.000	96.154	-2.4	0	0	0.003	0.000	Bus651	-0.262	-0.166	17.0	84.5	
								Bus759	0.260	0.166	16.8	84.2	
Bus759	0.400	94.679	-3.2	0	0	0.258	0.160	Bus758	-0.258	-0.160	462.8	85.0	
Bus760	11.000	96.210	-2.4	0	0	0.003	0.000	Bus651	-0.163	-0.101	10.5	85.0	
								Bus761	0.160	0.101	10.3	84.5	
Bus761	0.400	95.308	-2.9	0	0	0.159	0.099	Bus760	-0.159	-0.099	284.1	85.0	
Bus776	11.000	96.222	-2.4	0	0	0.003	0.000	Bus651	-0.141	-0.089	9.1	84.5	
								Bus777	0.138	0.089	8.9	84.0	
Bus777	0.400	94.127	-3.4	0	0	0.136	0.084	Bus776	-0.136	-0.084	245.7	85.0	
Bus778	11.000	96.220	-2.4	0	0	0.003	0.000	Bus651	-0.146	-0.091	9.4	84.9	
								Bus779	0.143	0.091	9.2	84.4	
Bus779	0.400	94.873	-3.0	0	0	0.142	0.088	Bus778	-0.142	-0.088	253.5	85.0	
Bus780	11.000	96.221	-2.4	0	0	0.003	0.000	Bus651	-0.144	-0.089	9.2	85.1	
								Bus781	0.141	0.089	9.1	84.6	
Bus781	0.400	95.428	-2.8	0	0	0.140	0.087	Bus780	-0.140	-0.087	249.7	85.0	
Bus782	11.000	96.206	-2.4	0	0	0.003	0.000	Bus651	-0.168	-0.108	10.9	84.3	
								Bus783	0.165	0.108	10.8	83.8	
Bus783	0.400	93.678	-3.6	0	0	0.163	0.101	Bus782	-0.163	-0.101	296.0	85.0	
Bus784	11.000	96.185	-2.4	0	0	0.003	0.000	Bus651	-0.208	-0.130	13.4	84.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus785	0.205	0.131	13.3	84.4	
Bus785	0.400	95.023	-3.0	0	0	0.204	0.127	Bus784	-0.204	-0.127	365.0	85.0	
Bus788	11.000	96.154	-2.4	0	0	0.003	0.000	Bus651	-0.262	-0.166	17.0	84.5	
								Bus789	0.260	0.166	16.8	84.2	
Bus789	0.400	94.679	-3.2	0	0	0.258	0.160	Bus788	-0.258	-0.160	462.8	85.0	
Bus798	11.000	96.643	-2.9	0	0	-0.006	0.001	Bus1065	-0.106	-0.047	6.3	91.3	
								Bus799	0.112	0.046	6.6	92.5	
Bus799	0.400	95.837	-3.5	0	0	0.111	0.045	Bus798	-0.111	-0.045	180.8	92.8	
Bus800	0.400	95.882	-3.5	0	0	0.173	0.069	Bus801	-0.173	-0.069	280.5	92.8	
Bus801	11.000	96.613	-2.9	0	0	-0.006	0.001	Bus1065	-0.168	-0.073	9.9	91.7	
								Bus800	0.174	0.072	10.2	92.5	
Bus802	0.400	95.746	-3.6	0	0	0.123	0.049	Bus803	-0.123	-0.049	199.9	92.8	
Bus803	11.000	96.637	-2.9	0	0	-0.006	0.001	Bus1065	-0.118	-0.052	7.0	91.4	
								Bus802	0.124	0.051	7.3	92.4	
Bus804	0.400	95.876	-3.5	0	0	0.106	0.043	Bus805	-0.106	-0.043	172.5	92.8	
Bus805	11.000	96.645	-2.9	0	0	-0.006	0.001	Bus1065	-0.101	-0.045	6.0	91.2	
								Bus804	0.107	0.044	6.3	92.5	
Bus838	11.000	96.638	-2.9	0	0	-0.006	0.001	Bus1065	-0.115	-0.051	6.8	91.3	
								Bus839	0.121	0.050	7.1	92.4	
Bus839	0.400	95.765	-3.6	0	0	0.121	0.048	Bus838	-0.121	-0.048	196.0	92.8	
Bus840	11.000	96.595	-2.9	0	0	-0.006	0.001	Bus1065	-0.203	-0.088	12.0	91.7	
								Bus841	0.210	0.087	12.3	92.4	
Bus841	0.400	95.710	-3.7	0	0	0.209	0.084	Bus840	-0.209	-0.084	339.4	92.8	
Bus842	11.000	96.610	-2.9	0	0	-0.006	0.001	Bus1065	-0.174	-0.075	10.3	91.7	
								Bus843	0.180	0.074	10.6	92.4	
Bus843	0.400	95.853	-3.6	0	0	0.179	0.072	Bus842	-0.179	-0.072	290.7	92.8	
Bus844	11.000	96.600	-2.9	0	0	-0.006	0.001	Bus1065	-0.194	-0.084	11.5	91.7	
								Bus845	0.200	0.083	11.8	92.4	
Bus845	0.400	95.755	-3.6	0	0	0.200	0.080	Bus844	-0.200	-0.080	324.2	92.8	
Bus846	0.400	95.564	-3.7	0	0	0.094	0.037	Bus847	-0.094	-0.037	152.2	92.8	
Bus847	11.000	96.651	-2.9	0	0	-0.006	0.001	Bus1065	-0.088	-0.040	5.3	90.9	
								Bus846	0.094	0.039	5.5	92.3	
Bus848	0.400	95.760	-3.6	0	0	0.121	0.049	Bus849	-0.121	-0.049	196.9	92.8	
Bus849	11.000	96.638	-2.9	0	0	-0.006	0.001	Bus1065	-0.116	-0.052	6.9	91.3	
								Bus848	0.122	0.050	7.2	92.4	
Bus850	0.400	95.472	-3.8	0	0	0.101	0.040	Bus851	-0.101	-0.040	164.4	92.8	
Bus851	11.000	96.648	-2.9	0	0	-0.006	0.001	Bus1065	-0.096	-0.044	5.7	90.9	
								Bus850	0.102	0.042	6.0	92.3	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus852	11.000	96.642	-2.9	0	0	-0.006	0.001	Bus1065	-0.108	-0.049	6.5	91.3	
								Bus853	0.115	0.047	6.7	92.5	
Bus853	0.400	95.816	-3.5	0	0	0.114	0.046	Bus852	-0.114	-0.046	185.4	92.8	
Bus854	0.400	95.518	-3.7	0	0	0.097	0.039	Bus855	-0.097	-0.039	158.3	92.8	
Bus855	11.000	96.650	-2.9	0	0	-0.006	0.001	Bus1065	-0.092	-0.042	5.5	90.9	
								Bus854	0.098	0.041	5.8	92.3	
Bus856	11.000	96.645	-2.9	0	0	-0.006	0.001	Bus1065	-0.101	-0.046	6.0	91.0	
								Bus857	0.107	0.045	6.3	92.3	
Bus857	0.400	95.400	-3.8	0	0	0.107	0.043	Bus856	-0.107	-0.043	174.0	92.8	
Bus858	11.000	96.607	-2.9	0	0	-0.006	0.001	Bus1065	-0.179	-0.078	10.6	91.7	
								Bus859	0.185	0.077	10.9	92.4	
Bus859	0.400	95.826	-3.6	0	0	0.185	0.074	Bus858	-0.185	-0.074	299.9	92.8	
Bus860	11.000	96.648	-2.9	0	0	-0.006	0.001	Bus1065	-0.096	-0.043	5.7	91.2	
								Bus861	0.103	0.042	6.0	92.5	
Bus861	0.400	95.910	-3.5	0	0	0.102	0.041	Bus860	-0.102	-0.041	165.6	92.8	
Bus862	11.000	96.637	-2.9	0	0	-0.006	0.001	Bus1065	-0.118	-0.054	7.1	91.1	
								Bus863	0.124	0.052	7.3	92.2	
Bus863	0.400	95.192	-4.0	0	0	0.123	0.049	Bus862	-0.123	-0.049	201.7	92.8	
Bus864	0.400	95.113	-4.0	0	0	0.130	0.052	Bus865	-0.130	-0.052	212.0	92.8	
Bus865	11.000	96.633	-2.9	0	0	-0.006	0.001	Bus1065	-0.125	-0.057	7.4	91.1	
								Bus864	0.131	0.055	7.7	92.1	
Bus866	0.400	95.423	-3.8	0	0	0.164	0.066	Bus867	-0.164	-0.066	267.1	92.8	
Bus867	11.000	96.617	-2.9	0	0	-0.006	0.001	Bus1065	-0.159	-0.070	9.5	91.5	
								Bus866	0.165	0.069	9.7	92.3	
Bus902	11.000	96.598	-2.9	0	0	-0.006	0.001	Bus1065	-0.197	-0.085	11.7	91.7	
								Bus903	0.203	0.084	12.0	92.4	
Bus903	0.400	95.742	-3.6	0	0	0.202	0.081	Bus902	-0.202	-0.081	328.8	92.8	
Bus926	11.000	96.599	-2.9	0	0	-0.006	0.001	Bus1065	-0.195	-0.086	11.6	91.5	
								Bus927	0.201	0.085	11.9	92.2	
Bus927	0.400	95.138	-4.0	0	0	0.200	0.080	Bus926	-0.200	-0.080	326.2	92.8	
Bus928	0.400	95.181	-4.0	0	0	0.318	0.127	Bus929	-0.318	-0.127	519.0	92.8	
Bus929	11.000	96.540	-3.0	0	0	-0.006	0.001	Bus1065	-0.314	-0.136	18.6	91.7	
								Bus928	0.320	0.135	18.9	92.1	
Bus930	0.400	95.227	-4.0	0	0	0.308	0.123	Bus931	-0.308	-0.123	503.6	92.8	
Bus931	11.000	96.545	-3.0	0	0	-0.006	0.001	Bus1065	-0.305	-0.132	18.1	91.7	
								Bus930	0.310	0.131	18.3	92.1	
Bus932	0.400	95.195	-4.0	0	0	0.315	0.126	Bus933	-0.315	-0.126	514.4	92.8	
Bus933	11.000	96.542	-3.0	0	0	-0.006	0.001	Bus1065	-0.311	-0.135	18.5	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus852	11.000	96.642	-2.9	0	0	-0.006	0.001	Bus1065	-0.108	-0.049	6.5	91.3	
								Bus853	0.115	0.047	6.7	92.5	
Bus853	0.400	95.816	-3.5	0	0	0.114	0.046	Bus852	-0.114	-0.046	185.4	92.8	
Bus854	0.400	95.518	-3.7	0	0	0.097	0.039	Bus855	-0.097	-0.039	158.3	92.8	
Bus855	11.000	96.650	-2.9	0	0	-0.006	0.001	Bus1065	-0.092	-0.042	5.5	90.9	
								Bus854	0.098	0.041	5.8	92.3	
Bus856	11.000	96.645	-2.9	0	0	-0.006	0.001	Bus1065	-0.101	-0.046	6.0	91.0	
								Bus857	0.107	0.045	6.3	92.3	
Bus857	0.400	95.400	-3.8	0	0	0.107	0.043	Bus856	-0.107	-0.043	174.0	92.8	
Bus858	11.000	96.607	-2.9	0	0	-0.006	0.001	Bus1065	-0.179	-0.078	10.6	91.7	
								Bus859	0.185	0.077	10.9	92.4	
Bus859	0.400	95.826	-3.6	0	0	0.185	0.074	Bus858	-0.185	-0.074	299.9	92.8	
Bus860	11.000	96.648	-2.9	0	0	-0.006	0.001	Bus1065	-0.096	-0.043	5.7	91.2	
								Bus861	0.103	0.042	6.0	92.5	
Bus861	0.400	95.910	-3.5	0	0	0.102	0.041	Bus860	-0.102	-0.041	165.6	92.8	
Bus862	11.000	96.637	-2.9	0	0	-0.006	0.001	Bus1065	-0.118	-0.054	7.1	91.1	
								Bus863	0.124	0.052	7.3	92.2	
Bus863	0.400	95.192	-4.0	0	0	0.123	0.049	Bus862	-0.123	-0.049	201.7	92.8	
Bus864	0.400	95.113	-4.0	0	0	0.130	0.052	Bus865	-0.130	-0.052	212.0	92.8	
Bus865	11.000	96.633	-2.9	0	0	-0.006	0.001	Bus1065	-0.125	-0.057	7.4	91.1	
								Bus864	0.131	0.055	7.7	92.1	
Bus866	0.400	95.423	-3.8	0	0	0.164	0.066	Bus867	-0.164	-0.066	267.1	92.8	
Bus867	11.000	96.617	-2.9	0	0	-0.006	0.001	Bus1065	-0.159	-0.070	9.5	91.5	
								Bus866	0.165	0.069	9.7	92.3	
Bus902	11.000	96.598	-2.9	0	0	-0.006	0.001	Bus1065	-0.197	-0.085	11.7	91.7	
								Bus903	0.203	0.084	12.0	92.4	
Bus903	0.400	95.742	-3.6	0	0	0.202	0.081	Bus902	-0.202	-0.081	328.8	92.8	
Bus926	11.000	96.599	-2.9	0	0	-0.006	0.001	Bus1065	-0.195	-0.086	11.6	91.5	
								Bus927	0.201	0.085	11.9	92.2	
Bus927	0.400	95.138	-4.0	0	0	0.200	0.080	Bus926	-0.200	-0.080	326.2	92.8	
Bus928	0.400	95.181	-4.0	0	0	0.318	0.127	Bus929	-0.318	-0.127	519.0	92.8	
Bus929	11.000	96.540	-3.0	0	0	-0.006	0.001	Bus1065	-0.314	-0.136	18.6	91.7	
								Bus928	0.320	0.135	18.9	92.1	
Bus930	0.400	95.227	-4.0	0	0	0.308	0.123	Bus931	-0.308	-0.123	503.6	92.8	
Bus931	11.000	96.545	-3.0	0	0	-0.006	0.001	Bus1065	-0.305	-0.132	18.1	91.7	
								Bus930	0.310	0.131	18.3	92.1	
Bus932	0.400	95.195	-4.0	0	0	0.315	0.126	Bus933	-0.315	-0.126	514.4	92.8	
Bus933	11.000	96.542	-3.0	0	0	-0.006	0.001	Bus1065	-0.311	-0.135	18.5	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus932	0.317	0.134	18.7	92.1	
Bus960	11.000	96.638	-2.9	0	0	-0.006	0.001	Bus1065	-0.115	-0.052	6.9	91.1	
								Bus961	0.122	0.051	7.2	92.2	
Bus961	0.400	95.227	-3.9	0	0	0.121	0.048	Bus960	-0.121	-0.048	197.0	92.8	
Bus962	11.000	96.571	-2.9	0	0	-0.006	0.001	Bus1065	-0.253	-0.110	15.0	91.8	
								Bus963	0.259	0.109	15.3	92.3	
Bus963	0.400	95.473	-3.8	0	0	0.258	0.103	Bus962	-0.258	-0.103	420.3	92.8	
Bus964	11.000	96.607	-2.9	0	0	-0.006	0.001	Bus1065	-0.178	-0.078	10.6	91.5	
								Bus965	0.184	0.077	10.9	92.2	
Bus965	0.400	95.272	-3.9	0	0	0.183	0.073	Bus964	-0.183	-0.073	298.5	92.8	
Bus966	11.000	96.556	-3.0	0	0	-0.006	0.001	Bus1065	-0.283	-0.123	16.8	91.7	
								Bus967	0.289	0.122	17.1	92.2	
Bus967	0.400	95.328	-3.9	0	0	0.288	0.115	Bus966	-0.288	-0.115	469.4	92.8	
Bus968	0.400	95.840	-3.5	0	0	0.111	0.044	Bus969	-0.111	-0.044	180.1	92.8	
Bus969	11.000	96.643	-2.9	0	0	-0.006	0.001	Bus1065	-0.106	-0.047	6.3	91.3	
								Bus968	0.112	0.046	6.6	92.5	
Bus970	0.400	95.771	-3.6	0	0	0.196	0.079	Bus971	-0.196	-0.079	318.5	92.8	
Bus971	11.000	96.601	-2.9	0	0	-0.006	0.001	Bus1065	-0.191	-0.083	11.3	91.8	
								Bus970	0.197	0.082	11.6	92.4	
Bus972	11.000	96.620	-2.9	0	0	-0.006	0.001	Bus1065	-0.154	-0.068	9.1	91.5	
								Bus973	0.160	0.067	9.4	92.3	
Bus973	0.400	95.464	-3.8	0	0	0.159	0.064	Bus972	-0.159	-0.064	258.6	92.8	
Bus974	0.400	95.949	-3.4	0	0	0.097	0.039	Bus975	-0.097	-0.039	157.4	92.8	
Bus975	11.000	96.650	-2.9	0	0	-0.006	0.001	Bus1065	-0.092	-0.041	5.5	91.1	
								Bus974	0.097	0.040	5.7	92.5	
Bus976	11.000	96.482	-3.0	0	0	-0.006	0.001	Bus1065	-0.432	-0.188	25.6	91.7	
								Bus977	0.438	0.187	25.9	92.0	
Bus977	0.400	95.165	-4.2	0	0	0.436	0.175	Bus976	-0.436	-0.175	712.7	92.8	
Bus978	11.000	96.611	-2.9	0	0	-0.006	0.001	Bus1065	-0.171	-0.074	10.1	91.7	
								Bus979	0.177	0.073	10.4	92.4	
Bus979	0.400	95.866	-3.5	0	0	0.176	0.071	Bus978	-0.176	-0.071	286.2	92.8	
Bus980	0.400	95.331	-3.9	0	0	0.287	0.115	Bus981	-0.287	-0.115	468.2	92.8	
Bus981	11.000	96.556	-3.0	0	0	-0.006	0.001	Bus1065	-0.283	-0.123	16.8	91.8	
								Bus980	0.289	0.121	17.0	92.2	
Bus982	0.400	95.534	-3.8	0	0	0.245	0.098	Bus983	-0.245	-0.098	399.3	92.8	
Bus983	11.000	96.577	-2.9	0	0	-0.006	0.001	Bus1065	-0.241	-0.104	14.3	91.8	
								Bus982	0.247	0.103	14.5	92.3	
Bus984	0.400	95.758	-3.6	0	0	0.199	0.080	Bus985	-0.199	-0.080	323.1	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus932	0.317	0.134	18.7	92.1	
Bus960	11.000	96.638	-2.9	0	0	-0.006	0.001	Bus1065	-0.115	-0.052	6.9	91.1	
								Bus961	0.122	0.051	7.2	92.2	
Bus961	0.400	95.227	-3.9	0	0	0.121	0.048	Bus960	-0.121	-0.048	197.0	92.8	
Bus962	11.000	96.571	-2.9	0	0	-0.006	0.001	Bus1065	-0.253	-0.110	15.0	91.8	
								Bus963	0.259	0.109	15.3	92.3	
Bus963	0.400	95.473	-3.8	0	0	0.258	0.103	Bus962	-0.258	-0.103	420.3	92.8	
Bus964	11.000	96.607	-2.9	0	0	-0.006	0.001	Bus1065	-0.178	-0.078	10.6	91.5	
								Bus965	0.184	0.077	10.9	92.2	
Bus965	0.400	95.272	-3.9	0	0	0.183	0.073	Bus964	-0.183	-0.073	298.5	92.8	
Bus966	11.000	96.556	-3.0	0	0	-0.006	0.001	Bus1065	-0.283	-0.123	16.8	91.7	
								Bus967	0.289	0.122	17.1	92.2	
Bus967	0.400	95.328	-3.9	0	0	0.288	0.115	Bus966	-0.288	-0.115	469.4	92.8	
Bus968	0.400	95.840	-3.5	0	0	0.111	0.044	Bus969	-0.111	-0.044	180.1	92.8	
Bus969	11.000	96.643	-2.9	0	0	-0.006	0.001	Bus1065	-0.106	-0.047	6.3	91.3	
								Bus968	0.112	0.046	6.6	92.5	
Bus970	0.400	95.771	-3.6	0	0	0.196	0.079	Bus971	-0.196	-0.079	318.5	92.8	
Bus971	11.000	96.601	-2.9	0	0	-0.006	0.001	Bus1065	-0.191	-0.083	11.3	91.8	
								Bus970	0.197	0.082	11.6	92.4	
Bus972	11.000	96.620	-2.9	0	0	-0.006	0.001	Bus1065	-0.154	-0.068	9.1	91.5	
								Bus973	0.160	0.067	9.4	92.3	
Bus973	0.400	95.464	-3.8	0	0	0.159	0.064	Bus972	-0.159	-0.064	258.6	92.8	
Bus974	0.400	95.949	-3.4	0	0	0.097	0.039	Bus975	-0.097	-0.039	157.4	92.8	
Bus975	11.000	96.650	-2.9	0	0	-0.006	0.001	Bus1065	-0.092	-0.041	5.5	91.1	
								Bus974	0.097	0.040	5.7	92.5	
Bus976	11.000	96.482	-3.0	0	0	-0.006	0.001	Bus1065	-0.432	-0.188	25.6	91.7	
								Bus977	0.438	0.187	25.9	92.0	
Bus977	0.400	95.165	-4.2	0	0	0.436	0.175	Bus976	-0.436	-0.175	712.7	92.8	
Bus978	11.000	96.611	-2.9	0	0	-0.006	0.001	Bus1065	-0.171	-0.074	10.1	91.7	
								Bus979	0.177	0.073	10.4	92.4	
Bus979	0.400	95.866	-3.5	0	0	0.176	0.071	Bus978	-0.176	-0.071	286.2	92.8	
Bus980	0.400	95.331	-3.9	0	0	0.287	0.115	Bus981	-0.287	-0.115	468.2	92.8	
Bus981	11.000	96.556	-3.0	0	0	-0.006	0.001	Bus1065	-0.283	-0.123	16.8	91.8	
								Bus980	0.289	0.121	17.0	92.2	
Bus982	0.400	95.534	-3.8	0	0	0.245	0.098	Bus983	-0.245	-0.098	399.3	92.8	
Bus983	11.000	96.577	-2.9	0	0	-0.006	0.001	Bus1065	-0.241	-0.104	14.3	91.8	
								Bus982	0.247	0.103	14.5	92.3	
Bus984	0.400	95.758	-3.6	0	0	0.199	0.080	Bus985	-0.199	-0.080	323.1	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus985	11.000	96.600	-2.9	0	0	-0.006	0.001	Bus1065	-0.194	-0.084	11.5	91.8	
								Bus984	0.200	0.083	11.7	92.4	
Bus986	11.000	96.638	-2.9	0	0	-0.006	0.001	Bus1065	-0.115	-0.051	6.8	91.3	
								Bus987	0.121	0.050	7.1	92.4	
Bus987	0.400	95.765	-3.6	0	0	0.121	0.048	Bus986	-0.121	-0.048	196.0	92.8	
Bus988	11.000	96.612	-2.9	0	0	-0.006	0.001	Bus1065	-0.169	-0.074	10.0	91.5	
								Bus989	0.175	0.073	10.3	92.2	
Bus989	0.400	95.346	-3.8	0	0	0.174	0.069	Bus988	-0.174	-0.069	283.1	92.8	
Bus990	11.000	96.641	-2.9	0	0	-0.006	0.001	Bus1065	-0.110	-0.050	6.6	91.0	
								Bus991	0.116	0.049	6.8	92.2	
Bus991	0.400	95.296	-3.9	0	0	0.115	0.046	Bus990	-0.115	-0.046	187.8	92.8	
Bus992	11.000	96.646	-2.9	0	0	-0.006	0.001	Bus1065	-0.099	-0.045	5.9	91.2	
								Bus993	0.105	0.043	6.2	92.5	
Bus993	0.400	95.888	-3.5	0	0	0.105	0.042	Bus992	-0.105	-0.042	170.2	92.8	
Bus998	11.000	96.551	-3.0	0	0	-0.006	0.001	Bus1065	-0.292	-0.127	17.3	91.7	
								Bus999	0.299	0.126	17.6	92.2	
Bus999	0.400	95.283	-4.0	0	0	0.297	0.119	Bus998	-0.297	-0.119	484.7	92.8	
Bus1000	0.400	95.518	-3.7	0	0	0.097	0.039	Bus1001	-0.097	-0.039	158.3	92.8	
Bus1001	11.000	96.650	-2.9	0	0	-0.006	0.001	Bus1065	-0.092	-0.042	5.5	90.9	
								Bus1000	0.098	0.041	5.8	92.3	
Bus1002	11.000	96.647	-2.9	0	0	-0.006	0.001	Bus1065	-0.098	-0.044	5.8	91.2	
								Bus1003	0.104	0.043	6.1	92.5	
Bus1003	0.400	95.895	-3.5	0	0	0.104	0.042	Bus1002	-0.104	-0.042	168.7	92.8	
Bus1004	11.000	96.604	-2.9	0	0	-0.006	0.001	Bus1065	-0.185	-0.080	10.9	91.7	
								Bus1005	0.191	0.079	11.2	92.4	
Bus1005	0.400	95.800	-3.6	0	0	0.190	0.076	Bus1004	-0.190	-0.076	309.0	92.8	
Bus1006	0.400	96.090	-3.4	0	0	0.129	0.052	Bus1007	-0.129	-0.052	209.4	92.8	
Bus1007	11.000	96.634	-2.9	0	0	-0.006	0.001	Bus1065	-0.124	-0.054	7.4	91.6	
								Bus1006	0.130	0.053	7.6	92.6	
Bus1008	0.400	95.548	-3.7	0	0	0.148	0.059	Bus1009	-0.148	-0.059	241.1	92.8	
Bus1009	11.000	96.625	-2.9	0	0	-0.006	0.001	Bus1065	-0.143	-0.063	8.5	91.5	
								Bus1008	0.149	0.062	8.8	92.3	
Bus1010	0.400	95.216	-3.9	0	0	0.190	0.076	Bus1011	-0.190	-0.076	310.1	92.8	
Bus1011	11.000	96.604	-2.9	0	0	-0.006	0.001	Bus1065	-0.186	-0.082	11.0	91.5	
								Bus1010	0.191	0.080	11.3	92.2	
Bus1020	11.000	96.604	-2.9	0	0	-0.006	0.001	Bus1065	-0.186	-0.082	11.0	91.5	
								Bus1021	0.192	0.081	11.3	92.2	
Bus1021	0.400	95.213	-3.9	0	0	0.190	0.076	Bus1020	-0.190	-0.076	310.8	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1022	0.400	95.401	-3.8	0	0	0.167	0.067	Bus1023	-0.167	-0.067	271.7	92.8	
Bus1023	11.000	96.615	-2.9	0	0	-0.006	0.001	Bus1065	-0.162	-0.071	9.6	91.5	
								Bus1022	0.168	0.070	9.9	92.3	
Bus1024	0.400	95.775	-3.5	0	0	0.119	0.048	Bus1025	-0.119	-0.048	193.8	92.8	
Bus1025	11.000	96.639	-2.9	0	0	-0.006	0.001	Bus1065	-0.114	-0.051	6.8	91.3	
								Bus1024	0.120	0.050	7.0	92.4	
Bus1026	0.400	95.722	-3.7	0	0	0.206	0.083	Bus1027	-0.206	-0.083	335.2	92.8	
Bus1027	11.000	96.596	-2.9	0	0	-0.006	0.001	Bus1065	-0.202	-0.087	11.9	91.8	
								Bus1026	0.207	0.086	12.2	92.4	
Bus1048	11.000	96.503	-3.0	0	0	-0.006	0.001	Bus1065	-0.390	-0.169	23.1	91.8	
								Bus1049	0.396	0.168	23.4	92.1	
Bus1049	0.400	95.316	-4.1	0	0	0.395	0.158	Bus1048	-0.395	-0.158	643.5	92.8	
Bus1050	0.400	95.235	-4.2	0	0	0.417	0.167	Bus1051	-0.417	-0.167	680.5	92.8	
Bus1051	11.000	96.491	-3.0	0	0	-0.005	0.001	Bus1065	-0.413	-0.179	24.5	91.8	
								Bus1050	0.419	0.178	24.7	92.0	
Bus1052	0.400	95.134	-4.2	0	0	0.445	0.178	Bus1053	-0.445	-0.178	726.6	92.8	
Bus1053	11.000	96.477	-3.0	0	0	-0.005	0.001	Bus1065	-0.441	-0.192	26.2	91.7	
								Bus1052	0.447	0.190	26.4	92.0	
Bus1054	0.400	90.654	-7.7	0	0	0.123	0.049	Bus1055	-0.123	-0.049	211.1	92.8	
Bus1055	11.000	92.169	-6.5	0	0	0	0	Bus1065	-0.124	-0.053	7.7	92.1	
								Bus1054	0.124	0.053	7.7	92.1	
Bus1056	11.000	96.532	-3.0	0	0	-0.006	0.001	Bus1065	-0.330	-0.144	19.6	91.7	
								Bus1057	0.336	0.143	19.9	92.1	
Bus1057	0.400	95.101	-4.1	0	0	0.334	0.134	Bus1056	-0.334	-0.134	546.3	92.8	
Bus1060	11.000	96.621	-2.9	0	0	-0.006	0.001	Bus1065	-0.151	-0.066	9.0	91.7	
								Bus1061	0.157	0.065	9.2	92.5	
Bus1061	0.400	95.959	-3.5	0	0	0.157	0.063	Bus1060	-0.157	-0.063	254.4	92.8	
Bus1062	11.000	96.658	-2.9	0	0	-0.006	0.001	Bus1065	-0.075	-0.034	4.5	91.0	
								Bus1063	0.081	0.033	4.7	92.7	
Bus1063	0.400	96.320	-3.2	0	0	0.081	0.032	Bus1062	-0.081	-0.032	130.6	92.8	
# Bus1064	33.000	98.695	-0.3	0	0	0.104	-0.136	Bus650	-10.959	-4.144	207.7	93.5	
								Bus1065	5.427	2.140	103.4	93.0	
								Bus1065	5.427	2.140	103.4	93.0	
# Bus1065	11.000	96.696	-2.9	0	0	0.131	-0.985	Bus798	0.106	0.047	6.3	91.4	
								Bus801	0.168	0.073	9.9	91.8	
								Bus803	0.118	0.052	7.0	91.5	
								Bus805	0.101	0.045	6.0	91.4	
								Bus838	0.115	0.051	6.8	91.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus840	0.204	0.088	12.0	91.8	
								Bus842	0.174	0.075	10.3	91.8	
								Bus844	0.194	0.084	11.5	91.8	
								Bus847	0.088	0.040	5.3	91.0	
								Bus849	0.116	0.051	6.9	91.4	
								Bus851	0.096	0.043	5.7	91.1	
								Bus852	0.109	0.048	6.4	91.4	
								Bus855	0.092	0.042	5.5	91.0	
								Bus856	0.101	0.046	6.0	91.1	
								Bus858	0.179	0.078	10.6	91.8	
								Bus860	0.096	0.043	5.7	91.3	
								Bus862	0.118	0.053	7.0	91.2	
								Bus865	0.125	0.056	7.4	91.2	
								Bus867	0.159	0.070	9.4	91.6	
								Bus902	0.197	0.085	11.7	91.8	
								Bus926	0.195	0.086	11.6	91.5	
								Bus929	0.315	0.137	18.6	91.7	
								Bus931	0.305	0.132	18.1	91.7	
								Bus933	0.312	0.135	18.4	91.7	
								Bus960	0.116	0.052	6.9	91.2	
								Bus962	0.253	0.110	15.0	91.8	
								Bus964	0.178	0.078	10.6	91.6	
								Bus966	0.283	0.123	16.8	91.8	
								Bus969	0.106	0.047	6.3	91.4	
								Bus971	0.191	0.083	11.3	91.8	
								Bus972	0.154	0.068	9.1	91.5	
								Bus975	0.092	0.041	5.5	91.3	
								Bus976	0.433	0.188	25.6	91.7	
								Bus978	0.171	0.074	10.1	91.8	
								Bus981	0.284	0.123	16.8	91.8	
								Bus983	0.241	0.104	14.3	91.8	
								Bus985	0.194	0.084	11.5	91.8	
								Bus986	0.115	0.051	6.8	91.4	
								Bus988	0.169	0.074	10.0	91.6	
								Bus990	0.110	0.050	6.5	91.1	
								Bus992	0.099	0.044	5.9	91.3	
								Bus998	0.293	0.127	17.3	91.7	
								Bus1001	0.092	0.042	5.5	91.0	
								Bus1002	0.098	0.044	5.8	91.3	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1004	0.185	0.080	10.9	91.8	
								Bus1007	0.124	0.054	7.4	91.7	
								Bus1009	0.143	0.063	8.5	91.5	
								Bus1011	0.186	0.082	11.0	91.6	
								Bus1020	0.186	0.082	11.0	91.6	
								Bus1023	0.162	0.071	9.6	91.6	
								Bus1025	0.114	0.051	6.8	91.4	
								Bus1027	0.202	0.087	11.9	91.8	
								Bus1048	0.391	0.169	23.1	91.8	
								Bus1051	0.414	0.179	24.5	91.8	
								Bus1053	0.442	0.192	26.2	91.7	
								Bus1055	0.127	0.062	7.7	89.7	
								Bus1056	0.331	0.144	19.6	91.7	
								Bus1060	0.151	0.066	8.9	91.7	
								Bus1062	0.075	0.034	4.4	91.2	
								Bus1064	-5.409	-1.849	310.2	94.6	
								Bus1064	-5.409	-1.849	310.2	94.6	
Bus1195	0.400	89.119	-11.0	0	0	0.154	0.062	Bus1196	-0.154	-0.062	269.5	92.7	
Bus1196	11.000	90.330	-10.1	0	0	-0.027	0.001	Bus1328	-0.128	-0.066	8.4	88.8	
								Bus1195	0.155	0.066	9.8	92.1	
Bus1197	0.400	89.596	-10.7	0	0	0.161	0.065	Bus1198	-0.161	-0.065	279.4	92.7	
Bus1198	11.000	90.327	-10.1	0	0	-0.026	0.001	Bus1328	-0.135	-0.068	8.8	89.3	
								Bus1197	0.161	0.067	10.2	92.3	
Bus1199	0.400	89.326	-10.9	0	0	0.213	0.086	Bus1200	-0.213	-0.086	371.0	92.7	
Bus1200	11.000	90.299	-10.1	0	0	-0.026	0.001	Bus1328	-0.188	-0.091	12.1	90.0	
								Bus1199	0.214	0.090	13.5	92.2	
Bus1201	0.400	89.421	-10.9	0	0	0.195	0.079	Bus1202	-0.195	-0.079	338.8	92.7	
Bus1202	11.000	90.309	-10.1	0	0	-0.026	0.001	Bus1328	-0.169	-0.083	11.0	89.8	
								Bus1201	0.195	0.082	12.3	92.2	
Bus1203	0.400	89.411	-10.9	0	0	0.196	0.079	Bus1204	-0.196	-0.079	342.0	92.7	
Bus1204	11.000	90.308	-10.1	0	0	-0.026	0.001	Bus1328	-0.171	-0.084	11.1	89.9	
								Bus1203	0.197	0.083	12.4	92.2	
Bus1205	0.400	89.502	-10.8	0	0	0.179	0.072	Bus1206	-0.179	-0.072	311.5	92.7	
Bus1206	11.000	90.317	-10.1	0	0	-0.026	0.001	Bus1328	-0.153	-0.076	10.0	89.6	
								Bus1205	0.180	0.075	11.3	92.3	
Bus1207	0.400	88.720	-11.3	0	0	0.128	0.052	Bus1208	-0.128	-0.052	224.9	92.7	
Bus1208	11.000	90.343	-10.1	0	0	-0.028	0.000	Bus1328	-0.102	-0.056	6.8	87.6	
								Bus1207	0.129	0.056	8.2	91.9	
Bus1209	0.400	89.516	-10.7	0	0	0.108	0.044	Bus1210	-0.108	-0.044	187.2	92.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1210	11.000	90.355	-10.1	0	0	-0.027	0.001	Bus1328	-0.081	-0.046	5.4	87.0	
								Bus1209	0.108	0.045	6.8	92.3	
Bus1211	0.400	89.719	-10.6	0	0	0.137	0.055	Bus1212	-0.137	-0.055	237.8	92.8	
Bus1212	11.000	90.339	-10.1	0	0	-0.027	0.001	Bus1328	-0.111	-0.058	7.3	88.7	
								Bus1211	0.138	0.057	8.6	92.4	
Bus1213	0.400	89.197	-10.9	0	0	0.145	0.059	Bus1214	-0.145	-0.059	253.3	92.7	
Bus1214	11.000	90.335	-10.1	0	0	-0.027	0.001	Bus1328	-0.119	-0.062	7.8	88.6	
								Bus1213	0.146	0.062	9.2	92.1	
Bus1215	0.400	89.314	-10.9	0	0	0.131	0.053	Bus1216	-0.131	-0.053	229.0	92.7	
Bus1216	11.000	90.342	-10.1	0	0	-0.027	0.001	Bus1328	-0.105	-0.056	6.9	88.2	
								Bus1215	0.132	0.056	8.3	92.2	
Bus1217	0.400	89.501	-10.7	0	0	0.166	0.067	Bus1218	-0.166	-0.067	289.4	92.7	
Bus1218	11.000	90.324	-10.1	0	0	-0.027	0.001	Bus1328	-0.141	-0.070	9.1	89.4	
								Bus1217	0.167	0.070	10.5	92.3	
Bus1219	0.400	88.961	-11.1	0	0	0.172	0.070	Bus1220	-0.172	-0.070	302.0	92.7	
Bus1220	11.000	90.320	-10.1	0	0	-0.027	0.000	Bus1328	-0.147	-0.075	9.6	89.2	
								Bus1219	0.174	0.074	11.0	92.0	
Bus1221	0.400	89.254	-11.0	0	0	0.227	0.092	Bus1222	-0.227	-0.092	395.2	92.7	
Bus1222	11.000	90.291	-10.1	0	0	-0.026	0.001	Bus1328	-0.202	-0.097	13.0	90.1	
								Bus1221	0.228	0.096	14.4	92.1	
Bus1223	0.400	89.302	-10.9	0	0	0.217	0.088	Bus1224	-0.217	-0.088	379.1	92.7	
Bus1224	11.000	90.296	-10.1	0	0	-0.026	0.001	Bus1328	-0.192	-0.093	12.4	90.1	
								Bus1223	0.219	0.092	13.8	92.1	
Bus1225	0.400	89.358	-10.8	0	0	0.126	0.051	Bus1226	-0.126	-0.051	220.1	92.7	
Bus1226	11.000	90.345	-10.1	0	0	-0.027	0.001	Bus1328	-0.100	-0.054	6.6	88.0	
								Bus1225	0.127	0.053	8.0	92.2	
Bus1227	0.400	89.483	-10.8	0	0	0.183	0.074	Bus1228	-0.183	-0.074	318.1	92.8	
Bus1228	11.000	90.315	-10.1	0	0	-0.027	0.001	Bus1328	-0.157	-0.077	10.2	89.7	
								Bus1227	0.184	0.077	11.6	92.3	
Bus1229	0.400	89.700	-10.6	0	0	0.141	0.057	Bus1230	-0.141	-0.057	244.2	92.7	
Bus1230	11.000	90.337	-10.1	0	0	-0.027	0.001	Bus1328	-0.115	-0.059	7.5	88.8	
								Bus1229	0.141	0.058	8.9	92.4	
Bus1231	0.400	89.487	-10.8	0	0	0.182	0.073	Bus1232	-0.182	-0.073	316.3	92.7	
Bus1232	11.000	90.315	-10.1	0	0	-0.026	0.001	Bus1328	-0.156	-0.077	10.1	89.7	
								Bus1231	0.183	0.076	11.5	92.3	
Bus1233	0.400	89.411	-10.9	0	0	0.196	0.079	Bus1234	-0.196	-0.079	342.0	92.7	
Bus1234	11.000	90.308	-10.1	0	0	-0.026	0.001	Bus1328	-0.171	-0.084	11.1	89.9	
								Bus1233	0.197	0.083	12.4	92.2	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1235	0.400	89.469	-10.8	0	0	0.185	0.075	Bus1236	-0.185	-0.075	322.7	92.7	
Bus1236	11.000	90.313	-10.1	0	0	-0.026	0.001	Bus1328	-0.160	-0.079	10.4	89.7	
								Bus1235	0.186	0.078	11.7	92.2	
Bus1237	0.400	88.755	-11.2	0	0	0.196	0.080	Bus1238	-0.196	-0.080	344.3	92.7	
Bus1238	11.000	90.307	-10.1	0	0	-0.027	0.000	Bus1328	-0.171	-0.085	11.1	89.5	
								Bus1237	0.198	0.085	12.5	91.9	
Bus1239	0.400	89.587	-10.7	0	0	0.163	0.066	Bus1240	-0.163	-0.066	282.6	92.7	
Bus1240	11.000	90.326	-10.1	0	0	-0.026	0.001	Bus1328	-0.137	-0.069	8.9	89.3	
								Bus1239	0.163	0.068	10.3	92.3	
Bus1241	0.400	88.482	-11.5	0	0	0.145	0.059	Bus1242	-0.145	-0.059	256.1	92.7	
Bus1242	11.000	90.334	-10.1	0	0	-0.027	0.000	Bus1328	-0.120	-0.064	7.9	88.1	
								Bus1241	0.147	0.064	9.3	91.7	
Bus1243	0.400	89.440	-10.8	0	0	0.191	0.077	Bus1244	-0.191	-0.077	332.4	92.7	
Bus1244	11.000	90.310	-10.1	0	0	-0.026	0.001	Bus1328	-0.166	-0.081	10.7	89.8	
								Bus1243	0.192	0.080	12.1	92.2	
Bus1245	0.400	88.750	-11.3	0	0	0.082	0.033	Bus1246	-0.082	-0.033	143.5	92.7	
Bus1246	11.000	90.368	-10.1	0	0	-0.028	0.000	Bus1328	-0.055	-0.036	3.8	83.5	
								Bus1245	0.083	0.036	5.2	91.9	
Bus1247	0.400	89.445	-10.8	0	0	0.190	0.077	Bus1248	-0.190	-0.077	330.7	92.7	
Bus1248	11.000	90.311	-10.1	0	0	-0.026	0.001	Bus1328	-0.165	-0.081	10.7	89.8	
								Bus1247	0.191	0.080	12.0	92.2	
Bus1249	0.400	88.989	-11.2	0	0	0.277	0.112	Bus1250	-0.277	-0.112	484.3	92.7	
Bus1250	11.000	90.264	-10.1	0	0	-0.026	0.001	Bus1328	-0.253	-0.120	16.3	90.4	
								Bus1249	0.279	0.119	17.6	92.0	
Bus1251	0.400	89.557	-10.7	0	0	0.127	0.051	Bus1252	-0.127	-0.051	219.9	92.7	
Bus1252	11.000	90.345	-10.1	0	0	-0.027	0.001	Bus1328	-0.100	-0.054	6.6	88.2	
								Bus1251	0.127	0.053	8.0	92.3	
Bus1253	0.400	89.634	-10.7	0	0	0.154	0.062	Bus1254	-0.154	-0.062	266.6	92.7	
Bus1254	11.000	90.331	-10.1	0	0	-0.027	0.001	Bus1328	-0.128	-0.065	8.3	89.2	
								Bus1253	0.154	0.064	9.7	92.3	
Bus1255	0.400	89.134	-11.0	0	0	0.152	0.062	Bus1256	-0.152	-0.062	266.2	92.7	
Bus1256	11.000	90.331	-10.1	0	0	-0.027	0.001	Bus1328	-0.126	-0.065	8.3	88.8	
								Bus1255	0.153	0.065	9.7	92.1	
Bus1257	0.400	88.842	-11.2	0	0	0.186	0.075	Bus1258	-0.186	-0.075	326.4	92.7	
Bus1258	11.000	90.312	-10.1	0	0	-0.027	0.000	Bus1328	-0.161	-0.081	10.5	89.4	
								Bus1257	0.188	0.080	11.9	91.9	
Bus1259	0.400	89.544	-10.7	0	0	0.104	0.042	Bus1260	-0.104	-0.042	181.6	92.7	
Bus1260	11.000	90.357	-10.1	0	0	-0.028	0.001	Bus1328	-0.077	-0.044	5.2	86.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1259	0.105	0.044	6.6	92.3	
Bus1261	0.400	88.821	-11.2	0	0	0.079	0.032	Bus1262	-0.079	-0.032	137.6	92.7	
Bus1262	11.000	90.370	-10.1	0	0	-0.028	0.000	Bus1328	-0.051	-0.034	3.6	83.0	
								Bus1261	0.079	0.034	5.0	91.9	
Bus1263	0.400	89.067	-11.1	0	0	0.262	0.106	Bus1264	-0.262	-0.106	458.3	92.7	
Bus1264	11.000	90.272	-10.1	0	0	-0.026	0.001	Bus1328	-0.238	-0.113	15.3	90.3	
								Bus1263	0.264	0.112	16.7	92.0	
Bus1265	0.400	89.549	-10.8	0	0	0.170	0.069	Bus1266	-0.170	-0.069	295.4	92.7	
Bus1266	11.000	90.322	-10.1	0	0	-0.026	0.001	Bus1328	-0.144	-0.072	9.4	89.5	
								Bus1265	0.171	0.071	10.7	92.3	
Bus1267	0.400	88.917	-11.2	0	0	0.290	0.118	Bus1268	-0.290	-0.118	508.7	92.7	
Bus1268	11.000	90.257	-10.1	0	0	-0.025	0.001	Bus1328	-0.267	-0.126	17.2	90.4	
								Bus1267	0.292	0.125	18.5	91.9	
Bus1269	0.400	88.177	-11.5	0	0	0.064	0.026	Bus1270	-0.064	-0.026	112.5	92.6	
Bus1270	11.000	90.378	-10.1	0	0	-0.028	0.000	Bus1328	-0.036	-0.028	2.7	78.8	
								Bus1269	0.065	0.028	4.1	91.7	
Bus1271	0.400	89.104	-11.0	0	0	0.100	0.040	Bus1272	-0.100	-0.040	174.4	92.7	
Bus1272	11.000	90.359	-10.1	0	0	-0.028	0.000	Bus1328	-0.073	-0.043	4.9	86.0	
								Bus1271	0.101	0.043	6.3	92.0	
Bus1273	0.400	89.563	-10.7	0	0	0.167	0.067	Bus1274	-0.167	-0.067	290.6	92.7	
Bus1274	11.000	90.323	-10.1	0	0	-0.026	0.001	Bus1328	-0.141	-0.071	9.2	89.4	
								Bus1273	0.168	0.070	10.6	92.3	
Bus1275	0.400	89.115	-11.1	0	0	0.253	0.102	Bus1276	-0.253	-0.102	442.1	92.7	
Bus1276	11.000	90.277	-10.1	0	0	-0.026	0.001	Bus1328	-0.229	-0.109	14.7	90.3	
								Bus1275	0.254	0.108	16.1	92.0	
Bus1277	0.400	89.392	-10.8	0	0	0.122	0.049	Bus1278	-0.122	-0.049	212.9	92.7	
Bus1278	11.000	90.347	-10.1	0	0	-0.027	0.001	Bus1328	-0.096	-0.052	6.3	87.8	
								Bus1277	0.123	0.052	7.7	92.2	
Bus1279	0.400	88.748	-11.5	0	0	0.672	0.271	Bus1280	-0.672	-0.271	1178.1	92.7	
Bus1280	11.000	90.051	-10.1	0	0	-0.021	0.002	Bus1328	-0.654	-0.294	41.8	91.2	
								Bus1279	0.675	0.292	42.8	91.8	
Bus1281	0.400	89.158	-11.1	0	0	0.245	0.099	Bus1282	-0.245	-0.099	427.5	92.7	
Bus1282	11.000	90.281	-10.1	0	0	-0.026	0.001	Bus1328	-0.220	-0.105	14.2	90.3	
								Bus1281	0.246	0.104	15.5	92.1	
Bus1283	0.400	89.063	-11.0	0	0	0.161	0.065	Bus1284	-0.161	-0.065	280.8	92.7	
Bus1284	11.000	90.326	-10.1	0	0	-0.027	0.000	Bus1328	-0.135	-0.069	8.8	89.0	
								Bus1283	0.162	0.069	10.2	92.0	
Bus1285	0.400	89.254	-11.0	0	0	0.227	0.092	Bus1286	-0.227	-0.092	395.2	92.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1286	11.000	90.291	-10.1	0	0	-0.026	0.001	Bus1328	-0.202	-0.097	13.0	90.1	
								Bus1285	0.228	0.096	14.4	92.1	
Bus1287	0.400	88.842	-11.2	0	0	0.186	0.075	Bus1288	-0.186	-0.075	326.4	92.7	
Bus1288	11.000	90.312	-10.1	0	0	-0.027	0.000	Bus1328	-0.161	-0.081	10.5	89.4	
								Bus1287	0.188	0.080	11.9	91.9	
Bus1289	0.400	89.302	-10.9	0	0	0.217	0.088	Bus1290	-0.217	-0.088	379.1	92.7	
Bus1290	11.000	90.296	-10.1	0	0	-0.026	0.001	Bus1328	-0.192	-0.093	12.4	90.1	
								Bus1289	0.219	0.092	13.8	92.1	
Bus1291	0.400	89.483	-10.8	0	0	0.183	0.074	Bus1292	-0.183	-0.074	318.1	92.8	
Bus1292	11.000	90.315	-10.1	0	0	-0.027	0.001	Bus1328	-0.157	-0.077	10.2	89.7	
								Bus1291	0.184	0.077	11.6	92.3	
Bus1293	0.400	88.848	-11.2	0	0	0.186	0.075	Bus1294	-0.186	-0.075	325.6	92.7	
Bus1294	11.000	90.313	-10.1	0	0	-0.027	0.000	Bus1328	-0.160	-0.080	10.4	89.4	
								Bus1293	0.187	0.080	11.8	92.0	
Bus1295	0.400	89.278	-11.0	0	0	0.222	0.090	Bus1296	-0.222	-0.090	387.1	92.7	
Bus1296	11.000	90.294	-10.1	0	0	-0.026	0.001	Bus1328	-0.197	-0.095	12.7	90.1	
								Bus1295	0.223	0.094	14.1	92.1	
Bus1297	0.400	88.575	-11.5	0	0	0.354	0.144	Bus1298	-0.354	-0.144	623.0	92.7	
Bus1298	11.000	90.221	-10.1	0	0	-0.025	0.001	Bus1328	-0.332	-0.156	21.4	90.6	
								Bus1297	0.357	0.155	22.7	91.7	
Bus1299	0.400	89.535	-10.8	0	0	0.173	0.070	Bus1300	-0.173	-0.070	300.2	92.7	
Bus1300	11.000	90.320	-10.1	0	0	-0.026	0.001	Bus1328	-0.147	-0.073	9.5	89.5	
								Bus1299	0.173	0.072	10.9	92.3	
Bus1301	0.400	89.478	-10.8	0	0	0.184	0.074	Bus1302	-0.184	-0.074	319.5	92.7	
Bus1302	11.000	90.314	-10.1	0	0	-0.026	0.001	Bus1328	-0.158	-0.078	10.2	89.7	
								Bus1301	0.184	0.077	11.6	92.2	
Bus1303	0.400	89.002	-11.2	0	0	0.275	0.111	Bus1304	-0.275	-0.111	480.5	92.7	
Bus1304	11.000	90.265	-10.1	0	0	-0.026	0.001	Bus1328	-0.251	-0.118	16.1	90.4	
								Bus1303	0.276	0.118	17.5	92.0	
Bus1305	0.400	89.291	-10.9	0	0	0.134	0.054	Bus1306	-0.134	-0.054	233.9	92.7	
Bus1306	11.000	90.341	-10.1	0	0	-0.027	0.001	Bus1328	-0.108	-0.057	7.1	88.3	
								Bus1305	0.135	0.057	8.5	92.2	
Bus1307	0.400	87.910	-11.9	0	0	0.187	0.076	Bus1308	-0.187	-0.076	330.6	92.7	
Bus1308	11.000	90.311	-10.1	0	0	-0.027	0.000	Bus1328	-0.162	-0.084	10.6	88.8	
								Bus1307	0.189	0.084	12.0	91.4	
Bus1309	0.400	88.937	-11.1	0	0	0.175	0.071	Bus1310	-0.175	-0.071	306.8	92.7	
Bus1310	11.000	90.318	-10.1	0	0	-0.027	0.000	Bus1328	-0.150	-0.076	9.8	89.2	
								Bus1309	0.177	0.075	11.2	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1311	0.400	89.040	-11.0	0	0	0.163	0.066	Bus1312	-0.163	-0.066	285.7	92.7	
Bus1312	11.000	90.325	-10.1	0	0	-0.027	0.000	Bus1328	-0.138	-0.070	9.0	89.0	
								Bus1311	0.165	0.070	10.4	92.0	
Bus1313	0.400	88.364	-11.6	0	0	0.100	0.041	Bus1314	-0.100	-0.041	176.3	92.7	
Bus1314	11.000	90.358	-10.1	0	0	-0.028	0.000	Bus1328	-0.073	-0.044	5.0	85.5	
								Bus1313	0.101	0.044	6.4	91.7	
Bus1315	0.400	88.865	-11.2	0	0	0.076	0.031	Bus1316	-0.076	-0.031	133.7	92.7	
Bus1316	11.000	90.371	-10.1	0	0	-0.028	0.000	Bus1328	-0.049	-0.033	3.4	82.6	
								Bus1315	0.077	0.033	4.9	91.9	
Bus1317	0.400	89.775	-10.6	0	0	0.126	0.051	Bus1318	-0.126	-0.051	218.6	92.8	
Bus1318	11.000	90.345	-10.1	0	0	-0.027	0.001	Bus1328	-0.100	-0.053	6.6	88.3	
								Bus1317	0.126	0.052	7.9	92.4	
Bus1319	0.400	88.514	-11.6	0	0	0.366	0.148	Bus1320	-0.366	-0.148	644.0	92.7	
Bus1320	11.000	90.215	-10.1	0	0	-0.025	0.001	Bus1328	-0.344	-0.161	22.1	90.6	
								Bus1319	0.369	0.160	23.4	91.7	
Bus1321	0.400	89.066	-11.0	0	0	0.160	0.065	Bus1322	-0.160	-0.065	280.5	92.7	
Bus1322	11.000	90.326	-10.1	0	0	-0.027	0.001	Bus1328	-0.134	-0.069	8.8	89.0	
								Bus1321	0.162	0.068	10.2	92.1	
Bus1326	11.000	90.350	-10.1	0	0	-0.029	0.000	Bus1328	-0.089	-0.050	6.0	87.1	
								Bus1327	0.118	0.051	7.5	91.9	
Bus1327	0.400	88.869	-11.2	0	0	0.117	0.048	Bus1326	-0.117	-0.048	205.4	92.7	
# Bus1328	11.000	90.401	-10.1	0	0	0.935	-1.303	Bus1196	0.128	0.066	8.4	88.9	
								Bus1198	0.135	0.068	8.8	89.4	
								Bus1200	0.188	0.091	12.1	90.1	
								Bus1202	0.169	0.083	10.9	89.9	
								Bus1204	0.171	0.083	11.1	89.9	
								Bus1206	0.154	0.076	9.9	89.7	
								Bus1208	0.102	0.056	6.7	87.7	
								Bus1210	0.081	0.045	5.4	87.2	
								Bus1212	0.111	0.057	7.3	88.8	
								Bus1214	0.119	0.062	7.8	88.7	
								Bus1216	0.105	0.056	6.9	88.3	
								Bus1218	0.141	0.070	9.1	89.5	
								Bus1220	0.147	0.074	9.6	89.2	
								Bus1222	0.202	0.097	13.0	90.2	
								Bus1224	0.193	0.093	12.4	90.1	
								Bus1226	0.100	0.054	6.6	88.1	
								Bus1228	0.157	0.077	10.2	89.8	
								Bus1230	0.115	0.059	7.5	88.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1232	0.156	0.077	10.1	89.7	
								Bus1234	0.171	0.083	11.1	89.9	
								Bus1236	0.160	0.079	10.4	89.8	
								Bus1238	0.171	0.085	11.1	89.5	
								Bus1240	0.137	0.069	8.9	89.4	
								Bus1242	0.120	0.064	7.9	88.2	
								Bus1244	0.166	0.081	10.7	89.8	
								Bus1246	0.055	0.036	3.8	83.8	
								Bus1248	0.165	0.081	10.6	89.8	
								Bus1250	0.253	0.120	16.3	90.4	
								Bus1252	0.100	0.053	6.6	88.3	
								Bus1254	0.128	0.065	8.3	89.2	
								Bus1256	0.126	0.065	8.3	88.9	
								Bus1258	0.161	0.081	10.5	89.4	
								Bus1260	0.077	0.044	5.2	87.0	
								Bus1262	0.051	0.034	3.6	83.3	
								Bus1264	0.238	0.113	15.3	90.4	
								Bus1266	0.144	0.072	9.4	89.5	
								Bus1268	0.267	0.126	17.2	90.5	
								Bus1270	0.036	0.028	2.7	79.1	
								Bus1272	0.073	0.043	4.9	86.2	
								Bus1274	0.142	0.071	9.2	89.5	
								Bus1276	0.229	0.109	14.7	90.3	
								Bus1278	0.096	0.052	6.3	87.9	
								Bus1280	0.656	0.296	41.8	91.2	
								Bus1282	0.221	0.105	14.2	90.3	
								Bus1284	0.135	0.069	8.8	89.0	
								Bus1286	0.202	0.097	13.0	90.2	
								Bus1288	0.161	0.081	10.5	89.4	
								Bus1290	0.193	0.093	12.4	90.1	
								Bus1292	0.157	0.077	10.2	89.8	
								Bus1294	0.160	0.080	10.4	89.4	
								Bus1296	0.197	0.095	12.7	90.1	
								Bus1298	0.333	0.156	21.3	90.6	
								Bus1300	0.147	0.073	9.5	89.6	
								Bus1302	0.158	0.078	10.2	89.8	
								Bus1304	0.251	0.118	16.1	90.4	
								Bus1306	0.108	0.057	7.1	88.4	
								Bus1308	0.162	0.084	10.6	88.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1310	0.150	0.076	9.7	89.3	
								Bus1312	0.138	0.070	9.0	89.1	
								Bus1314	0.073	0.044	5.0	85.6	
								Bus1316	0.049	0.033	3.4	82.9	
								Bus1318	0.100	0.053	6.6	88.4	
								Bus1320	0.345	0.161	22.1	90.6	
								Bus1322	0.135	0.069	8.8	89.0	
								Bus1326	0.089	0.050	5.9	87.2	
								Bus1329	-11.195	-3.805	686.5	94.7	
# Bus1329	33.000	99.346	-0.1	0	0	0.819	-0.898	Bus1	-12.215	-5.345	234.8	91.6	
								Bus1328	11.396	6.243	228.8	87.7	
Bus1364	11.000	96.694	-3.2	0	0	-0.006	0.001	Bus1591	-0.184	-0.079	10.8	91.8	
								Bus1365	0.189	0.078	11.1	92.4	
Bus1365	0.400	95.898	-3.9	0	0	0.189	0.075	Bus1364	-0.189	-0.075	305.7	92.8	
Bus1366	0.400	94.770	-4.6	0	0	0.164	0.066	Bus1367	-0.164	-0.066	269.2	92.8	
Bus1367	11.000	96.705	-3.2	0	0	-0.005	0.001	Bus1591	-0.160	-0.072	9.5	91.2	
								Bus1366	0.166	0.071	9.8	91.9	
Bus1368	0.400	95.835	-3.8	0	0	0.123	0.049	Bus1369	-0.123	-0.049	199.8	92.8	
Bus1369	11.000	96.726	-3.2	0	0	-0.005	0.001	Bus1591	-0.118	-0.052	7.0	91.5	
								Bus1368	0.124	0.051	7.3	92.4	
Bus1370	0.400	95.652	-4.0	0	0	0.146	0.059	Bus1371	-0.146	-0.059	237.9	92.8	
Bus1371	11.000	96.714	-3.2	0	0	-0.005	0.001	Bus1591	-0.142	-0.062	8.4	91.6	
								Bus1370	0.147	0.061	8.6	92.3	
Bus1372	11.000	96.727	-3.2	0	0	-0.006	0.001	Bus1591	-0.116	-0.052	6.9	91.2	
								Bus1373	0.122	0.051	7.2	92.2	
Bus1373	0.400	95.317	-4.2	0	0	0.121	0.048	Bus1372	-0.121	-0.048	196.9	92.8	
Bus1374	11.000	96.659	-3.2	0	0	-0.006	0.001	Bus1591	-0.254	-0.110	15.0	91.8	
								Bus1375	0.259	0.109	15.3	92.3	
Bus1375	0.400	95.562	-4.1	0	0	0.258	0.103	Bus1374	-0.258	-0.103	420.0	92.8	
Bus1376	11.000	96.696	-3.2	0	0	-0.006	0.001	Bus1591	-0.179	-0.078	10.6	91.6	
								Bus1377	0.184	0.077	10.8	92.2	
Bus1377	0.400	95.362	-4.2	0	0	0.183	0.073	Bus1376	-0.183	-0.073	298.2	92.8	
Bus1378	11.000	96.731	-3.2	0	0	-0.006	0.001	Bus1591	-0.108	-0.048	6.4	91.4	
								Bus1379	0.114	0.047	6.7	92.5	
Bus1379	0.400	95.912	-3.8	0	0	0.113	0.045	Bus1378	-0.113	-0.045	183.7	92.8	
Bus1380	0.400	95.194	-4.3	0	0	0.204	0.082	Bus1381	-0.204	-0.082	333.0	92.8	
Bus1381	11.000	96.685	-3.2	0	0	-0.005	0.001	Bus1591	-0.200	-0.088	11.9	91.6	
								Bus1380	0.206	0.087	12.1	92.1	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1382	0.400	95.861	-3.9	0	0	0.196	0.079	Bus1383	-0.196	-0.079	318.4	92.8	
Bus1383	11.000	96.690	-3.2	0	0	-0.005	0.001	Bus1591	-0.192	-0.083	11.3	91.8	
								Bus1382	0.197	0.082	11.6	92.4	
Bus1384	11.000	96.708	-3.2	0	0	-0.006	0.001	Bus1591	-0.154	-0.068	9.1	91.6	
								Bus1385	0.160	0.067	9.4	92.3	
Bus1385	0.400	95.554	-4.0	0	0	0.159	0.064	Bus1384	-0.159	-0.064	258.4	92.8	
Bus1386	0.400	95.892	-3.9	0	0	0.190	0.076	Bus1387	-0.190	-0.076	307.7	92.8	
Bus1387	11.000	96.693	-3.2	0	0	-0.005	0.001	Bus1591	-0.185	-0.080	11.0	91.8	
								Bus1386	0.191	0.079	11.2	92.4	
Bus1388	11.000	96.663	-3.2	0	0	-0.006	0.001	Bus1591	-0.246	-0.106	14.6	91.8	
								Bus1389	0.252	0.105	14.8	92.3	
Bus1389	0.400	95.598	-4.1	0	0	0.251	0.100	Bus1388	-0.251	-0.100	407.8	92.8	
Bus1390	11.000	96.699	-3.2	0	0	-0.006	0.001	Bus1591	-0.172	-0.075	10.2	91.6	
								Bus1391	0.178	0.074	10.5	92.2	
Bus1391	0.400	95.414	-4.1	0	0	0.176	0.071	Bus1390	-0.176	-0.071	287.5	92.8	
Bus1392	0.400	95.306	-4.2	0	0	0.190	0.076	Bus1393	-0.190	-0.076	309.9	92.8	
Bus1393	11.000	96.692	-3.2	0	0	-0.005	0.001	Bus1591	-0.186	-0.082	11.0	91.6	
								Bus1392	0.191	0.080	11.3	92.2	
Bus1394	0.400	95.624	-4.1	0	0	0.245	0.098	Bus1395	-0.245	-0.098	399.1	92.8	
Bus1395	11.000	96.666	-3.2	0	0	-0.005	0.001	Bus1591	-0.242	-0.104	14.3	91.8	
								Bus1394	0.247	0.103	14.5	92.3	
Bus1396	0.400	95.231	-4.2	0	0	0.199	0.080	Bus1397	-0.199	-0.080	325.3	92.8	
Bus1397	11.000	96.688	-3.2	0	0	-0.005	0.001	Bus1591	-0.196	-0.086	11.6	91.6	
								Bus1396	0.201	0.085	11.8	92.2	
Bus1424	11.000	96.731	-3.2	0	0	-0.006	0.001	Bus1591	-0.107	-0.048	6.3	91.2	
								Bus1425	0.112	0.047	6.6	92.2	
Bus1425	0.400	95.433	-4.1	0	0	0.111	0.045	Bus1424	-0.111	-0.045	181.5	92.8	
Bus1426	0.400	95.439	-4.1	0	0	0.173	0.069	Bus1427	-0.173	-0.069	282.2	92.8	
Bus1427	11.000	96.701	-3.2	0	0	-0.005	0.001	Bus1591	-0.169	-0.074	10.0	91.6	
								Bus1426	0.174	0.073	10.3	92.2	
Bus1428	0.400	95.475	-4.2	0	0	0.276	0.110	Bus1429	-0.276	-0.110	449.6	92.8	
Bus1429	11.000	96.650	-3.2	0	0	-0.005	0.001	Bus1591	-0.273	-0.118	16.1	91.8	
								Bus1428	0.278	0.116	16.3	92.2	
Bus1430	0.400	94.719	-4.7	0	0	0.429	0.172	Bus1431	-0.429	-0.172	704.4	92.8	
Bus1431	11.000	96.572	-3.2	0	0	-0.005	0.001	Bus1591	-0.428	-0.188	25.4	91.6	
								Bus1430	0.433	0.186	25.6	91.8	
Bus1432	11.000	96.727	-3.2	0	0	-0.006	0.001	Bus1591	-0.116	-0.051	6.9	91.5	
								Bus1433	0.121	0.050	7.1	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1433	0.400	95.854	-3.8	0	0	0.121	0.048	Bus1432	-0.121	-0.048	195.9	92.8	
Bus1434	11.000	96.652	-3.2	0	0	-0.006	0.001	Bus1591	-0.266	-0.118	15.8	91.5	
								Bus1435	0.272	0.117	16.1	91.9	
Bus1435	0.400	94.665	-4.6	0	0	0.269	0.108	Bus1434	-0.269	-0.108	442.2	92.8	
Bus1436	11.000	96.708	-3.2	0	0	-0.006	0.001	Bus1591	-0.154	-0.068	9.1	91.6	
								Bus1437	0.160	0.067	9.4	92.3	
Bus1437	0.400	95.554	-4.0	0	0	0.159	0.064	Bus1436	-0.159	-0.064	258.4	92.8	
Bus1438	0.400	96.038	-3.7	0	0	0.097	0.039	Bus1439	-0.097	-0.039	157.3	92.8	
Bus1439	11.000	96.739	-3.2	0	0	-0.005	0.001	Bus1591	-0.092	-0.041	5.5	91.3	
								Bus1438	0.098	0.040	5.7	92.5	
Bus1440	11.000	96.687	-3.2	0	0	-0.006	0.001	Bus1591	-0.197	-0.086	11.6	91.6	
								Bus1441	0.202	0.085	11.9	92.2	
Bus1441	0.400	95.221	-4.2	0	0	0.201	0.080	Bus1440	-0.201	-0.080	327.5	92.8	
Bus1442	11.000	96.700	-3.2	0	0	-0.006	0.001	Bus1591	-0.171	-0.074	10.1	91.8	
								Bus1443	0.177	0.073	10.4	92.4	
Bus1443	0.400	95.956	-3.8	0	0	0.176	0.071	Bus1442	-0.176	-0.071	286.0	92.8	
Bus1444	0.400	94.868	-4.6	0	0	0.400	0.160	Bus1445	-0.400	-0.160	654.7	92.8	
Bus1445	11.000	96.588	-3.2	0	0	-0.005	0.001	Bus1591	-0.398	-0.174	23.6	91.6	
								Bus1444	0.403	0.173	23.8	91.9	
Bus1446	0.400	94.817	-4.7	0	0	0.410	0.164	Bus1447	-0.410	-0.164	671.8	92.8	
Bus1447	11.000	96.582	-3.2	0	0	-0.005	0.001	Bus1591	-0.408	-0.178	24.2	91.6	
								Bus1446	0.413	0.177	24.4	91.9	
Bus1448	0.400	95.847	-3.9	0	0	0.199	0.080	Bus1449	-0.199	-0.080	322.9	92.8	
Bus1449	11.000	96.689	-3.2	0	0	-0.005	0.001	Bus1591	-0.195	-0.084	11.5	91.8	
								Bus1448	0.200	0.083	11.7	92.4	
Bus1476	11.000	96.653	-3.2	0	0	-0.006	0.001	Bus1591	-0.266	-0.117	15.8	91.5	
								Bus1477	0.271	0.116	16.0	91.9	
Bus1477	0.400	94.673	-4.6	0	0	0.268	0.107	Bus1476	-0.268	-0.107	440.6	92.8	
Bus1478	0.400	95.972	-3.8	0	0	0.173	0.069	Bus1479	-0.173	-0.069	280.4	92.8	
Bus1479	11.000	96.701	-3.2	0	0	-0.005	0.001	Bus1591	-0.169	-0.073	10.0	91.8	
								Bus1478	0.174	0.072	10.2	92.5	
Bus1480	0.400	96.210	-3.6	0	0	0.123	0.049	Bus1481	-0.123	-0.049	198.8	92.8	
Bus1481	11.000	96.726	-3.2	0	0	-0.005	0.001	Bus1591	-0.118	-0.052	7.0	91.7	
								Bus1480	0.123	0.050	7.2	92.6	
Bus1482	0.400	95.570	-4.1	0	0	0.257	0.103	Bus1483	-0.257	-0.103	417.4	92.8	
Bus1483	11.000	96.660	-3.2	0	0	-0.005	0.001	Bus1591	-0.253	-0.109	15.0	91.8	
								Bus1482	0.258	0.108	15.2	92.3	
Bus1484	11.000	96.727	-3.2	0	0	-0.006	0.001	Bus1591	-0.116	-0.051	6.9	91.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1485	0.121	0.050	7.1	92.4	
Bus1485	0.400	95.854	-3.8	0	0	0.121	0.048	Bus1484	-0.121	-0.048	195.9	92.8	
Bus1488	11.000	96.708	-3.2	0	0	-0.006	0.001	Bus1591	-0.154	-0.068	9.1	91.6	
								Bus1489	0.160	0.067	9.4	92.3	
Bus1489	0.400	95.554	-4.0	0	0	0.159	0.064	Bus1488	-0.159	-0.064	258.4	92.8	
Bus1490	0.400	95.918	-3.8	0	0	0.184	0.074	Bus1491	-0.184	-0.074	298.6	92.8	
Bus1491	11.000	96.696	-3.2	0	0	-0.005	0.001	Bus1591	-0.180	-0.078	10.6	91.8	
								Bus1490	0.185	0.076	10.9	92.4	
Bus1492	11.000	96.653	-3.2	0	0	-0.006	0.001	Bus1591	-0.267	-0.115	15.8	91.8	
								Bus1493	0.273	0.114	16.1	92.2	
Bus1493	0.400	95.499	-4.2	0	0	0.271	0.109	Bus1492	-0.271	-0.109	441.4	92.8	
Bus1494	11.000	96.699	-3.2	0	0	-0.006	0.001	Bus1591	-0.172	-0.075	10.2	91.6	
								Bus1495	0.178	0.074	10.5	92.2	
Bus1495	0.400	95.414	-4.1	0	0	0.176	0.071	Bus1494	-0.176	-0.071	287.5	92.8	
Bus1496	0.400	95.421	-4.2	0	0	0.287	0.115	Bus1497	-0.287	-0.115	468.0	92.8	
Bus1497	11.000	96.645	-3.2	0	0	-0.005	0.001	Bus1591	-0.284	-0.123	16.8	91.8	
								Bus1496	0.289	0.121	17.0	92.2	
Bus1498	0.400	94.857	-4.5	0	0	0.246	0.098	Bus1499	-0.246	-0.098	402.6	92.8	
Bus1499	11.000	96.664	-3.2	0	0	-0.005	0.001	Bus1591	-0.243	-0.107	14.4	91.5	
								Bus1498	0.248	0.106	14.6	92.0	
Bus1500	0.400	94.640	-4.8	0	0	0.445	0.178	Bus1501	-0.445	-0.178	730.9	92.8	
Bus1501	11.000	96.564	-3.2	0	0	-0.005	0.001	Bus1591	-0.444	-0.195	26.4	91.6	
								Bus1500	0.449	0.194	26.6	91.8	
Bus1526	11.000	96.686	-3.2	0	0	-0.006	0.001	Bus1591	-0.199	-0.086	11.8	91.8	
								Bus1527	0.205	0.085	12.1	92.4	
Bus1527	0.400	95.822	-3.9	0	0	0.204	0.082	Bus1526	-0.204	-0.082	331.5	92.8	
Bus1528	0.400	95.525	-4.1	0	0	0.266	0.106	Bus1529	-0.266	-0.106	432.7	92.8	
Bus1529	11.000	96.655	-3.2	0	0	-0.005	0.001	Bus1591	-0.262	-0.113	15.5	91.8	
								Bus1528	0.267	0.112	15.7	92.2	
Bus1530	0.400	95.835	-3.8	0	0	0.123	0.049	Bus1531	-0.123	-0.049	199.8	92.8	
Bus1531	11.000	96.726	-3.2	0	0	-0.005	0.001	Bus1591	-0.118	-0.052	7.0	91.5	
								Bus1530	0.124	0.051	7.3	92.4	
Bus1532	0.400	95.493	-4.1	0	0	0.107	0.043	Bus1533	-0.107	-0.043	173.5	92.8	
Bus1533	11.000	96.734	-3.2	0	0	-0.005	0.001	Bus1591	-0.102	-0.046	6.1	91.1	
								Bus1532	0.107	0.045	6.3	92.3	
Bus1534	11.000	96.681	-3.2	0	0	-0.006	0.001	Bus1591	-0.210	-0.092	12.4	91.6	
								Bus1535	0.215	0.091	12.7	92.1	
Bus1535	0.400	95.117	-4.3	0	0	0.214	0.085	Bus1534	-0.214	-0.085	349.1	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1538	0.400	95.306	-4.2	0	0	0.190	0.076	Bus1539	-0.190	-0.076	309.9	92.8	
Bus1539	11.000	96.692	-3.2	0	0	-0.005	0.001	Bus1591	-0.186	-0.082	11.0	91.6	
								Bus1538	0.191	0.080	11.3	92.2	
Bus1542	11.000	96.700	-3.2	0	0	-0.006	0.001	Bus1591	-0.171	-0.074	10.1	91.8	
								Bus1543	0.177	0.073	10.4	92.4	
Bus1543	0.400	95.956	-3.8	0	0	0.176	0.071	Bus1542	-0.176	-0.071	286.0	92.8	
Bus1544	0.400	95.421	-4.2	0	0	0.287	0.115	Bus1545	-0.287	-0.115	468.0	92.8	
Bus1545	11.000	96.645	-3.2	0	0	-0.005	0.001	Bus1591	-0.284	-0.123	16.8	91.8	
								Bus1544	0.289	0.121	17.0	92.2	
Bus1546	0.400	95.357	-4.2	0	0	0.183	0.073	Bus1547	-0.183	-0.073	299.1	92.8	
Bus1547	11.000	96.696	-3.2	0	0	-0.005	0.001	Bus1591	-0.180	-0.079	10.6	91.6	
								Bus1546	0.185	0.078	10.9	92.2	
Bus1548	0.400	95.847	-3.9	0	0	0.199	0.080	Bus1549	-0.199	-0.080	322.9	92.8	
Bus1549	11.000	96.689	-3.2	0	0	-0.005	0.001	Bus1591	-0.195	-0.084	11.5	91.8	
								Bus1548	0.200	0.083	11.7	92.4	
Bus1562	11.000	96.727	-3.2	0	0	-0.006	0.001	Bus1591	-0.116	-0.052	6.9	91.2	
								Bus1563	0.122	0.051	7.2	92.2	
Bus1563	0.400	95.317	-4.2	0	0	0.121	0.048	Bus1562	-0.121	-0.048	196.9	92.8	
Bus1564	0.400	96.038	-3.7	0	0	0.097	0.039	Bus1565	-0.097	-0.039	157.3	92.8	
Bus1565	11.000	96.739	-3.2	0	0	-0.005	0.001	Bus1591	-0.092	-0.041	5.5	91.3	
								Bus1564	0.098	0.040	5.7	92.5	
Bus1566	11.000	96.700	-3.2	0	0	-0.006	0.001	Bus1591	-0.171	-0.074	10.1	91.8	
								Bus1567	0.177	0.073	10.4	92.4	
Bus1567	0.400	95.956	-3.8	0	0	0.176	0.071	Bus1566	-0.176	-0.071	286.0	92.8	
Bus1568	0.400	95.870	-3.9	0	0	0.194	0.078	Bus1569	-0.194	-0.078	315.3	92.8	
Bus1569	11.000	96.691	-3.2	0	0	-0.005	0.001	Bus1591	-0.190	-0.082	11.2	91.8	
								Bus1568	0.195	0.081	11.5	92.4	
Bus1570	0.400	94.911	-4.5	0	0	0.153	0.061	Bus1571	-0.153	-0.061	250.5	92.8	
Bus1571	11.000	96.710	-3.2	0	0	-0.005	0.001	Bus1591	-0.149	-0.067	8.9	91.2	
								Bus1570	0.154	0.066	9.1	92.0	
Bus1572	0.400	95.847	-3.9	0	0	0.199	0.080	Bus1573	-0.199	-0.080	322.9	92.8	
Bus1573	11.000	96.689	-3.2	0	0	-0.005	0.001	Bus1591	-0.195	-0.084	11.5	91.8	
								Bus1572	0.200	0.083	11.7	92.4	
Bus1582	11.000	96.697	-3.2	0	0	-0.006	0.001	Bus1591	-0.177	-0.076	10.5	91.8	
								Bus1583	0.183	0.075	10.7	92.4	
Bus1583	0.400	95.929	-3.8	0	0	0.182	0.073	Bus1582	-0.182	-0.073	295.1	92.8	
Bus1584	11.000	96.653	-3.2	0	0	-0.006	0.001	Bus1591	-0.266	-0.116	15.7	91.7	
								Bus1585	0.272	0.115	16.0	92.1	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1449	0.195	0.084	11.5	91.9	
								Bus1476	0.266	0.117	15.8	91.5	
								Bus1479	0.169	0.073	10.0	91.9	
								Bus1481	0.118	0.051	7.0	91.7	
								Bus1483	0.253	0.109	14.9	91.9	
								Bus1484	0.116	0.051	6.9	91.6	
								Bus1488	0.154	0.067	9.1	91.6	
								Bus1491	0.180	0.077	10.6	91.9	
								Bus1492	0.267	0.115	15.8	91.8	
								Bus1494	0.172	0.075	10.2	91.6	
								Bus1497	0.284	0.123	16.8	91.8	
								Bus1499	0.243	0.107	14.4	91.6	
								Bus1501	0.445	0.195	26.3	91.6	
								Bus1526	0.200	0.086	11.8	91.9	
oad flow analysis after add two substation								Bus1529	0.263	0.113	15.5	91.8	
								Bus1531	0.119	0.052	7.0	91.6	
								Bus1533	0.102	0.046	6.1	91.3	
								Bus1534	0.210	0.092	12.4	91.6	
								Bus1539	0.186	0.081	11.0	91.6	
								Bus1542	0.171	0.074	10.1	91.9	
								Bus1545	0.284	0.123	16.8	91.8	
								Bus1547	0.180	0.078	10.6	91.6	
								Bus1549	0.195	0.084	11.5	91.9	
								Bus1562	0.116	0.052	6.9	91.3	
								Bus1565	0.092	0.041	5.5	91.4	
								Bus1566	0.171	0.074	10.1	91.9	
								Bus1569	0.190	0.082	11.2	91.9	
								Bus1571	0.149	0.067	8.9	91.3	
								Bus1573	0.195	0.084	11.5	91.9	
								Bus1582	0.177	0.076	10.5	91.9	
								Bus1584	0.266	0.116	15.7	91.7	
								Bus1587	0.116	0.051	6.9	91.6	
								Bus1589	0.405	0.175	23.9	91.8	
								Bus1590	-6.306	-2.379	365.5	93.6	
								Bus1590	-6.306	-2.379	365.5	93.6	

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

# Indicates a bus with a load mismatch of more than 0.1 MVA

LOAD FLOW REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* Bus1	33.000	100.000	0.0	56.492	23.182	0	0	Bus189	0.000	-0.002	0.0	0.0	
								Bus17	0.000	-0.002	0.0	0.0	
								Bus147	7.763	3.393	148.2	91.6	
								Bus612	9.472	2.868	173.1	95.7	
								Bus650	13.402	5.846	255.8	91.7	
								Bus1329	10.545	4.551	200.9	91.8	
								Bus1590	11.470	4.780	217.4	92.3	
								Bus2	3.840	1.747	73.8	91.0	
# Bus2	11.000	97.203	-3.1	0	0	-0.128	-0.086	Bus3	0.108	0.043	6.3	92.9	
								Bus7	0.133	0.053	7.7	92.8	
								Bus11	0.053	0.020	3.1	93.5	
								Bus19	0.062	0.027	3.6	91.9	
								Bus21	0.114	0.045	6.6	92.9	
								Bus23	0.254	0.105	14.8	92.5	
								Bus33	0.170	0.068	9.9	92.7	
								Bus35	0.142	0.057	8.2	92.9	
								Bus38	0.167	0.067	9.7	92.8	
								Bus39	0.086	0.033	5.0	93.2	
								Bus61	0.123	0.049	7.2	92.8	
								Bus63	0.100	0.040	5.8	93.0	
								Bus65	0.061	0.023	3.5	93.3	
								Bus67	0.084	0.034	4.9	92.7	
								Bus70	0.078	0.030	4.5	93.2	
								Bus71	0.055	0.021	3.2	93.4	
								Bus73	0.047	0.017	2.7	93.7	
								Bus75	0.177	0.072	10.3	92.7	
								Bus77	0.114	0.045	6.6	92.9	
								Bus79	0.076	0.030	4.4	93.1	
								Bus83	0.109	0.043	6.3	92.9	
								Bus87	0.105	0.041	6.1	93.0	
								Bus99	0.160	0.064	9.3	92.8	
								Bus102	0.253	0.103	14.8	92.6	
								Bus103	0.263	0.107	15.3	92.6	
								Bus113	0.169	0.068	9.8	92.9	
								Bus115	0.120	0.048	7.0	93.0	
								Bus117	0.202	0.081	11.8	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus139	0.067	0.026	3.9	93.2	
								Bus141	0.083	0.032	4.8	93.1	
								Bus143	0.132	0.053	7.7	92.9	
								Bus145	0.080	0.031	4.7	93.2	
								Bus1	-3.819	-1.493	221.4	93.1	
Bus3	11.000	97.151	-3.1	0	0	0.002	0.000	Bus2	-0.108	-0.043	6.3	92.8	
								Bus4	0.106	0.043	6.2	92.5	
Bus4	0.400	96.394	-3.7	0	0	0.105	0.042	Bus3	-0.105	-0.042	169.8	92.8	
Bus5	33.000	99.942	0.0	0	0	-0.001	-0.003	Bus17	-1.093	-0.464	20.8	92.0	
								Bus6	1.094	0.467	20.8	92.0	
Bus6	11.000	99.159	-0.9	0	0	0.001	-0.003	Bus138	0.136	0.057	7.8	92.2	
								Bus151	0.098	0.040	5.6	92.4	
								Bus155	0.117	0.048	6.7	92.6	
								Bus159	0.149	0.062	8.6	92.4	
								Bus161	0.094	0.039	5.4	92.5	
								Bus167	0.105	0.043	6.0	92.6	
								Bus169	0.187	0.077	10.7	92.5	
								Bus175	0.205	0.085	11.7	92.4	
								Bus5	-1.092	-0.447	62.5	92.6	
Bus7	11.000	97.139	-3.1	0	0	0.002	0.000	Bus2	-0.133	-0.054	7.7	92.7	
								Bus8	0.131	0.054	7.6	92.4	
Bus8	0.400	96.202	-3.8	0	0	0.130	0.052	Bus7	-0.130	-0.052	210.1	92.8	
Bus9	33.000	99.986	0.0	0	0	0.003	-0.004	Bus17	-0.264	-0.113	5.0	91.9	
								Bus10	0.261	0.117	5.0	91.3	
Bus10	11.000	96.978	-2.0	0	0	-0.009	-0.003	Bus181	0.109	0.043	6.4	92.9	
								Bus183	0.157	0.064	9.2	92.6	
								Bus9	-0.257	-0.104	15.0	92.7	
Bus11	11.000	97.177	-3.1	0	0	0.002	0.000	Bus2	-0.053	-0.020	3.1	93.3	
								Bus12	0.051	0.021	3.0	92.7	
Bus12	0.400	96.813	-3.4	0	0	0.051	0.020	Bus11	-0.051	-0.020	82.1	92.8	
Bus13	33.000	99.986	0.0	0	0	0.003	-0.004	Bus17	-0.269	-0.117	5.1	91.7	
								Bus14	0.266	0.121	5.1	91.0	
Bus14	11.000	96.899	-2.0	0	0	-0.010	-0.003	Bus185	0.109	0.043	6.4	92.9	
								Bus187	0.162	0.067	9.5	92.3	
								Bus13	-0.262	-0.108	15.3	92.5	
Bus15	33.000	99.773	0.0	0	0	0.000	-0.029	Bus17	-4.221	-1.904	81.2	91.2	
								Bus16	4.221	1.933	81.4	90.9	
Bus16	11.000	97.991	-2.0	0	0	-0.010	-0.027	Bus50	0.581	0.252	33.9	91.8	
								Bus52	0.197	0.082	11.4	92.3	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus54	0.135	0.056	7.8	92.5	
								Bus56	0.346	0.146	20.1	92.1	
								Bus58	0.238	0.099	13.8	92.4	
								Bus60	0.515	0.221	30.0	91.9	
								Bus82	0.191	0.079	11.1	92.5	
								Bus92	0.269	0.112	15.6	92.3	
								Bus94	0.126	0.052	7.3	92.6	
								Bus96	0.365	0.155	21.3	92.1	
								Bus98	0.103	0.042	5.9	92.7	
								Bus106	0.295	0.123	17.1	92.2	
								Bus108	0.441	0.190	25.7	91.9	
								Bus110	0.252	0.105	14.6	92.3	
								Bus112	0.164	0.067	9.5	92.6	
								Bus15	-4.209	-1.752	244.2	92.3	
*Bus17	33.000	100.000	0.0	5.855	2.591	0	0	Bus13	0.269	0.114	5.1	92.1	
								Bus9	0.264	0.110	5.0	92.3	
								Bus5	1.094	0.461	20.8	92.1	
								Bus15	4.229	1.908	81.2	91.2	
								Bus1	0.000	-0.002	0.0	0.0	
Bus19	11.000	95.152	-4.8	0	0	0	0	Bus2	-0.061	-0.025	3.6	92.6	
								Bus20	0.061	0.025	3.7	92.6	
Bus20	0.400	94.704	-5.2	0	0	0.061	0.025	Bus19	-0.061	-0.025	100.7	92.8	
Bus21	11.000	97.148	-3.1	0	0	0.002	0.000	Bus2	-0.114	-0.046	6.6	92.8	
								Bus22	0.112	0.046	6.5	92.5	
Bus22	0.400	96.347	-3.7	0	0	0.111	0.045	Bus21	-0.111	-0.045	179.8	92.8	
Bus23	11.000	97.080	-3.1	0	0	0.002	0.000	Bus2	-0.254	-0.105	14.8	92.4	
								Bus24	0.252	0.105	14.8	92.3	
Bus24	0.400	96.020	-4.0	0	0	0.251	0.100	Bus23	-0.251	-0.100	405.8	92.8	
Bus33	11.000	97.121	-3.1	0	0	0.002	0.000	Bus2	-0.170	-0.069	9.9	92.7	
								Bus34	0.168	0.069	9.8	92.5	
Bus34	0.400	96.419	-3.7	0	0	0.167	0.067	Bus33	-0.167	-0.067	269.5	92.8	
Bus35	11.000	97.135	-3.1	0	0	0.002	0.000	Bus2	-0.142	-0.057	8.2	92.8	
								Bus36	0.140	0.057	8.2	92.5	
Bus36	0.400	96.551	-3.6	0	0	0.139	0.056	Bus35	-0.139	-0.056	224.3	92.8	
Bus37	0.400	96.435	-3.7	0	0	0.164	0.066	Bus38	-0.164	-0.066	264.2	92.8	
Bus38	11.000	97.122	-3.1	0	0	0.002	0.000	Bus2	-0.167	-0.067	9.7	92.7	
								Bus37	0.164	0.068	9.6	92.5	
Bus39	11.000	97.162	-3.1	0	0	0.002	0.000	Bus2	-0.086	-0.034	5.0	93.1	
								Bus40	0.084	0.034	4.9	92.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus40	0.400	96.813	-3.4	0	0	0.084	0.033	Bus39	-0.084	-0.033	134.3	92.8	
Bus50	11.000	97.709	-2.1	0	0	0	0	Bus16	-0.579	-0.251	33.9	91.8	
								Bus51	0.579	0.251	33.9	91.8	
Bus51	0.400	95.978	-3.7	0	0	0.576	0.230	Bus50	-0.576	-0.230	932.4	92.8	
Bus52	11.000	97.897	-2.1	0	0	0	0	Bus16	-0.197	-0.082	11.4	92.2	
								Bus53	0.196	0.082	11.4	92.2	
Bus53	0.400	96.491	-3.0	0	0	0.195	0.078	Bus52	-0.195	-0.078	314.1	92.8	
Bus54	11.000	97.926	-2.1	0	0	0	0	Bus16	-0.135	-0.056	7.9	92.4	
								Bus55	0.135	0.056	7.8	92.4	
Bus55	0.400	96.964	-2.7	0	0	0.135	0.054	Bus54	-0.135	-0.054	215.8	92.8	
Bus56	11.000	97.824	-2.1	0	0	0	0	Bus16	-0.346	-0.146	20.2	92.1	
								Bus57	0.346	0.146	20.2	92.1	
Bus57	0.400	96.372	-3.2	0	0	0.344	0.137	Bus56	-0.344	-0.137	554.2	92.8	
Bus58	11.000	97.877	-2.1	0	0	0	0	Bus16	-0.238	-0.099	13.8	92.3	
								Bus59	0.238	0.099	13.8	92.3	
Bus59	0.400	96.886	-2.9	0	0	0.237	0.095	Bus58	-0.237	-0.095	379.9	92.8	
Bus60	11.000	97.742	-2.1	0	0	0	0	Bus16	-0.514	-0.220	30.0	91.9	
								Bus81	0.513	0.220	30.0	91.9	
Bus61	11.000	97.143	-3.1	0	0	0.002	0.000	Bus2	-0.123	-0.050	7.2	92.7	
								Bus62	0.121	0.050	7.1	92.4	
Bus62	0.400	96.274	-3.7	0	0	0.121	0.048	Bus61	-0.121	-0.048	194.9	92.8	
Bus63	11.000	97.155	-3.1	0	0	0.002	0.000	Bus2	-0.100	-0.040	5.8	92.9	
								Bus64	0.098	0.040	5.7	92.5	
Bus64	0.400	96.455	-3.6	0	0	0.098	0.039	Bus63	-0.098	-0.039	157.2	92.8	
Bus65	11.000	97.174	-3.1	0	0	0.002	0.000	Bus2	-0.061	-0.024	3.5	93.1	
								Bus66	0.059	0.024	3.4	92.5	
Bus66	0.400	96.502	-3.6	0	0	0.059	0.023	Bus65	-0.059	-0.023	94.3	92.8	
Bus67	11.000	97.162	-3.1	0	0	0.002	0.000	Bus2	-0.084	-0.034	4.9	92.6	
								Bus68	0.082	0.035	4.8	92.1	
Bus68	0.400	95.676	-4.2	0	0	0.082	0.033	Bus67	-0.082	-0.033	132.7	92.8	
Bus69	0.400	96.622	-3.5	0	0	0.076	0.030	Bus70	-0.076	-0.030	122.1	92.8	
Bus70	11.000	97.165	-3.1	0	0	0.002	0.000	Bus2	-0.078	-0.031	4.5	93.1	
								Bus69	0.076	0.031	4.4	92.6	
Bus71	11.000	97.176	-3.1	0	0	0.002	0.000	Bus2	-0.055	-0.021	3.2	93.2	
								Bus72	0.053	0.022	3.1	92.6	
Bus72	0.400	96.570	-3.5	0	0	0.053	0.021	Bus71	-0.053	-0.021	85.2	92.8	
Bus73	11.000	97.181	-3.1	0	0	0.002	0.000	Bus2	-0.047	-0.018	2.7	93.5	
								Bus74	0.045	0.018	2.6	92.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus74	0.400	96.862	-3.3	0	0	0.045	0.018	Bus73	-0.045	-0.018	71.6	92.8	
Bus75	11.000	97.117	-3.1	0	0	0.002	0.000	Bus2	-0.177	-0.072	10.3	92.7	
								Bus76	0.175	0.072	10.2	92.4	
Bus76	0.400	96.384	-3.7	0	0	0.175	0.070	Bus75	-0.175	-0.070	281.6	92.8	
Bus77	11.000	97.148	-3.1	0	0	0.002	0.000	Bus2	-0.114	-0.046	6.6	92.8	
								Bus78	0.112	0.046	6.5	92.5	
Bus78	0.400	96.347	-3.7	0	0	0.111	0.045	Bus77	-0.111	-0.045	179.8	92.8	
Bus79	11.000	97.166	-3.1	0	0	0.002	0.000	Bus2	-0.076	-0.030	4.4	92.9	
								Bus80	0.074	0.030	4.3	92.4	
Bus80	0.400	96.322	-3.7	0	0	0.073	0.029	Bus79	-0.073	-0.029	118.4	92.8	
Bus81	0.400	96.214	-3.5	0	0	0.511	0.204	Bus60	-0.511	-0.204	825.1	92.8	
Bus82	11.000	97.900	-2.1	0	0	0	0	Bus16	-0.191	-0.079	11.1	92.5	
								Bus85	0.191	0.079	11.1	92.4	
Bus83	11.000	97.150	-3.1	0	0	0.002	0.000	Bus2	-0.109	-0.044	6.4	92.8	
								Bus84	0.107	0.044	6.3	92.5	
Bus84	0.400	96.383	-3.7	0	0	0.107	0.043	Bus83	-0.107	-0.043	172.3	92.8	
Bus85	0.400	97.106	-2.7	0	0	0.190	0.076	Bus82	-0.190	-0.076	304.7	92.8	
Bus87	11.000	97.152	-3.1	0	0	0.002	0.000	Bus2	-0.105	-0.042	6.1	92.8	
								Bus88	0.103	0.042	6.0	92.5	
Bus88	0.400	96.419	-3.6	0	0	0.102	0.041	Bus87	-0.102	-0.041	164.7	92.8	
Bus92	11.000	97.862	-2.1	0	0	0	0	Bus16	-0.269	-0.112	15.6	92.3	
								Bus93	0.269	0.112	15.6	92.3	
Bus93	0.400	96.740	-3.0	0	0	0.267	0.107	Bus92	-0.267	-0.107	429.7	92.8	
Bus94	11.000	97.931	-2.1	0	0	0	0	Bus16	-0.126	-0.052	7.3	92.5	
								Bus95	0.126	0.052	7.3	92.4	
Bus95	0.400	97.036	-2.7	0	0	0.125	0.050	Bus94	-0.125	-0.050	200.8	92.8	
Bus96	11.000	97.815	-2.1	0	0	0	0	Bus16	-0.365	-0.155	21.3	92.0	
								Bus97	0.365	0.155	21.3	92.0	
Bus97	0.400	96.282	-3.3	0	0	0.362	0.145	Bus96	-0.362	-0.145	584.7	92.8	
Bus98	11.000	97.942	-2.1	0	0	0	0	Bus16	-0.103	-0.042	5.9	92.6	
								Bus105	0.103	0.042	5.9	92.5	
Bus99	11.000	97.125	-3.1	0	0	0.002	0.000	Bus2	-0.160	-0.065	9.3	92.7	
								Bus100	0.158	0.065	9.3	92.5	
Bus100	0.400	96.464	-3.7	0	0	0.158	0.063	Bus99	-0.158	-0.063	254.4	92.8	
Bus101	0.400	96.497	-3.7	0	0	0.250	0.100	Bus102	-0.250	-0.100	402.7	92.9	
Bus102	11.000	97.080	-3.1	0	0	0.003	0.000	Bus2	-0.253	-0.103	14.8	92.6	
								Bus101	0.250	0.103	14.6	92.5	
Bus103	11.000	97.076	-3.1	0	0	0.002	0.000	Bus2	-0.262	-0.107	15.3	92.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus104	0.260	0.108	15.2	92.4	
Bus104	0.400	96.468	-3.8	0	0	0.260	0.104	Bus103	-0.260	-0.104	419.0	92.8	
Bus105	0.400	97.215	-2.6	0	0	0.102	0.041	Bus98	-0.102	-0.041	163.3	92.8	
Bus106	11.000	97.849	-2.1	0	0	0	0	Bus16	-0.294	-0.123	17.1	92.2	
								Bus107	0.294	0.124	17.1	92.2	
Bus107	0.400	96.619	-3.1	0	0	0.292	0.117	Bus106	-0.292	-0.117	470.6	92.8	
Bus108	11.000	97.777	-2.1	0	0	0	0	Bus16	-0.440	-0.189	25.7	91.9	
								Bus109	0.440	0.189	25.7	91.9	
Bus109	0.400	95.917	-3.6	0	0	0.436	0.175	Bus108	-0.436	-0.175	707.3	92.8	
Bus110	11.000	97.870	-2.1	0	0	0	0	Bus16	-0.252	-0.105	14.6	92.3	
								Bus111	0.252	0.105	14.6	92.3	
Bus111	0.400	96.820	-2.9	0	0	0.251	0.100	Bus110	-0.251	-0.100	402.5	92.8	
Bus112	11.000	97.913	-2.1	0	0	0	0	Bus16	-0.164	-0.067	9.5	92.5	
								Bus119	0.164	0.067	9.5	92.5	
Bus113	11.000	97.121	-3.1	0	0	0.002	-0.001	Bus2	-0.169	-0.068	9.9	92.8	
								Bus114	0.167	0.068	9.8	92.6	
Bus114	0.400	96.733	-3.5	0	0	0.167	0.067	Bus113	-0.167	-0.067	268.7	92.8	
Bus115	11.000	97.145	-3.1	0	0	0.002	0.000	Bus2	-0.120	-0.048	7.0	92.9	
								Bus116	0.118	0.048	6.9	92.6	
Bus116	0.400	96.652	-3.5	0	0	0.118	0.047	Bus115	-0.118	-0.047	189.8	92.8	
Bus117	11.000	97.105	-3.1	0	0	0.002	-0.001	Bus2	-0.202	-0.081	11.8	92.7	
								Bus118	0.200	0.082	11.7	92.5	
Bus118	0.400	96.641	-3.6	0	0	0.200	0.080	Bus117	-0.200	-0.080	321.2	92.8	
Bus119	0.400	97.233	-2.6	0	0	0.163	0.065	Bus112	-0.163	-0.065	261.3	92.8	
Bus138	11.000	99.095	-0.9	0	0	0	0	Bus6	-0.136	-0.057	7.8	92.1	
								Bus150	0.136	0.057	7.8	92.1	
Bus139	11.000	97.170	-3.1	0	0	0.002	0.000	Bus2	-0.067	-0.027	3.9	93.0	
								Bus140	0.065	0.027	3.8	92.5	
Bus140	0.400	96.423	-3.6	0	0	0.065	0.026	Bus139	-0.065	-0.026	104.8	92.8	
Bus141	11.000	97.163	-3.1	0	0	0.002	0.000	Bus2	-0.083	-0.033	4.8	93.0	
								Bus142	0.081	0.033	4.7	92.6	
Bus142	0.400	96.584	-3.5	0	0	0.081	0.032	Bus141	-0.081	-0.032	130.1	92.8	
Bus143	11.000	97.139	-3.1	0	0	0.002	0.000	Bus2	-0.132	-0.053	7.7	92.8	
								Bus144	0.130	0.053	7.6	92.5	
Bus144	0.400	96.595	-3.6	0	0	0.130	0.052	Bus143	-0.130	-0.052	209.3	92.8	
Bus145	11.000	97.164	-3.1	0	0	0.002	0.000	Bus2	-0.080	-0.032	4.7	93.0	
								Bus146	0.078	0.032	4.6	92.6	
Bus146	0.400	96.606	-3.5	0	0	0.078	0.031	Bus145	-0.078	-0.031	125.6	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus147	33.000	99.588	-0.1	0	0	0.036	-0.074	Bus1	-7.735	-3.372	148.2	91.7	
								Bus148	3.737	1.533	71.0	92.5	
								Bus149	3.962	1.913	77.3	90.0	
Bus148	11.000	98.151	-1.9	0	0	-0.036	-0.031	Bus152	0.206	0.084	11.9	92.5	
								Bus156	0.072	0.028	4.1	93.1	
								Bus162	0.108	0.043	6.2	92.8	
								Bus164	0.073	0.029	4.2	93.0	
								Bus170	0.459	0.195	26.7	92.0	
								Bus172	0.104	0.042	6.0	92.6	
								Bus192	0.375	0.159	21.8	92.1	
								Bus194	0.272	0.113	15.7	92.4	
								Bus196	0.153	0.062	8.8	92.7	
								Bus212	0.132	0.053	7.6	92.7	
								Bus214	0.082	0.032	4.7	93.0	
								Bus216	0.108	0.043	6.2	92.8	
								Bus218	0.155	0.063	9.0	92.5	
								Bus220	0.421	0.178	24.4	92.1	
								Bus222	0.090	0.036	5.2	92.7	
								Bus224	0.108	0.044	6.3	92.6	
								Bus228	0.084	0.034	4.8	92.8	
								Bus149	0.764	0.187	42.0	97.1	
								Bus147	-3.729	-1.396	212.9	93.7	
Bus149	11.000	97.825	-2.0	0	0	-0.076	-0.031	Bus232	0.106	0.042	6.1	92.9	
								Bus242	0.092	0.037	5.3	92.8	
								Bus250	0.108	0.043	6.3	92.8	
								Bus252	0.347	0.146	20.2	92.2	
								Bus266	0.083	0.033	4.8	92.9	
								Bus268	0.139	0.056	8.0	92.8	
								Bus270	0.096	0.038	5.6	92.9	
								Bus272	0.177	0.072	10.3	92.7	
								Bus274	0.115	0.046	6.6	92.9	
								Bus276	0.104	0.041	6.0	92.9	
								Bus294	0.083	0.033	4.8	92.9	
								Bus298	0.087	0.035	5.0	92.8	
								Bus314	0.165	0.068	9.6	92.5	
								Bus316	0.136	0.055	7.9	92.8	
								Bus318	0.183	0.074	10.6	92.6	
								Bus320	0.127	0.051	7.4	92.7	
								Bus322	0.089	0.035	5.1	93.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus324	0.254	0.106	14.8	92.3	
								Bus338	0.128	0.051	7.4	92.9	
								Bus340	0.100	0.039	5.8	93.0	
								Bus342	0.254	0.105	14.7	92.5	
								Bus345	0.134	0.054	7.8	92.8	
								Bus346	0.146	0.058	8.4	92.8	
								Bus348	0.379	0.165	22.2	91.6	
								Bus376	0.376	0.159	21.9	92.1	
								Bus378	0.376	0.159	21.9	92.1	
								Bus382	0.134	0.054	7.7	92.7	
								Bus388	0.113	0.046	6.6	92.6	
								Bus390	0.158	0.064	9.1	92.7	
								Bus148	-0.762	-0.185	42.0	97.2	
								Bus147	-3.952	-1.751	231.9	91.4	
Bus150	0.400	97.558	-2.0	0	0	0.135	0.054	Bus138	-0.135	-0.054	214.5	92.8	
Bus151	11.000	99.113	-0.9	0	0	0	0	Bus6	-0.098	-0.041	5.6	92.3	
								Bus154	0.098	0.041	5.6	92.3	
Bus152	11.000	98.052	-1.9	0	0	0	0	Bus148	-0.206	-0.085	11.9	92.5	
								Bus153	0.205	0.085	11.9	92.4	
Bus153	0.400	97.201	-2.6	0	0	0.204	0.082	Bus152	-0.204	-0.082	326.8	92.8	
Bus154	0.400	98.008	-1.7	0	0	0.097	0.039	Bus151	-0.097	-0.039	154.6	92.8	
Bus155	11.000	99.104	-0.9	0	0	0	0	Bus6	-0.116	-0.048	6.7	92.5	
								Bus158	0.117	0.048	6.7	92.5	
Bus156	11.000	98.117	-1.9	0	0	0	0	Bus148	-0.072	-0.029	4.1	92.9	
								Bus157	0.071	0.029	4.1	92.6	
Bus157	0.400	97.617	-2.2	0	0	0.071	0.028	Bus156	-0.071	-0.028	112.4	92.8	
Bus158	0.400	98.286	-1.5	0	0	0.116	0.046	Bus155	-0.116	-0.046	183.6	92.8	
Bus159	11.000	99.088	-0.9	0	0	0	0	Bus6	-0.149	-0.062	8.6	92.4	
								Bus160	0.149	0.062	8.6	92.4	
Bus160	0.400	98.037	-1.6	0	0	0.149	0.059	Bus159	-0.149	-0.059	235.6	92.8	
Bus161	11.000	99.114	-0.9	0	0	0	0	Bus6	-0.094	-0.039	5.4	92.3	
								Bus166	0.094	0.039	5.4	92.4	
Bus162	11.000	98.099	-1.9	0	0	0	0	Bus148	-0.108	-0.044	6.2	92.7	
								Bus163	0.107	0.044	6.2	92.5	
Bus163	0.400	97.340	-2.4	0	0	0.107	0.043	Bus162	-0.107	-0.043	170.6	92.8	
Bus164	11.000	98.116	-1.9	0	0	0	0	Bus148	-0.073	-0.029	4.2	92.9	
								Bus165	0.073	0.030	4.2	92.6	
Bus165	0.400	97.603	-2.2	0	0	0.072	0.029	Bus164	-0.072	-0.029	115.4	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus166	0.400	98.053	-1.6	0	0	0.094	0.038	Bus161	-0.094	-0.038	148.7	92.8	
Bus167	11.000	99.109	-0.9	0	0	0	0	Bus6	-0.105	-0.043	6.0	92.5	
								Bus168	0.105	0.043	6.0	92.5	
Bus168	0.400	98.371	-1.4	0	0	0.105	0.042	Bus167	-0.105	-0.042	165.8	92.8	
Bus169	11.000	99.070	-0.9	0	0	0	0	Bus6	-0.187	-0.077	10.7	92.4	
								Bus174	0.187	0.077	10.7	92.4	
Bus170	11.000	97.929	-1.9	0	0	0	0	Bus148	-0.458	-0.194	26.7	92.0	
								Bus171	0.457	0.195	26.6	92.0	
Bus171	0.400	96.576	-3.2	0	0	0.455	0.182	Bus170	-0.455	-0.182	732.4	92.8	
Bus172	11.000	98.101	-1.9	0	0	0	0	Bus148	-0.104	-0.043	6.0	92.5	
								Bus173	0.103	0.043	6.0	92.3	
Bus173	0.400	96.930	-2.7	0	0	0.102	0.041	Bus172	-0.102	-0.041	163.8	92.8	
Bus174	0.400	98.302	-1.5	0	0	0.187	0.075	Bus169	-0.187	-0.075	295.1	92.8	
Bus175	11.000	99.062	-0.9	0	0	0	0	Bus6	-0.205	-0.085	11.8	92.4	
								Bus176	0.205	0.085	11.8	92.4	
Bus176	0.400	98.220	-1.6	0	0	0.204	0.082	Bus175	-0.204	-0.082	323.3	92.8	
Bus181	11.000	96.925	-2.0	0	0	0.002	0.000	Bus10	-0.109	-0.044	6.4	92.8	
								Bus182	0.107	0.044	6.3	92.5	
Bus182	0.400	96.156	-2.6	0	0	0.107	0.043	Bus181	-0.107	-0.043	172.6	92.8	
Bus183	11.000	96.902	-2.0	0	0	0.002	0.000	Bus10	-0.157	-0.064	9.2	92.6	
								Bus184	0.155	0.065	9.1	92.3	
Bus184	0.400	95.785	-2.8	0	0	0.154	0.062	Bus183	-0.154	-0.062	250.1	92.8	
Bus185	11.000	96.846	-2.1	0	0	0.002	0.000	Bus14	-0.109	-0.044	6.4	92.8	
								Bus186	0.107	0.044	6.3	92.5	
Bus186	0.400	96.077	-2.6	0	0	0.107	0.043	Bus185	-0.107	-0.043	172.8	92.8	
Bus187	11.000	96.820	-2.1	0	0	0.002	0.000	Bus14	-0.162	-0.068	9.5	92.2	
								Bus188	0.159	0.068	9.4	92.0	
Bus188	0.400	94.964	-3.4	0	0	0.158	0.063	Bus187	-0.158	-0.063	258.3	92.8	
*Bus189	33.000	100.000	0.0	5.687	2.513	0	0	Bus190	3.053	1.378	58.6	91.1	
								Bus191	1.180	0.501	22.4	92.0	
								Bus198	1.454	0.636	27.8	91.6	
								Bus1	0.000	-0.002	0.0	0.0	
Bus190	33.000	99.836	0.0	0	0	-0.004	-0.004	Bus189	-3.049	-1.377	58.6	91.1	
								Bus200	3.053	1.381	58.7	91.1	
Bus191	33.000	99.938	0.0	0	0	-0.001	-0.002	Bus189	-1.179	-0.504	22.5	92.0	
								Bus201	1.180	0.506	22.5	91.9	
Bus192	11.000	97.969	-1.9	0	0	0	0	Bus148	-0.375	-0.159	21.8	92.1	
								Bus193	0.374	0.159	21.8	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus193	0.400	96.398	-3.1	0	0	0.371	0.149	Bus192	-0.371	-0.149	599.0	92.8	
Bus194	11.000	98.020	-1.9	0	0	0	0	Bus148	-0.271	-0.113	15.7	92.3	
								Bus195	0.271	0.113	15.7	92.3	
Bus195	0.400	96.892	-2.8	0	0	0.269	0.108	Bus194	-0.269	-0.108	432.1	92.8	
Bus196	11.000	98.078	-1.9	0	0	0	0	Bus148	-0.153	-0.062	8.8	92.6	
								Bus197	0.152	0.062	8.8	92.5	
Bus197	0.400	97.450	-2.4	0	0	0.151	0.061	Bus196	-0.151	-0.061	241.5	92.8	
Bus198	33.000	99.923	0.0	0	0	-0.002	-0.003	Bus189	-1.453	-0.638	27.8	91.6	
								Bus202	1.455	0.641	27.8	91.5	
Bus200	11.000	98.550	-1.5	0	0	0.009	-0.011	Bus278	0.363	0.153	21.0	92.1	
								Bus280	0.580	0.252	33.7	91.7	
								Bus282	0.542	0.234	31.5	91.8	
								Bus284	0.465	0.199	26.9	91.9	
								Bus304	0.192	0.081	11.1	92.1	
								Bus306	0.346	0.147	20.0	92.0	
								Bus308	0.191	0.081	11.1	92.1	
								Bus310	0.149	0.064	8.6	92.0	
								Bus394	0.209	0.088	12.1	92.2	
								Bus190	-3.047	-1.288	176.2	92.1	
Bus201	11.000	99.091	-1.0	0	0	0.002	-0.003	Bus350	0.187	0.077	10.7	92.5	
								Bus352	0.205	0.085	11.7	92.4	
								Bus366	0.187	0.077	10.7	92.5	
								Bus368	0.205	0.085	11.7	92.4	
								Bus374	0.187	0.077	10.7	92.5	
								Bus380	0.205	0.085	11.7	92.4	
								Bus191	-1.178	-0.482	67.4	92.6	
Bus202	11.000	98.857	-1.2	0	0	0.003	-0.005	Bus354	0.259	0.108	14.9	92.3	
								Bus356	0.481	0.206	27.8	91.9	
								Bus370	0.107	0.044	6.1	92.5	
								Bus372	0.289	0.122	16.7	92.2	
								Bus384	0.157	0.065	9.0	92.5	
								Bus386	0.155	0.066	9.0	92.0	
								Bus198	-1.452	-0.605	83.5	92.3	
Bus212	11.000	98.088	-1.9	0	0	0	0	Bus148	-0.131	-0.054	7.6	92.6	
								Bus213	0.131	0.054	7.6	92.4	
Bus213	0.400	97.160	-2.5	0	0	0.130	0.052	Bus212	-0.130	-0.052	208.0	92.8	
Bus214	11.000	98.112	-1.9	0	0	0	0	Bus148	-0.082	-0.033	4.7	92.8	
								Bus215	0.081	0.033	4.7	92.6	
Bus215	0.400	97.539	-2.3	0	0	0.081	0.032	Bus214	-0.081	-0.032	128.8	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus216	11.000	98.099	-1.9	0	0	0	0	Bus148	-0.108	-0.044	6.2	92.7	
								Bus217	0.107	0.044	6.2	92.5	
Bus217	0.400	97.340	-2.4	0	0	0.107	0.043	Bus216	-0.107	-0.043	170.6	92.8	
Bus218	11.000	98.076	-1.9	0	0	0	0	Bus148	-0.155	-0.064	9.0	92.5	
								Bus219	0.154	0.064	8.9	92.3	
Bus219	0.400	96.980	-2.6	0	0	0.153	0.061	Bus218	-0.153	-0.061	245.6	92.8	
Bus220	11.000	97.947	-1.9	0	0	0	0	Bus148	-0.420	-0.178	24.5	92.1	
								Bus221	0.420	0.178	24.4	92.1	
Bus221	0.400	96.708	-3.1	0	0	0.418	0.167	Bus220	-0.418	-0.167	671.7	92.8	
Bus222	11.000	98.108	-1.9	0	0	0	0	Bus148	-0.090	-0.036	5.2	92.6	
								Bus223	0.089	0.037	5.1	92.4	
Bus223	0.400	97.100	-2.6	0	0	0.088	0.035	Bus222	-0.088	-0.035	141.2	92.8	
Bus224	11.000	98.099	-1.9	0	0	0	0	Bus148	-0.108	-0.045	6.3	92.5	
								Bus225	0.107	0.045	6.2	92.3	
Bus225	0.400	96.874	-2.7	0	0	0.107	0.043	Bus224	-0.107	-0.043	171.4	92.8	
Bus228	11.000	98.111	-1.9	0	0	0	0	Bus148	-0.084	-0.034	4.8	92.6	
								Bus229	0.083	0.034	4.8	92.4	
Bus229	0.400	97.167	-2.5	0	0	0.083	0.033	Bus228	-0.083	-0.033	132.2	92.8	
Bus232	11.000	97.775	-2.0	0	0	0.001	0.000	Bus149	-0.106	-0.043	6.1	92.7	
								Bus233	0.104	0.043	6.1	92.5	
Bus233	0.400	97.033	-2.5	0	0	0.104	0.042	Bus232	-0.104	-0.042	166.7	92.8	
Bus242	11.000	97.782	-2.0	0	0	0.001	0.000	Bus149	-0.092	-0.037	5.3	92.7	
								Bus243	0.091	0.038	5.3	92.4	
Bus243	0.400	96.748	-2.7	0	0	0.090	0.036	Bus242	-0.090	-0.036	144.7	92.8	
Bus250	11.000	97.774	-2.0	0	0	0.001	0.000	Bus149	-0.108	-0.044	6.3	92.7	
								Bus251	0.107	0.044	6.2	92.5	
Bus251	0.400	97.011	-2.5	0	0	0.107	0.043	Bus250	-0.107	-0.043	171.2	92.8	
Bus252	11.000	97.657	-2.0	0	0	0.001	0.000	Bus149	-0.347	-0.146	20.2	92.2	
								Bus253	0.346	0.147	20.2	92.1	
Bus253	0.400	96.203	-3.2	0	0	0.344	0.137	Bus252	-0.344	-0.137	555.2	92.8	
Bus265	0.400	97.310	-2.5	0	0	0.362	0.145	Bus278	-0.362	-0.145	578.7	92.9	
Bus266	11.000	97.786	-2.0	0	0	0.001	0.000	Bus149	-0.083	-0.034	4.8	92.7	
								Bus267	0.082	0.034	4.8	92.4	
Bus267	0.400	96.850	-2.6	0	0	0.082	0.033	Bus266	-0.082	-0.033	131.2	92.8	
Bus268	11.000	97.759	-2.0	0	0	0.001	0.000	Bus149	-0.139	-0.056	8.0	92.7	
								Bus269	0.138	0.056	8.0	92.5	
Bus269	0.400	97.188	-2.4	0	0	0.137	0.055	Bus268	-0.137	-0.055	219.9	92.8	
Bus270	11.000	97.780	-2.0	0	0	0.001	0.000	Bus149	-0.096	-0.039	5.6	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus271	0.095	0.039	5.5	92.5	
Bus271	0.400	97.104	-2.4	0	0	0.095	0.038	Bus270	-0.095	-0.038	151.7	92.8	
Bus272	11.000	97.740	-2.0	0	0	0.001	0.000	Bus149	-0.177	-0.072	10.3	92.6	
								Bus273	0.176	0.073	10.2	92.5	
Bus273	0.400	97.008	-2.6	0	0	0.176	0.070	Bus272	-0.176	-0.070	281.3	92.8	
Bus274	11.000	97.771	-2.0	0	0	0.001	0.000	Bus149	-0.115	-0.046	6.6	92.8	
								Bus275	0.114	0.046	6.6	92.6	
Bus275	0.400	97.301	-2.4	0	0	0.113	0.045	Bus274	-0.113	-0.045	181.1	92.8	
Bus276	11.000	97.776	-2.0	0	0	0.001	0.000	Bus149	-0.104	-0.042	6.0	92.8	
								Bus277	0.102	0.042	5.9	92.6	
Bus277	0.400	97.195	-2.4	0	0	0.102	0.041	Bus276	-0.102	-0.041	163.4	92.8	
Bus278	11.000	98.375	-1.5	0	0	0	0	Bus200	-0.363	-0.153	21.0	92.1	
								Bus265	0.364	0.153	21.0	92.2	
Bus279	0.400	96.548	-3.1	0	0	0.576	0.230	Bus280	-0.576	-0.230	927.1	92.9	
Bus280	11.000	98.269	-1.5	0	0	0	0	Bus200	-0.578	-0.251	33.7	91.7	
								Bus279	0.579	0.251	33.7	91.8	
Bus281	0.400	96.683	-3.0	0	0	0.539	0.215	Bus282	-0.539	-0.215	866.1	92.9	
Bus282	11.000	98.288	-1.5	0	0	0	0	Bus200	-0.541	-0.234	31.5	91.8	
								Bus281	0.542	0.233	31.5	91.9	
Bus283	0.400	96.956	-2.8	0	0	0.463	0.185	Bus284	-0.463	-0.185	741.6	92.9	
Bus284	11.000	98.326	-1.5	0	0	0	0	Bus200	-0.464	-0.198	26.9	91.9	
								Bus283	0.465	0.198	27.0	92.0	
Bus294	11.000	97.786	-2.0	0	0	0.001	0.000	Bus149	-0.083	-0.034	4.8	92.7	
								Bus295	0.082	0.034	4.8	92.4	
Bus295	0.400	96.850	-2.6	0	0	0.082	0.033	Bus294	-0.082	-0.033	131.2	92.8	
Bus298	11.000	97.784	-2.0	0	0	0.001	0.000	Bus149	-0.087	-0.035	5.0	92.7	
								Bus299	0.086	0.036	5.0	92.4	
Bus299	0.400	96.805	-2.7	0	0	0.085	0.034	Bus298	-0.085	-0.034	137.2	92.8	
Bus303	0.400	97.088	-2.4	0	0	0.191	0.076	Bus304	-0.191	-0.076	306.3	92.9	
Bus304	11.000	98.458	-1.5	0	0	0	0	Bus200	-0.192	-0.081	11.1	92.1	
								Bus303	0.193	0.081	11.1	92.2	
Bus305	0.400	96.940	-2.6	0	0	0.344	0.137	Bus306	-0.344	-0.137	551.0	92.9	
Bus306	11.000	98.383	-1.5	0	0	0	0	Bus200	-0.345	-0.147	20.0	92.0	
								Bus305	0.346	0.146	20.0	92.1	
Bus307	0.400	97.095	-2.4	0	0	0.190	0.076	Bus308	-0.190	-0.076	304.8	92.9	
Bus308	11.000	98.458	-1.5	0	0	0	0	Bus200	-0.191	-0.081	11.1	92.1	
								Bus307	0.192	0.080	11.1	92.2	
Bus309	0.400	96.766	-2.7	0	0	0.149	0.059	Bus310	-0.149	-0.059	238.7	92.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus310	11.000	98.478	-1.5	0	0	0	0	Bus200	-0.149	-0.064	8.7	91.9	
								Bus309	0.150	0.064	8.7	92.1	
Bus314	11.000	97.746	-2.0	0	0	0.001	0.000	Bus149	-0.165	-0.068	9.6	92.5	
								Bus315	0.164	0.068	9.5	92.3	
Bus315	0.400	96.578	-2.8	0	0	0.163	0.065	Bus314	-0.163	-0.065	261.6	92.8	
Bus316	11.000	97.760	-2.0	0	0	0.001	0.000	Bus149	-0.136	-0.055	7.9	92.7	
								Bus317	0.135	0.055	7.8	92.6	
Bus317	0.400	97.201	-2.4	0	0	0.135	0.054	Bus316	-0.135	-0.054	215.4	92.8	
Bus318	11.000	97.738	-2.0	0	0	0.001	0.000	Bus149	-0.183	-0.075	10.6	92.6	
								Bus319	0.182	0.075	10.6	92.4	
Bus319	0.400	96.982	-2.6	0	0	0.181	0.072	Bus318	-0.181	-0.072	290.3	92.8	
Bus320	11.000	97.765	-2.0	0	0	0.001	0.000	Bus149	-0.127	-0.052	7.4	92.6	
								Bus321	0.126	0.052	7.3	92.4	
Bus321	0.400	96.868	-2.6	0	0	0.125	0.050	Bus320	-0.125	-0.050	201.2	92.8	
Bus322	11.000	97.783	-2.0	0	0	0.001	0.000	Bus149	-0.089	-0.035	5.1	92.8	
								Bus323	0.088	0.036	5.1	92.6	
Bus323	0.400	97.162	-2.4	0	0	0.087	0.035	Bus322	-0.087	-0.035	139.7	92.8	
Bus324	11.000	97.703	-2.0	0	0	0.001	0.000	Bus149	-0.254	-0.106	14.8	92.3	
								Bus325	0.253	0.106	14.7	92.2	
Bus325	0.400	96.253	-3.0	0	0	0.251	0.100	Bus324	-0.251	-0.100	404.9	92.8	
Bus338	11.000	97.764	-2.0	0	0	0.001	0.000	Bus149	-0.128	-0.051	7.4	92.8	
								Bus339	0.127	0.052	7.3	92.6	
Bus339	0.400	97.240	-2.4	0	0	0.126	0.051	Bus338	-0.126	-0.051	202.0	92.8	
Bus340	11.000	97.778	-2.0	0	0	0.001	0.000	Bus149	-0.100	-0.040	5.8	92.9	
								Bus341	0.099	0.040	5.7	92.6	
Bus341	0.400	97.370	-2.3	0	0	0.098	0.039	Bus340	-0.098	-0.039	157.2	92.8	
Bus342	11.000	97.703	-2.0	0	0	0.001	0.000	Bus149	-0.253	-0.105	14.7	92.4	
								Bus343	0.252	0.105	14.7	92.3	
Bus343	0.400	96.559	-2.8	0	0	0.251	0.100	Bus342	-0.251	-0.100	403.7	92.8	
Bus344	0.400	97.162	-2.4	0	0	0.133	0.053	Bus345	-0.133	-0.053	212.1	92.8	
Bus345	11.000	97.761	-2.0	0	0	0.001	0.000	Bus149	-0.134	-0.054	7.8	92.8	
								Bus344	0.133	0.054	7.7	92.6	
Bus346	11.000	97.756	-2.0	0	0	0.001	0.000	Bus149	-0.146	-0.059	8.4	92.7	
								Bus347	0.144	0.059	8.4	92.5	
Bus347	0.400	97.105	-2.4	0	0	0.144	0.058	Bus346	-0.144	-0.058	230.5	92.8	
Bus348	11.000	97.640	-2.0	0	0	0.001	0.000	Bus149	-0.378	-0.165	22.2	91.6	
								Bus349	0.377	0.165	22.1	91.6	
Bus349	0.400	94.892	-3.9	0	0	0.371	0.149	Bus348	-0.371	-0.149	608.4	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus350	11.000	99.002	-1.0	0	0	0	0	Bus201	-0.187	-0.077	10.7	92.4	
								Bus351	0.187	0.077	10.7	92.4	
Bus351	0.400	98.234	-1.6	0	0	0.187	0.075	Bus350	-0.187	-0.075	295.3	92.8	
Bus352	11.000	98.994	-1.0	0	0	0	0	Bus201	-0.205	-0.085	11.8	92.4	
								Bus353	0.205	0.085	11.8	92.4	
Bus353	0.400	98.151	-1.6	0	0	0.204	0.082	Bus352	-0.204	-0.082	323.5	92.8	
Bus354	11.000	98.733	-1.2	0	0	0	0	Bus202	-0.259	-0.108	14.9	92.2	
								Bus355	0.259	0.108	14.9	92.3	
Bus355	0.400	97.661	-2.0	0	0	0.258	0.103	Bus354	-0.258	-0.103	410.8	92.8	
Bus356	11.000	98.626	-1.2	0	0	0	0	Bus202	-0.480	-0.205	27.8	91.9	
								Bus357	0.481	0.205	27.8	92.0	
Bus357	0.400	97.212	-2.5	0	0	0.478	0.191	Bus356	-0.478	-0.191	764.6	92.8	
Bus366	11.000	99.002	-1.0	0	0	0	0	Bus201	-0.187	-0.077	10.7	92.4	
								Bus367	0.187	0.077	10.7	92.4	
Bus367	0.400	98.234	-1.6	0	0	0.187	0.075	Bus366	-0.187	-0.075	295.3	92.8	
Bus368	11.000	98.994	-1.0	0	0	0	0	Bus201	-0.205	-0.085	11.8	92.4	
								Bus369	0.205	0.085	11.8	92.4	
Bus369	0.400	98.151	-1.6	0	0	0.204	0.082	Bus368	-0.204	-0.082	323.5	92.8	
Bus370	11.000	98.806	-1.2	0	0	0	0	Bus202	-0.107	-0.044	6.1	92.4	
								Bus371	0.107	0.044	6.2	92.5	
Bus371	0.400	98.053	-1.7	0	0	0.107	0.043	Bus370	-0.107	-0.043	169.3	92.8	
Bus372	11.000	98.719	-1.2	0	0	0	0	Bus202	-0.289	-0.122	16.7	92.2	
								Bus373	0.289	0.121	16.7	92.2	
Bus373	0.400	97.520	-2.2	0	0	0.288	0.115	Bus372	-0.288	-0.115	458.8	92.8	
Bus374	11.000	99.002	-1.0	0	0	0	0	Bus201	-0.187	-0.077	10.7	92.4	
								Bus375	0.187	0.077	10.7	92.4	
Bus375	0.400	98.234	-1.6	0	0	0.187	0.075	Bus374	-0.187	-0.075	295.3	92.8	
Bus376	11.000	97.643	-2.0	0	0	0.001	0.000	Bus149	-0.376	-0.159	21.9	92.1	
								Bus377	0.375	0.159	21.9	92.1	
Bus377	0.400	95.929	-3.2	0	0	0.371	0.149	Bus376	-0.371	-0.149	601.9	92.8	
Bus378	11.000	97.643	-2.0	0	0	0.001	0.000	Bus149	-0.376	-0.159	21.9	92.1	
								Bus379	0.375	0.159	21.9	92.1	
Bus379	0.400	95.929	-3.2	0	0	0.371	0.149	Bus378	-0.371	-0.149	601.9	92.8	
Bus380	11.000	98.994	-1.0	0	0	0	0	Bus201	-0.205	-0.085	11.8	92.4	
								Bus381	0.205	0.085	11.8	92.4	
Bus381	0.400	98.151	-1.6	0	0	0.204	0.082	Bus380	-0.204	-0.082	323.5	92.8	
Bus382	11.000	97.761	-2.0	0	0	0.001	0.000	Bus149	-0.134	-0.054	7.7	92.6	
								Bus383	0.133	0.055	7.7	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus383	0.400	96.817	-2.6	0	0	0.132	0.053	Bus382	-0.132	-0.053	211.7	92.8	
Bus384	11.000	98.783	-1.2	0	0	0	0	Bus202	-0.157	-0.065	9.0	92.4	
								Bus385	0.157	0.065	9.0	92.5	
Bus385	0.400	98.136	-1.7	0	0	0.157	0.063	Bus384	-0.157	-0.063	248.5	92.8	
Bus386	11.000	98.783	-1.2	0	0	0	0	Bus202	-0.155	-0.066	9.0	92.0	
								Bus387	0.156	0.066	9.0	92.0	
Bus387	0.400	97.010	-2.4	0	0	0.154	0.062	Bus386	-0.154	-0.062	247.0	92.8	
Bus388	11.000	97.771	-2.0	0	0	0.001	0.000	Bus149	-0.113	-0.047	6.6	92.5	
								Bus389	0.112	0.047	6.5	92.3	
Bus389	0.400	96.487	-2.9	0	0	0.111	0.045	Bus388	-0.111	-0.045	179.5	92.8	
Bus390	11.000	97.750	-2.0	0	0	0.001	0.000	Bus149	-0.158	-0.064	9.1	92.7	
								Bus391	0.157	0.064	9.1	92.5	
Bus391	0.400	97.043	-2.5	0	0	0.156	0.062	Bus390	-0.156	-0.062	250.0	92.8	
Bus394	11.000	98.449	-1.5	0	0	0	0	Bus200	-0.209	-0.088	12.1	92.2	
								Bus395	0.210	0.088	12.1	92.3	
Bus395	0.400	97.395	-2.3	0	0	0.209	0.084	Bus394	-0.209	-0.084	333.4	92.8	
Bus416	11.000	98.083	-2.4	0	0	-0.002	0.001	Bus613	-0.101	-0.044	5.9	91.6	
								Bus417	0.103	0.044	6.0	92.0	
Bus417	0.400	96.232	-3.7	0	0	0.102	0.041	Bus416	-0.102	-0.041	165.0	92.8	
Bus418	0.400	96.764	-3.3	0	0	0.074	0.030	Bus419	-0.074	-0.030	119.3	92.8	
Bus419	11.000	98.097	-2.4	0	0	-0.002	0.001	Bus613	-0.073	-0.032	4.3	91.6	
								Bus418	0.075	0.031	4.3	92.2	
Bus420	11.000	97.947	-2.4	0	0	-0.002	0.001	Bus613	-0.382	-0.164	22.3	91.9	
								Bus421	0.384	0.163	22.3	92.0	
Bus421	0.400	96.335	-3.7	0	0	0.381	0.152	Bus420	-0.381	-0.152	614.4	92.8	
Bus422	0.400	96.154	-3.8	0	0	0.418	0.167	Bus423	-0.418	-0.167	675.2	92.8	
Bus423	11.000	97.929	-2.4	0	0	-0.002	0.001	Bus613	-0.419	-0.181	24.5	91.8	
								Bus422	0.421	0.181	24.6	91.9	
Bus424	11.000	98.082	-2.4	0	0	-0.002	0.001	Bus613	-0.105	-0.045	6.1	92.1	
								Bus425	0.107	0.044	6.2	92.5	
Bus425	0.400	97.322	-2.9	0	0	0.107	0.043	Bus424	-0.107	-0.043	170.6	92.9	
Bus426	0.400	97.403	-2.9	0	0	0.158	0.063	Bus427	-0.158	-0.063	251.6	92.8	
Bus427	11.000	98.057	-2.4	0	0	-0.002	0.001	Bus613	-0.156	-0.065	9.1	92.2	
								Bus426	0.158	0.065	9.2	92.5	
Bus428	11.000	98.090	-2.4	0	0	-0.002	0.001	Bus613	-0.088	-0.037	5.1	92.1	
								Bus429	0.089	0.037	5.2	92.6	
Bus429	0.400	97.458	-2.8	0	0	0.089	0.036	Bus428	-0.089	-0.036	142.2	92.9	
Bus430	11.000	98.086	-2.4	0	0	-0.002	0.001	Bus613	-0.096	-0.041	5.6	91.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus431	0.098	0.041	5.7	92.3	
Bus431	0.400	96.969	-3.2	0	0	0.098	0.039	Bus430	-0.098	-0.039	156.3	92.8	
Bus432	11.000	98.084	-2.4	0	0	-0.002	0.001	Bus613	-0.101	-0.043	5.9	91.9	
								Bus433	0.103	0.043	6.0	92.3	
Bus433	0.400	96.913	-3.2	0	0	0.102	0.041	Bus432	-0.102	-0.041	163.9	92.8	
Bus434	11.000	98.091	-2.4	0	0	-0.002	0.001	Bus613	-0.087	-0.037	5.1	91.9	
								Bus435	0.089	0.037	5.1	92.4	
Bus435	0.400	97.082	-3.1	0	0	0.088	0.035	Bus434	-0.088	-0.035	141.3	92.8	
Bus436	11.000	97.953	-2.4	0	0	-0.002	0.000	Bus613	-0.371	-0.157	21.6	92.0	
								Bus437	0.373	0.157	21.7	92.2	
Bus437	0.400	96.855	-3.4	0	0	0.371	0.149	Bus436	-0.371	-0.149	596.2	92.8	
Bus438	11.000	98.061	-2.4	0	0	-0.002	0.001	Bus613	-0.148	-0.063	8.6	92.1	
								Bus439	0.149	0.062	8.7	92.4	
Bus439	0.400	96.999	-3.1	0	0	0.149	0.059	Bus438	-0.149	-0.059	238.1	92.8	
Bus450	11.000	98.070	-2.4	0	0	-0.002	0.001	Bus613	-0.129	-0.054	7.5	92.1	
								Bus451	0.131	0.054	7.6	92.4	
Bus451	0.400	97.143	-3.0	0	0	0.130	0.052	Bus450	-0.130	-0.052	208.1	92.8	
Bus452	11.000	97.970	-2.4	0	0	-0.002	0.001	Bus613	-0.335	-0.143	19.5	92.0	
								Bus453	0.337	0.142	19.6	92.1	
Bus453	0.400	96.438	-3.5	0	0	0.334	0.134	Bus452	-0.334	-0.134	538.9	92.8	
Bus454	11.000	98.045	-2.4	0	0	-0.002	0.000	Bus613	-0.183	-0.077	10.6	92.2	
								Bus455	0.185	0.076	10.7	92.4	
Bus455	0.400	97.280	-3.0	0	0	0.184	0.074	Bus454	-0.184	-0.074	293.9	92.8	
Bus456	11.000	97.993	-2.4	0	0	-0.002	0.001	Bus613	-0.289	-0.123	16.8	92.1	
								Bus457	0.291	0.122	16.9	92.2	
Bus457	0.400	96.776	-3.4	0	0	0.290	0.116	Bus456	-0.290	-0.116	465.4	92.8	
Bus458	11.000	98.037	-2.4	0	0	-0.002	0.000	Bus613	-0.199	-0.083	11.5	92.2	
								Bus459	0.200	0.083	11.6	92.4	
Bus459	0.400	97.205	-3.1	0	0	0.200	0.080	Bus458	-0.200	-0.080	319.3	92.8	
Bus466	11.000	98.040	-2.4	0	0	-0.002	0.000	Bus613	-0.192	-0.080	11.1	92.2	
								Bus467	0.194	0.080	11.2	92.4	
Bus467	0.400	97.237	-3.0	0	0	0.193	0.077	Bus466	-0.193	-0.077	308.4	92.8	
Bus494	11.000	98.035	-2.4	0	0	-0.002	0.000	Bus613	-0.203	-0.085	11.8	92.2	
								Bus495	0.205	0.085	11.9	92.4	
Bus495	0.400	97.183	-3.1	0	0	0.204	0.082	Bus494	-0.204	-0.082	326.8	92.8	
Bus496	11.000	98.041	-2.4	0	0	-0.002	0.000	Bus613	-0.189	-0.079	11.0	92.2	
								Bus497	0.191	0.079	11.1	92.4	
Bus497	0.400	97.249	-3.0	0	0	0.190	0.076	Bus496	-0.190	-0.076	304.3	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus504	11.000	98.082	-2.4	0	0	-0.002	0.001	Bus613	-0.105	-0.045	6.1	92.1	
								Bus505	0.107	0.044	6.2	92.5	
Bus505	0.400	97.322	-2.9	0	0	0.107	0.043	Bus504	-0.107	-0.043	170.6	92.9	
Bus506	11.000	97.999	-2.4	0	0	-0.002	0.001	Bus613	-0.276	-0.117	16.1	92.1	
								Bus507	0.278	0.117	16.2	92.2	
Bus507	0.400	96.838	-3.3	0	0	0.277	0.111	Bus506	-0.277	-0.111	444.2	92.8	
Bus508	11.000	98.012	-2.4	0	0	-0.002	0.001	Bus613	-0.250	-0.106	14.5	92.1	
								Bus509	0.252	0.105	14.6	92.3	
Bus509	0.400	96.963	-3.2	0	0	0.251	0.100	Bus508	-0.251	-0.100	402.0	92.8	
Bus512	11.000	98.069	-2.4	0	0	-0.002	0.000	Bus613	-0.133	-0.056	7.7	92.2	
								Bus513	0.135	0.055	7.8	92.6	
Bus513	0.400	97.511	-2.8	0	0	0.135	0.054	Bus512	-0.135	-0.054	214.7	92.9	
Bus518	11.000	98.091	-2.4	0	0	-0.002	0.001	Bus613	-0.085	-0.036	4.9	91.9	
								Bus519	0.087	0.036	5.0	92.4	
Bus519	0.400	97.105	-3.1	0	0	0.086	0.035	Bus518	-0.086	-0.035	138.2	92.8	
Bus548	11.000	98.089	-2.4	0	0	-0.002	0.001	Bus613	-0.089	-0.039	5.2	91.6	
								Bus549	0.091	0.038	5.3	92.1	
Bus549	0.400	96.463	-3.5	0	0	0.090	0.036	Bus548	-0.090	-0.036	145.2	92.8	
Bus552	11.000	98.068	-2.4	0	0	-0.002	0.001	Bus613	-0.134	-0.058	7.8	91.8	
								Bus553	0.136	0.057	7.9	92.1	
Bus553	0.400	96.513	-3.5	0	0	0.135	0.054	Bus552	-0.135	-0.054	216.9	92.8	
Bus554	11.000	98.043	-2.4	0	0	-0.002	0.000	Bus613	-0.185	-0.078	10.8	92.2	
								Bus555	0.187	0.077	10.8	92.4	
Bus555	0.400	97.267	-3.0	0	0	0.187	0.075	Bus554	-0.187	-0.075	298.3	92.8	
Bus558	11.000	98.081	-2.4	0	0	-0.002	0.001	Bus613	-0.106	-0.045	6.2	91.9	
								Bus559	0.107	0.045	6.2	92.3	
Bus559	0.400	96.856	-3.2	0	0	0.107	0.043	Bus558	-0.107	-0.043	171.4	92.8	
Bus560	11.000	98.084	-2.4	0	0	-0.002	0.001	Bus613	-0.101	-0.043	5.9	91.9	
								Bus561	0.103	0.043	6.0	92.3	
Bus561	0.400	96.913	-3.2	0	0	0.102	0.041	Bus560	-0.102	-0.041	163.9	92.8	
Bus562	11.000	98.012	-2.4	0	0	-0.002	0.001	Bus613	-0.250	-0.106	14.5	92.1	
								Bus563	0.252	0.105	14.6	92.3	
Bus563	0.400	96.963	-3.2	0	0	0.251	0.100	Bus562	-0.251	-0.100	402.0	92.8	
Bus564	11.000	98.073	-2.4	0	0	-0.002	0.001	Bus613	-0.124	-0.052	7.2	92.1	
								Bus565	0.126	0.052	7.3	92.4	
Bus565	0.400	97.179	-3.0	0	0	0.125	0.050	Bus564	-0.125	-0.050	200.6	92.8	
Bus566	11.000	98.050	-2.4	0	0	-0.002	0.000	Bus613	-0.170	-0.071	9.9	92.2	
								Bus567	0.172	0.071	10.0	92.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus567	0.400	97.337	-3.0	0	0	0.172	0.069	Bus566	-0.172	-0.069	274.4	92.8	
Bus570	11.000	98.054	-2.4	0	0	-0.002	0.001	Bus613	-0.164	-0.069	9.5	92.0	
								Bus571	0.165	0.069	9.6	92.3	
Bus571	0.400	96.875	-3.2	0	0	0.164	0.066	Bus570	-0.164	-0.066	263.8	92.8	
Bus572	11.000	98.080	-2.4	0	0	-0.002	0.001	Bus613	-0.109	-0.046	6.3	92.1	
								Bus573	0.111	0.046	6.4	92.5	
Bus573	0.400	97.295	-2.9	0	0	0.110	0.044	Bus572	-0.110	-0.044	176.2	92.9	
Bus574	11.000	98.040	-2.4	0	0	-0.002	0.000	Bus613	-0.192	-0.080	11.1	92.2	
								Bus575	0.194	0.080	11.2	92.4	
Bus575	0.400	97.237	-3.0	0	0	0.193	0.077	Bus574	-0.193	-0.077	308.4	92.8	
Bus590	11.000	98.094	-2.4	0	0	-0.002	0.001	Bus613	-0.080	-0.035	4.6	91.6	
								Bus591	0.081	0.034	4.7	92.2	
Bus591	0.400	96.640	-3.4	0	0	0.081	0.032	Bus590	-0.081	-0.032	130.0	92.8	
Bus592	11.000	98.039	-2.4	0	0	-0.002	0.000	Bus613	-0.194	-0.081	11.3	92.2	
								Bus593	0.196	0.081	11.3	92.4	
Bus593	0.400	97.227	-3.0	0	0	0.195	0.078	Bus592	-0.195	-0.078	311.8	92.8	
Bus594	0.400	96.154	-3.8	0	0	0.418	0.167	Bus595	-0.418	-0.167	675.2	92.8	
Bus595	11.000	97.929	-2.4	0	0	-0.002	0.001	Bus613	-0.419	-0.181	24.5	91.8	
								Bus594	0.421	0.181	24.6	91.9	
Bus596	0.400	97.144	-3.0	0	0	0.130	0.052	Bus597	-0.130	-0.052	207.8	92.8	
Bus597	11.000	98.070	-2.4	0	0	-0.002	0.001	Bus613	-0.129	-0.054	7.5	92.1	
								Bus596	0.131	0.054	7.6	92.4	
Bus598	11.000	97.980	-2.4	0	0	-0.002	0.001	Bus613	-0.316	-0.134	18.4	92.0	
								Bus599	0.318	0.134	18.5	92.1	
Bus599	0.400	96.651	-3.5	0	0	0.316	0.126	Bus598	-0.316	-0.126	507.8	92.8	
Bus600	0.400	97.324	-3.0	0	0	0.174	0.070	Bus601	-0.174	-0.070	278.5	92.8	
Bus601	11.000	98.049	-2.4	0	0	-0.002	0.001	Bus613	-0.173	-0.073	10.1	92.2	
								Bus600	0.175	0.072	10.1	92.5	
Bus602	0.400	96.854	-3.2	0	0	0.167	0.067	Bus603	-0.167	-0.067	268.1	92.8	
Bus603	11.000	98.052	-2.4	0	0	-0.002	0.001	Bus613	-0.166	-0.071	9.7	92.0	
								Bus602	0.168	0.070	9.7	92.3	
Bus608	11.000	98.080	-2.4	0	0	-0.002	0.001	Bus613	-0.109	-0.046	6.3	92.1	
								Bus609	0.111	0.046	6.4	92.5	
Bus609	0.400	97.295	-2.9	0	0	0.110	0.044	Bus608	-0.110	-0.044	176.2	92.9	
Bus610	11.000	98.080	-2.4	0	0	-0.002	0.001	Bus613	-0.109	-0.046	6.3	92.1	
								Bus611	0.111	0.046	6.4	92.5	
Bus611	0.400	97.295	-2.9	0	0	0.110	0.044	Bus610	-0.110	-0.044	176.2	92.9	
# Bus612	33.000	99.541	-0.1	0	0	0.021	-0.102	Bus1	-9.435	-2.838	173.2	95.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus613	4.707	1.470	86.7	95.5	
								Bus613	4.707	1.470	86.7	95.5	
# Bus613	11.000	98.133	-2.4	0	0	0.013	-1.424	Bus416	0.101	0.044	5.9	91.7	
								Bus419	0.073	0.032	4.3	91.8	
								Bus420	0.382	0.164	22.2	91.9	
								Bus423	0.420	0.181	24.5	91.8	
								Bus424	0.105	0.044	6.1	92.2	
								Bus427	0.157	0.065	9.1	92.3	
								Bus428	0.088	0.037	5.1	92.2	
								Bus430	0.096	0.041	5.6	92.0	
								Bus432	0.101	0.043	5.9	92.0	
								Bus434	0.087	0.037	5.0	92.0	
								Bus436	0.372	0.158	21.6	92.1	
								Bus438	0.148	0.062	8.6	92.1	
								Bus450	0.129	0.054	7.5	92.2	
								Bus452	0.336	0.143	19.5	92.0	
								Bus454	0.183	0.076	10.6	92.3	
								Bus456	0.290	0.123	16.8	92.1	
								Bus458	0.199	0.083	11.5	92.2	
								Bus466	0.192	0.080	11.1	92.3	
								Bus494	0.203	0.085	11.8	92.2	
								Bus496	0.189	0.079	11.0	92.3	
								Bus504	0.105	0.044	6.1	92.2	
								Bus506	0.277	0.117	16.1	92.1	
								Bus508	0.250	0.105	14.5	92.2	
								Bus512	0.133	0.055	7.7	92.3	
								Bus518	0.085	0.036	4.9	92.0	
								Bus548	0.089	0.039	5.2	91.7	
								Bus552	0.134	0.058	7.8	91.9	
								Bus554	0.186	0.078	10.8	92.3	
								Bus558	0.106	0.045	6.1	92.0	
								Bus560	0.101	0.043	5.9	92.0	
								Bus562	0.250	0.105	14.5	92.2	
								Bus564	0.124	0.052	7.2	92.2	
								Bus566	0.171	0.071	9.9	92.3	
								Bus570	0.164	0.069	9.5	92.1	
								Bus572	0.109	0.046	6.3	92.2	
								Bus574	0.192	0.080	11.1	92.3	
								Bus590	0.080	0.034	4.6	91.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus592	0.194	0.081	11.2	92.3	
								Bus595	0.420	0.181	24.5	91.8	
								Bus597	0.129	0.054	7.5	92.2	
								Bus598	0.316	0.134	18.4	92.0	
								Bus601	0.173	0.072	10.0	92.3	
								Bus603	0.166	0.070	9.7	92.1	
								Bus608	0.109	0.046	6.3	92.2	
								Bus610	0.109	0.046	6.3	92.2	
								Bus632	0.179	0.074	10.4	92.4	
								Bus634	0.139	0.057	8.0	92.6	
								Bus638	0.131	0.053	7.6	92.6	
								Bus642	0.286	0.119	16.6	92.3	
								Bus644	0.181	0.074	10.4	92.6	
								Bus646	0.267	0.113	15.5	92.1	
								Bus648	0.170	0.069	9.8	92.6	
								Bus612	-4.693	-1.265	260.0	96.6	
								Bus612	-4.693	-1.265	260.0	96.6	
Bus632	11.000	98.047	-2.4	0	0	0	0	Bus613	-0.179	-0.074	10.4	92.4	
								Bus633	0.179	0.075	10.4	92.3	
Bus633	0.400	96.773	-3.3	0	0	0.177	0.071	Bus632	-0.177	-0.071	284.9	92.8	
Bus634	11.000	98.066	-2.4	0	0	0	0	Bus613	-0.139	-0.057	8.0	92.5	
								Bus635	0.138	0.057	8.0	92.4	
Bus635	0.400	97.085	-3.1	0	0	0.137	0.055	Bus634	-0.137	-0.055	220.1	92.8	
Bus638	11.000	98.070	-2.4	0	0	0	0	Bus613	-0.131	-0.054	7.6	92.6	
								Bus639	0.131	0.054	7.6	92.4	
Bus639	0.400	97.142	-3.0	0	0	0.130	0.052	Bus638	-0.130	-0.052	208.1	92.8	
Bus642	11.000	97.995	-2.4	0	0	0	0	Bus613	-0.285	-0.119	16.6	92.3	
								Bus643	0.285	0.119	16.5	92.2	
Bus643	0.400	96.807	-3.4	0	0	0.283	0.113	Bus642	-0.283	-0.113	454.8	92.8	
Bus644	11.000	98.046	-2.4	0	0	0	0	Bus613	-0.180	-0.074	10.4	92.6	
								Bus645	0.180	0.074	10.4	92.5	
Bus645	0.400	97.301	-3.0	0	0	0.179	0.072	Bus644	-0.179	-0.072	286.4	92.8	
Bus646	11.000	98.004	-2.4	0	0	0	0	Bus613	-0.267	-0.113	15.5	92.0	
								Bus647	0.266	0.114	15.5	92.0	
Bus647	0.400	96.091	-3.7	0	0	0.263	0.105	Bus646	-0.263	-0.105	426.0	92.8	
Bus648	11.000	98.051	-2.4	0	0	0	0	Bus613	-0.170	-0.069	9.8	92.6	
								Bus649	0.170	0.070	9.8	92.5	
Bus649	0.400	97.349	-3.0	0	0	0.169	0.068	Bus648	-0.169	-0.068	270.0	92.8	
Bus650	33.000	99.289	-0.1	0	0	0.058	-0.078	Bus1	-13.321	-5.776	255.8	91.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1064	10.525	3.967	198.2	93.6	
								Bus651	2.739	1.887	58.6	82.3	
# Bus651	11.000	96.327	-2.3	0	0	-0.113	-0.053	Bus720	0.115	0.070	7.3	85.2	
								Bus722	0.069	0.042	4.4	85.7	
								Bus728	0.141	0.088	9.1	85.0	
								Bus732	0.160	0.099	10.3	85.1	
								Bus736	0.169	0.105	10.8	85.0	
								Bus740	0.105	0.064	6.7	85.3	
								Bus744	0.238	0.149	15.3	84.6	
								Bus748	0.140	0.087	9.0	85.0	
								Bus756	0.206	0.139	13.5	83.0	
								Bus758	0.263	0.166	16.9	84.5	
								Bus760	0.163	0.101	10.4	85.0	
								Bus776	0.141	0.089	9.1	84.6	
								Bus778	0.146	0.090	9.3	84.9	
								Bus780	0.144	0.088	9.2	85.2	
								Bus782	0.169	0.107	10.9	84.3	
								Bus784	0.208	0.130	13.4	84.8	
								Bus788	0.263	0.166	16.9	84.5	
								Bus650	-2.726	-1.727	175.8	84.5	
Bus720	11.000	96.264	-2.4	0	0	0.003	0.000	Bus651	-0.114	-0.071	7.3	85.1	
								Bus721	0.112	0.071	7.2	84.5	
Bus721	0.400	95.213	-2.9	0	0	0.111	0.069	Bus720	-0.111	-0.069	197.9	85.0	
Bus722	11.000	96.289	-2.4	0	0	0.003	0.000	Bus651	-0.069	-0.042	4.4	85.5	
								Bus723	0.066	0.042	4.3	84.5	
Bus723	0.400	95.292	-2.9	0	0	0.066	0.041	Bus722	-0.066	-0.041	117.5	85.0	
Bus728	11.000	96.249	-2.4	0	0	0.003	0.000	Bus651	-0.141	-0.088	9.1	84.9	
								Bus729	0.138	0.088	8.9	84.4	
Bus729	0.400	94.942	-3.0	0	0	0.137	0.085	Bus728	-0.137	-0.085	246.0	85.0	
Bus732	11.000	96.238	-2.4	0	0	0.003	0.000	Bus651	-0.160	-0.099	10.3	85.0	
								Bus733	0.158	0.100	10.2	84.5	
Bus733	0.400	95.350	-2.9	0	0	0.157	0.097	Bus732	-0.157	-0.097	279.6	85.0	
Bus736	11.000	96.234	-2.4	0	0	0.003	0.000	Bus651	-0.169	-0.105	10.8	84.9	
								Bus737	0.166	0.105	10.7	84.5	
Bus737	0.400	95.298	-2.9	0	0	0.165	0.102	Bus736	-0.165	-0.102	294.5	85.0	
Bus740	11.000	96.269	-2.4	0	0	0.003	0.000	Bus651	-0.105	-0.065	6.7	85.2	
								Bus741	0.102	0.065	6.6	84.5	
Bus741	0.400	95.306	-2.8	0	0	0.102	0.063	Bus740	-0.102	-0.063	181.5	85.0	
Bus744	11.000	96.195	-2.4	0	0	0.003	0.000	Bus651	-0.237	-0.150	15.3	84.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus745	0.235	0.150	15.2	84.3	
Bus745	0.400	94.865	-3.1	0	0	0.233	0.145	Bus744	-0.233	-0.145	417.5	85.0	
Bus748	11.000	96.250	-2.4	0	0	0.003	0.000	Bus651	-0.140	-0.087	9.0	84.9	
								Bus749	0.137	0.087	8.8	84.4	
Bus749	0.400	94.959	-3.0	0	0	0.136	0.084	Bus748	-0.136	-0.084	242.9	85.0	
Bus756	11.000	96.209	-2.4	0	0	0.003	0.000	Bus651	-0.206	-0.139	13.6	83.0	
								Bus757	0.203	0.139	13.4	82.6	
Bus757	0.400	93.357	-4.9	0	0	0.203	0.126	Bus756	-0.203	-0.126	368.9	85.0	
Bus758	11.000	96.180	-2.4	0	0	0.003	0.000	Bus651	-0.262	-0.166	17.0	84.5	
								Bus759	0.260	0.166	16.8	84.2	
Bus759	0.400	94.706	-3.2	0	0	0.258	0.160	Bus758	-0.258	-0.160	462.7	85.0	
Bus760	11.000	96.237	-2.4	0	0	0.003	0.000	Bus651	-0.163	-0.101	10.5	85.0	
								Bus761	0.160	0.101	10.3	84.5	
Bus761	0.400	95.334	-2.9	0	0	0.159	0.099	Bus760	-0.159	-0.099	284.0	85.0	
Bus776	11.000	96.249	-2.4	0	0	0.003	0.000	Bus651	-0.141	-0.089	9.1	84.5	
								Bus777	0.138	0.089	8.9	84.0	
Bus777	0.400	94.154	-3.4	0	0	0.136	0.084	Bus776	-0.136	-0.084	245.7	85.0	
Bus778	11.000	96.246	-2.4	0	0	0.003	0.000	Bus651	-0.145	-0.091	9.3	84.9	
								Bus779	0.143	0.091	9.2	84.4	
Bus779	0.400	94.900	-3.0	0	0	0.142	0.088	Bus778	-0.142	-0.088	253.5	85.0	
Bus780	11.000	96.248	-2.4	0	0	0.003	0.000	Bus651	-0.144	-0.089	9.2	85.1	
								Bus781	0.141	0.089	9.1	84.6	
Bus781	0.400	95.455	-2.8	0	0	0.140	0.087	Bus780	-0.140	-0.087	249.7	85.0	
Bus782	11.000	96.233	-2.4	0	0	0.003	0.000	Bus651	-0.168	-0.108	10.9	84.3	
								Bus783	0.165	0.108	10.8	83.8	
Bus783	0.400	93.706	-3.6	0	0	0.163	0.101	Bus782	-0.163	-0.101	296.0	85.0	
Bus784	11.000	96.211	-2.4	0	0	0.003	0.000	Bus651	-0.208	-0.130	13.4	84.7	
								Bus785	0.205	0.131	13.3	84.4	
Bus785	0.400	95.050	-3.0	0	0	0.204	0.127	Bus784	-0.204	-0.127	364.9	85.0	
Bus788	11.000	96.180	-2.4	0	0	0.003	0.000	Bus651	-0.262	-0.166	17.0	84.5	
								Bus789	0.260	0.166	16.8	84.2	
Bus789	0.400	94.706	-3.2	0	0	0.258	0.160	Bus788	-0.258	-0.160	462.7	85.0	
Bus798	11.000	96.800	-2.8	0	0	-0.006	0.001	Bus1065	-0.106	-0.047	6.3	91.4	
								Bus799	0.112	0.046	6.6	92.5	
Bus799	0.400	95.996	-3.4	0	0	0.111	0.045	Bus798	-0.111	-0.045	180.5	92.8	
Bus800	0.400	96.041	-3.4	0	0	0.173	0.069	Bus801	-0.173	-0.069	280.2	92.8	
Bus801	11.000	96.770	-2.8	0	0	-0.005	0.001	Bus1065	-0.169	-0.073	10.0	91.8	
								Bus800	0.174	0.072	10.2	92.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus802	0.400	95.904	-3.4	0	0	0.123	0.049	Bus803	-0.123	-0.049	199.6	92.8	
Bus803	11.000	96.794	-2.8	0	0	-0.005	0.001	Bus1065	-0.118	-0.052	7.0	91.4	
								Bus802	0.124	0.051	7.3	92.4	
Bus804	0.400	96.035	-3.3	0	0	0.106	0.043	Bus805	-0.106	-0.043	172.3	92.8	
Bus805	11.000	96.803	-2.8	0	0	-0.005	0.001	Bus1065	-0.102	-0.045	6.0	91.3	
								Bus804	0.107	0.044	6.3	92.5	
Bus838	11.000	96.796	-2.8	0	0	-0.006	0.001	Bus1065	-0.116	-0.051	6.9	91.4	
								Bus839	0.121	0.050	7.1	92.4	
Bus839	0.400	95.923	-3.4	0	0	0.121	0.048	Bus838	-0.121	-0.048	195.7	92.8	
Bus840	11.000	96.753	-2.8	0	0	-0.006	0.001	Bus1065	-0.204	-0.088	12.1	91.8	
								Bus841	0.210	0.087	12.3	92.4	
Bus841	0.400	95.869	-3.5	0	0	0.209	0.084	Bus840	-0.209	-0.084	338.9	92.8	
Bus842	11.000	96.767	-2.8	0	0	-0.006	0.001	Bus1065	-0.174	-0.075	10.3	91.8	
								Bus843	0.180	0.074	10.6	92.4	
Bus843	0.400	96.012	-3.4	0	0	0.179	0.072	Bus842	-0.179	-0.072	290.3	92.8	
Bus844	11.000	96.757	-2.8	0	0	-0.006	0.001	Bus1065	-0.195	-0.084	11.5	91.8	
								Bus845	0.200	0.083	11.8	92.4	
Bus845	0.400	95.914	-3.5	0	0	0.200	0.080	Bus844	-0.200	-0.080	323.7	92.8	
Bus846	0.400	95.723	-3.6	0	0	0.094	0.037	Bus847	-0.094	-0.037	151.9	92.8	
Bus847	11.000	96.809	-2.8	0	0	-0.005	0.001	Bus1065	-0.089	-0.040	5.3	91.0	
								Bus846	0.094	0.039	5.5	92.3	
Bus848	0.400	95.919	-3.4	0	0	0.121	0.049	Bus849	-0.121	-0.049	196.6	92.8	
Bus849	11.000	96.795	-2.8	0	0	-0.005	0.001	Bus1065	-0.117	-0.052	6.9	91.4	
								Bus848	0.122	0.050	7.1	92.4	
Bus850	0.400	95.631	-3.6	0	0	0.101	0.040	Bus851	-0.101	-0.040	164.2	92.8	
Bus851	11.000	96.805	-2.8	0	0	-0.005	0.001	Bus1065	-0.096	-0.044	5.7	91.1	
								Bus850	0.102	0.042	6.0	92.3	
Bus852	11.000	96.799	-2.8	0	0	-0.006	0.001	Bus1065	-0.109	-0.048	6.5	91.4	
								Bus853	0.115	0.047	6.7	92.5	
Bus853	0.400	95.974	-3.4	0	0	0.114	0.046	Bus852	-0.114	-0.046	185.1	92.8	
Bus854	0.400	95.677	-3.6	0	0	0.097	0.039	Bus855	-0.097	-0.039	158.0	92.8	
Bus855	11.000	96.807	-2.8	0	0	-0.005	0.001	Bus1065	-0.092	-0.042	5.5	91.0	
								Bus854	0.098	0.041	5.7	92.3	
Bus856	11.000	96.802	-2.8	0	0	-0.006	0.001	Bus1065	-0.102	-0.046	6.1	91.1	
								Bus857	0.108	0.045	6.3	92.3	
Bus857	0.400	95.560	-3.7	0	0	0.107	0.043	Bus856	-0.107	-0.043	173.7	92.8	
Bus858	11.000	96.765	-2.8	0	0	-0.006	0.001	Bus1065	-0.180	-0.078	10.6	91.8	
								Bus859	0.186	0.077	10.9	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus859	0.400	95.985	-3.4	0	0	0.185	0.074	Bus858	-0.185	-0.074	299.4	92.8	
Bus860	11.000	96.805	-2.8	0	0	-0.006	0.001	Bus1065	-0.097	-0.043	5.8	91.3	
								Bus861	0.103	0.042	6.0	92.5	
Bus861	0.400	96.069	-3.3	0	0	0.102	0.041	Bus860	-0.102	-0.041	165.4	92.8	
Bus862	11.000	96.794	-2.8	0	0	-0.006	0.001	Bus1065	-0.119	-0.054	7.1	91.2	
								Bus863	0.124	0.052	7.3	92.2	
Bus863	0.400	95.352	-3.8	0	0	0.123	0.049	Bus862	-0.123	-0.049	201.3	92.8	
Bus864	0.400	95.273	-3.9	0	0	0.130	0.052	Bus865	-0.130	-0.052	211.7	92.8	
Bus865	11.000	96.791	-2.8	0	0	-0.005	0.001	Bus1065	-0.125	-0.057	7.5	91.2	
								Bus864	0.131	0.055	7.7	92.1	
Bus866	0.400	95.582	-3.7	0	0	0.164	0.066	Bus867	-0.164	-0.066	266.7	92.8	
Bus867	11.000	96.774	-2.8	0	0	-0.005	0.001	Bus1065	-0.160	-0.070	9.5	91.6	
								Bus866	0.165	0.069	9.7	92.3	
Bus902	11.000	96.756	-2.8	0	0	-0.006	0.001	Bus1065	-0.197	-0.085	11.7	91.8	
								Bus903	0.203	0.084	11.9	92.4	
Bus903	0.400	95.901	-3.5	0	0	0.202	0.081	Bus902	-0.202	-0.081	328.2	92.8	
Bus926	11.000	96.756	-2.8	0	0	-0.006	0.001	Bus1065	-0.196	-0.086	11.6	91.5	
								Bus927	0.201	0.085	11.8	92.2	
Bus927	0.400	95.298	-3.8	0	0	0.200	0.080	Bus926	-0.200	-0.080	325.7	92.8	
Bus928	0.400	95.341	-3.9	0	0	0.318	0.127	Bus929	-0.318	-0.127	518.2	92.8	
Bus929	11.000	96.698	-2.8	0	0	-0.005	0.001	Bus1065	-0.315	-0.136	18.6	91.8	
								Bus928	0.320	0.135	18.8	92.1	
Bus930	0.400	95.386	-3.9	0	0	0.309	0.123	Bus931	-0.309	-0.123	502.9	92.8	
Bus931	11.000	96.703	-2.8	0	0	-0.005	0.001	Bus1065	-0.305	-0.132	18.1	91.8	
								Bus930	0.310	0.131	18.3	92.1	
Bus932	0.400	95.354	-3.9	0	0	0.315	0.126	Bus933	-0.315	-0.126	513.6	92.8	
Bus933	11.000	96.699	-2.8	0	0	-0.005	0.001	Bus1065	-0.312	-0.135	18.5	91.8	
								Bus932	0.317	0.134	18.7	92.1	
Bus960	11.000	96.795	-2.8	0	0	-0.006	0.001	Bus1065	-0.116	-0.052	6.9	91.1	
								Bus961	0.122	0.051	7.2	92.2	
Bus961	0.400	95.387	-3.8	0	0	0.121	0.048	Bus960	-0.121	-0.048	196.7	92.8	
Bus962	11.000	96.728	-2.8	0	0	-0.006	0.001	Bus1065	-0.254	-0.110	15.0	91.8	
								Bus963	0.259	0.109	15.3	92.3	
Bus963	0.400	95.632	-3.7	0	0	0.258	0.103	Bus962	-0.258	-0.103	419.6	92.8	
Bus964	11.000	96.765	-2.8	0	0	-0.006	0.001	Bus1065	-0.179	-0.078	10.6	91.6	
								Bus965	0.184	0.077	10.8	92.2	
Bus965	0.400	95.432	-3.8	0	0	0.183	0.073	Bus964	-0.183	-0.073	298.0	92.8	
Bus966	11.000	96.713	-2.8	0	0	-0.006	0.001	Bus1065	-0.284	-0.123	16.8	91.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus967	0.289	0.122	17.0	92.2	
Bus967	0.400	95.488	-3.8	0	0	0.288	0.115	Bus966	-0.288	-0.115	468.6	92.8	
Bus968	0.400	95.999	-3.4	0	0	0.111	0.044	Bus969	-0.111	-0.044	179.9	92.8	
Bus969	11.000	96.800	-2.8	0	0	-0.005	0.001	Bus1065	-0.106	-0.047	6.3	91.4	
								Bus968	0.112	0.046	6.5	92.5	
Bus970	0.400	95.930	-3.5	0	0	0.196	0.079	Bus971	-0.196	-0.079	318.1	92.8	
Bus971	11.000	96.759	-2.8	0	0	-0.005	0.001	Bus1065	-0.192	-0.083	11.3	91.8	
								Bus970	0.197	0.082	11.6	92.4	
Bus972	11.000	96.777	-2.8	0	0	-0.006	0.001	Bus1065	-0.154	-0.068	9.1	91.5	
								Bus973	0.160	0.067	9.4	92.3	
Bus973	0.400	95.624	-3.6	0	0	0.159	0.064	Bus972	-0.159	-0.064	258.2	92.8	
Bus974	0.400	96.107	-3.3	0	0	0.097	0.039	Bus975	-0.097	-0.039	157.2	92.8	
Bus975	11.000	96.807	-2.8	0	0	-0.005	0.001	Bus1065	-0.092	-0.041	5.5	91.3	
								Bus974	0.098	0.040	5.7	92.5	
Bus976	11.000	96.640	-2.8	0	0	-0.006	0.001	Bus1065	-0.433	-0.188	25.6	91.7	
								Bus977	0.438	0.187	25.9	92.0	
Bus977	0.400	95.325	-4.1	0	0	0.436	0.175	Bus976	-0.436	-0.175	711.6	92.8	
Bus978	11.000	96.769	-2.8	0	0	-0.006	0.001	Bus1065	-0.171	-0.074	10.1	91.8	
								Bus979	0.177	0.073	10.4	92.4	
Bus979	0.400	96.025	-3.4	0	0	0.176	0.071	Bus978	-0.176	-0.071	285.7	92.8	
Bus980	0.400	95.490	-3.8	0	0	0.287	0.115	Bus981	-0.287	-0.115	467.6	92.8	
Bus981	11.000	96.713	-2.8	0	0	-0.005	0.001	Bus1065	-0.284	-0.123	16.8	91.8	
								Bus980	0.289	0.121	17.0	92.2	
Bus982	0.400	95.693	-3.7	0	0	0.245	0.098	Bus983	-0.245	-0.098	398.8	92.8	
Bus983	11.000	96.734	-2.8	0	0	-0.005	0.001	Bus1065	-0.242	-0.104	14.3	91.8	
								Bus982	0.247	0.103	14.5	92.3	
Bus984	0.400	95.917	-3.5	0	0	0.199	0.080	Bus985	-0.199	-0.080	322.6	92.8	
Bus985	11.000	96.757	-2.8	0	0	-0.005	0.001	Bus1065	-0.195	-0.084	11.5	91.8	
								Bus984	0.200	0.083	11.7	92.4	
Bus986	11.000	96.796	-2.8	0	0	-0.006	0.001	Bus1065	-0.116	-0.051	6.9	91.4	
								Bus987	0.121	0.050	7.1	92.4	
Bus987	0.400	95.923	-3.4	0	0	0.121	0.048	Bus986	-0.121	-0.048	195.7	92.8	
Bus998	11.000	96.709	-2.8	0	0	-0.006	0.001	Bus1065	-0.293	-0.127	17.3	91.8	
								Bus999	0.299	0.126	17.6	92.2	
Bus999	0.400	95.443	-3.8	0	0	0.297	0.119	Bus998	-0.297	-0.119	484.0	92.8	
Bus1002	11.000	96.804	-2.8	0	0	-0.006	0.001	Bus1065	-0.099	-0.044	5.9	91.3	
								Bus1003	0.104	0.043	6.1	92.5	
Bus1003	0.400	96.054	-3.3	0	0	0.104	0.042	Bus1002	-0.104	-0.042	168.4	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1004	11.000	96.762	-2.8	0	0	-0.006	0.001	Bus1065	-0.185	-0.080	11.0	91.8	
								Bus1005	0.191	0.079	11.2	92.4	
Bus1005	0.400	95.958	-3.5	0	0	0.190	0.076	Bus1004	-0.190	-0.076	308.5	92.8	
Bus1006	0.400	96.248	-3.2	0	0	0.129	0.052	Bus1007	-0.129	-0.052	209.1	92.8	
Bus1007	11.000	96.792	-2.8	0	0	-0.005	0.001	Bus1065	-0.125	-0.054	7.4	91.6	
								Bus1006	0.130	0.053	7.6	92.6	
Bus1008	0.400	95.707	-3.6	0	0	0.148	0.059	Bus1009	-0.148	-0.059	240.7	92.8	
Bus1009	11.000	96.782	-2.8	0	0	-0.005	0.001	Bus1065	-0.144	-0.063	8.5	91.5	
								Bus1008	0.149	0.062	8.8	92.3	
Bus1010	0.400	95.375	-3.8	0	0	0.190	0.076	Bus1011	-0.190	-0.076	309.6	92.8	
Bus1011	11.000	96.761	-2.8	0	0	-0.005	0.001	Bus1065	-0.186	-0.082	11.0	91.6	
								Bus1010	0.191	0.080	11.3	92.2	
Bus1020	11.000	96.761	-2.8	0	0	-0.006	0.001	Bus1065	-0.186	-0.082	11.0	91.6	
								Bus1021	0.192	0.081	11.3	92.2	
Bus1021	0.400	95.373	-3.8	0	0	0.190	0.076	Bus1020	-0.190	-0.076	310.3	92.8	
Bus1022	0.400	95.560	-3.7	0	0	0.167	0.067	Bus1023	-0.167	-0.067	271.3	92.8	
Bus1023	11.000	96.773	-2.8	0	0	-0.005	0.001	Bus1065	-0.163	-0.071	9.6	91.6	
								Bus1022	0.168	0.070	9.9	92.3	
Bus1024	0.400	95.933	-3.4	0	0	0.119	0.048	Bus1025	-0.119	-0.048	193.6	92.8	
Bus1025	11.000	96.796	-2.8	0	0	-0.005	0.001	Bus1065	-0.115	-0.051	6.8	91.4	
								Bus1024	0.120	0.050	7.0	92.4	
Bus1026	0.400	95.881	-3.5	0	0	0.206	0.083	Bus1027	-0.206	-0.083	334.8	92.8	
Bus1027	11.000	96.754	-2.8	0	0	-0.005	0.001	Bus1065	-0.202	-0.087	11.9	91.8	
								Bus1026	0.207	0.086	12.2	92.4	
Bus1048	11.000	96.661	-2.8	0	0	-0.006	0.001	Bus1065	-0.390	-0.169	23.1	91.8	
								Bus1049	0.396	0.168	23.4	92.1	
Bus1049	0.400	95.475	-4.0	0	0	0.395	0.158	Bus1048	-0.395	-0.158	642.5	92.8	
Bus1050	0.400	95.395	-4.0	0	0	0.417	0.167	Bus1051	-0.417	-0.167	679.5	92.8	
Bus1051	11.000	96.649	-2.8	0	0	-0.005	0.001	Bus1065	-0.414	-0.179	24.5	91.8	
								Bus1050	0.419	0.178	24.7	92.1	
Bus1052	0.400	95.294	-4.1	0	0	0.445	0.178	Bus1053	-0.445	-0.178	725.6	92.8	
Bus1053	11.000	96.635	-2.8	0	0	-0.005	0.001	Bus1065	-0.442	-0.192	26.2	91.7	
								Bus1052	0.447	0.190	26.4	92.0	
Bus1054	0.400	90.823	-7.5	0	0	0.123	0.049	Bus1055	-0.123	-0.049	210.8	92.8	
Bus1055	11.000	92.335	-6.4	0	0	0	0	Bus1065	-0.124	-0.053	7.7	92.1	
								Bus1054	0.124	0.053	7.7	92.1	
Bus1056	11.000	96.690	-2.8	0	0	-0.006	0.001	Bus1065	-0.331	-0.144	19.6	91.7	
								Bus1057	0.336	0.143	19.8	92.1	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1057	0.400	95.261	-4.0	0	0	0.334	0.134	Bus1056	-0.334	-0.134	545.5	92.8	
Bus1060	11.000	96.778	-2.8	0	0	-0.006	0.001	Bus1065	-0.152	-0.066	9.0	91.7	
								Bus1061	0.157	0.065	9.2	92.5	
Bus1061	0.400	96.118	-3.3	0	0	0.157	0.063	Bus1060	-0.157	-0.063	253.9	92.8	
Bus1062	11.000	96.816	-2.8	0	0	-0.006	0.001	Bus1065	-0.075	-0.034	4.5	91.1	
								Bus1063	0.081	0.033	4.7	92.7	
Bus1063	0.400	96.478	-3.1	0	0	0.081	0.032	Bus1062	-0.081	-0.032	130.4	92.8	
# Bus1064	33.000	98.748	-0.3	0	0	0.085	-0.118	Bus650	-10.476	-3.926	198.2	93.6	
								Bus1065	5.195	2.022	98.8	93.2	
								Bus1065	5.195	2.022	98.8	93.2	
# Bus1065	11.000	96.853	-2.8	0	0	0.108	-0.958	Bus798	0.106	0.047	6.3	91.5	
								Bus801	0.169	0.073	10.0	91.8	
								Bus803	0.119	0.052	7.0	91.5	
								Bus805	0.102	0.045	6.0	91.4	
								Bus838	0.116	0.051	6.9	91.5	
								Bus840	0.204	0.088	12.0	91.8	
								Bus842	0.174	0.075	10.3	91.8	
								Bus844	0.195	0.084	11.5	91.8	
								Bus847	0.089	0.040	5.3	91.1	
								Bus849	0.117	0.051	6.9	91.5	
								Bus851	0.096	0.043	5.7	91.2	
								Bus852	0.109	0.048	6.5	91.5	
								Bus855	0.093	0.042	5.5	91.2	
								Bus856	0.102	0.046	6.1	91.2	
								Bus858	0.180	0.078	10.6	91.8	
								Bus860	0.097	0.043	5.7	91.4	
								Bus862	0.119	0.053	7.1	91.3	
								Bus865	0.126	0.056	7.5	91.3	
								Bus867	0.160	0.070	9.5	91.6	
								Bus902	0.198	0.085	11.7	91.8	
								Bus926	0.196	0.086	11.6	91.6	
								Bus929	0.315	0.136	18.6	91.8	
								Bus931	0.306	0.132	18.1	91.8	
								Bus933	0.312	0.135	18.4	91.8	
								Bus960	0.116	0.052	6.9	91.2	
								Bus962	0.254	0.110	15.0	91.8	
								Bus964	0.179	0.078	10.6	91.6	
								Bus966	0.284	0.123	16.8	91.8	
								Bus969	0.106	0.047	6.3	91.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus971	0.192	0.083	11.3	91.9	
								Bus972	0.154	0.068	9.1	91.6	
								Bus975	0.092	0.041	5.5	91.4	
								Bus976	0.433	0.188	25.6	91.7	
								Bus978	0.171	0.074	10.1	91.8	
								Bus981	0.284	0.123	16.8	91.8	
								Bus983	0.242	0.104	14.3	91.8	
								Bus985	0.195	0.084	11.5	91.9	
								Bus986	0.116	0.051	6.9	91.5	
								Bus998	0.293	0.127	17.3	91.8	
								Bus1002	0.099	0.044	5.9	91.4	
								Bus1004	0.185	0.080	10.9	91.8	
								Bus1007	0.125	0.054	7.4	91.7	
								Bus1009	0.144	0.063	8.5	91.6	
								Bus1011	0.186	0.082	11.0	91.6	
								Bus1020	0.186	0.082	11.0	91.6	
								Bus1023	0.163	0.071	9.6	91.6	
								Bus1025	0.115	0.051	6.8	91.5	
								Bus1027	0.202	0.087	11.9	91.9	
								Bus1048	0.391	0.169	23.1	91.8	
								Bus1051	0.415	0.179	24.5	91.8	
								Bus1053	0.443	0.192	26.2	91.7	
								Bus1055	0.127	0.062	7.7	89.7	
								Bus1056	0.331	0.144	19.6	91.7	
								Bus1060	0.152	0.066	9.0	91.8	
								Bus1062	0.075	0.034	4.5	91.3	
								Bus1064	-5.178	-1.756	296.3	94.7	
								Bus1064	-5.178	-1.756	296.3	94.7	
Bus1195	0.400	90.605	-9.5	0	0	0.155	0.063	Bus1196	-0.155	-0.063	266.6	92.7	
Bus1196	11.000	91.801	-8.6	0	0	-0.021	0.001	Bus1328	-0.135	-0.067	8.6	89.7	
								Bus1195	0.156	0.066	9.7	92.1	
Bus1197	0.400	91.076	-9.3	0	0	0.162	0.065	Bus1198	-0.162	-0.065	276.8	92.8	
Bus1198	11.000	91.798	-8.6	0	0	-0.021	0.001	Bus1328	-0.142	-0.068	9.0	90.1	
								Bus1197	0.163	0.067	10.1	92.4	
Bus1199	0.400	90.809	-9.5	0	0	0.214	0.086	Bus1200	-0.214	-0.086	367.3	92.8	
Bus1200	11.000	91.771	-8.7	0	0	-0.020	0.001	Bus1328	-0.195	-0.091	12.3	90.6	
								Bus1199	0.215	0.090	13.4	92.2	
Bus1201	0.400	90.903	-9.4	0	0	0.196	0.079	Bus1202	-0.196	-0.079	335.5	92.8	
Bus1202	11.000	91.781	-8.7	0	0	-0.021	0.001	Bus1328	-0.176	-0.083	11.1	90.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1201	0.197	0.082	12.2	92.3	
Bus1203	0.400	90.894	-9.4	0	0	0.198	0.080	Bus1204	-0.198	-0.080	338.6	92.8	
Bus1204	11.000	91.780	-8.7	0	0	-0.021	0.001	Bus1328	-0.178	-0.084	11.3	90.4	
								Bus1203	0.199	0.083	12.3	92.3	
Bus1205	0.400	90.983	-9.3	0	0	0.180	0.073	Bus1206	-0.180	-0.073	308.5	92.8	
Bus1206	11.000	91.789	-8.6	0	0	-0.021	0.001	Bus1328	-0.160	-0.076	10.2	90.3	
								Bus1205	0.181	0.075	11.2	92.3	
Bus1207	0.400	90.213	-9.8	0	0	0.129	0.052	Bus1208	-0.129	-0.052	222.4	92.7	
Bus1208	11.000	91.815	-8.6	0	0	-0.022	0.001	Bus1328	-0.109	-0.056	7.0	88.7	
								Bus1207	0.130	0.056	8.1	91.9	
Bus1209	0.400	90.997	-9.3	0	0	0.108	0.044	Bus1210	-0.108	-0.044	185.4	92.7	
Bus1210	11.000	91.826	-8.6	0	0	-0.021	0.001	Bus1328	-0.087	-0.046	5.6	88.5	
								Bus1209	0.109	0.045	6.7	92.3	
Bus1211	0.400	91.197	-9.2	0	0	0.138	0.056	Bus1212	-0.138	-0.056	235.7	92.8	
Bus1212	11.000	91.811	-8.6	0	0	-0.021	0.001	Bus1328	-0.118	-0.058	7.5	89.6	
								Bus1211	0.139	0.057	8.6	92.4	
Bus1213	0.400	90.683	-9.5	0	0	0.146	0.059	Bus1214	-0.146	-0.059	250.6	92.7	
Bus1214	11.000	91.806	-8.6	0	0	-0.021	0.001	Bus1328	-0.126	-0.063	8.0	89.5	
								Bus1213	0.147	0.062	9.1	92.2	
Bus1215	0.400	90.798	-9.4	0	0	0.132	0.053	Bus1216	-0.132	-0.053	226.7	92.7	
Bus1216	11.000	91.814	-8.6	0	0	-0.021	0.001	Bus1328	-0.112	-0.056	7.2	89.2	
								Bus1215	0.133	0.056	8.2	92.2	
Bus1217	0.400	90.982	-9.3	0	0	0.168	0.068	Bus1218	-0.168	-0.068	286.6	92.7	
Bus1218	11.000	91.795	-8.6	0	0	-0.021	0.001	Bus1328	-0.147	-0.071	9.4	90.1	
								Bus1217	0.168	0.070	10.4	92.3	
Bus1219	0.400	90.450	-9.6	0	0	0.174	0.070	Bus1220	-0.174	-0.070	298.7	92.7	
Bus1220	11.000	91.792	-8.6	0	0	-0.021	0.001	Bus1328	-0.154	-0.075	9.8	89.9	
								Bus1219	0.175	0.074	10.9	92.1	
Bus1221	0.400	90.739	-9.5	0	0	0.228	0.092	Bus1222	-0.228	-0.092	391.2	92.8	
Bus1222	11.000	91.764	-8.7	0	0	-0.020	0.001	Bus1328	-0.209	-0.097	13.2	90.6	
								Bus1221	0.229	0.096	14.2	92.2	
Bus1223	0.400	90.786	-9.5	0	0	0.219	0.088	Bus1224	-0.219	-0.088	375.2	92.8	
Bus1224	11.000	91.768	-8.7	0	0	-0.020	0.001	Bus1328	-0.200	-0.093	12.6	90.6	
								Bus1223	0.220	0.092	13.6	92.2	
Bus1225	0.400	90.836	-9.4	0	0	0.128	0.051	Bus1226	-0.128	-0.051	219.0	92.8	
Bus1226	11.000	91.816	-8.6	0	0	-0.021	0.001	Bus1328	-0.107	-0.054	6.9	89.1	
								Bus1225	0.129	0.054	8.0	92.3	
Bus1227	0.400	90.960	-9.4	0	0	0.185	0.074	Bus1228	-0.185	-0.074	316.6	92.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1228	11.000	91.786	-8.6	0	0	-0.021	0.001	Bus1328	-0.165	-0.078	10.4	90.3	
								Bus1227	0.186	0.077	11.5	92.3	
Bus1229	0.400	91.178	-9.2	0	0	0.142	0.057	Bus1230	-0.142	-0.057	242.0	92.8	
Bus1230	11.000	91.809	-8.6	0	0	-0.021	0.001	Bus1328	-0.121	-0.060	7.7	89.7	
								Bus1229	0.142	0.059	8.8	92.4	
Bus1235	0.400	90.950	-9.4	0	0	0.187	0.075	Bus1236	-0.187	-0.075	319.6	92.8	
Bus1236	11.000	91.785	-8.6	0	0	-0.021	0.001	Bus1328	-0.167	-0.079	10.6	90.4	
								Bus1235	0.188	0.078	11.6	92.3	
Bus1237	0.400	90.247	-9.8	0	0	0.197	0.080	Bus1238	-0.197	-0.080	340.6	92.7	
Bus1238	11.000	91.779	-8.7	0	0	-0.021	0.001	Bus1328	-0.178	-0.086	11.3	90.1	
								Bus1237	0.199	0.085	12.4	92.0	
Bus1239	0.400	91.067	-9.3	0	0	0.164	0.066	Bus1240	-0.164	-0.066	279.9	92.8	
Bus1240	11.000	91.797	-8.6	0	0	-0.021	0.001	Bus1328	-0.144	-0.069	9.1	90.1	
								Bus1239	0.164	0.068	10.2	92.4	
Bus1241	0.400	89.979	-10.0	0	0	0.146	0.059	Bus1242	-0.146	-0.059	253.2	92.7	
Bus1242	11.000	91.805	-8.6	0	0	-0.021	0.001	Bus1328	-0.126	-0.065	8.1	89.1	
								Bus1241	0.148	0.064	9.2	91.8	
Bus1243	0.400	90.922	-9.4	0	0	0.192	0.077	Bus1244	-0.192	-0.077	329.1	92.8	
Bus1244	11.000	91.782	-8.7	0	0	-0.021	0.001	Bus1328	-0.173	-0.082	10.9	90.4	
								Bus1243	0.193	0.081	12.0	92.3	
Bus1245	0.400	90.242	-9.8	0	0	0.082	0.033	Bus1246	-0.082	-0.033	141.9	92.7	
Bus1246	11.000	91.839	-8.6	0	0	-0.022	0.001	Bus1328	-0.061	-0.036	4.1	86.0	
								Bus1245	0.083	0.036	5.2	91.9	
Bus1247	0.400	90.927	-9.4	0	0	0.191	0.077	Bus1248	-0.191	-0.077	327.5	92.8	
Bus1248	11.000	91.783	-8.7	0	0	-0.021	0.001	Bus1328	-0.172	-0.081	10.9	90.4	
								Bus1247	0.192	0.080	11.9	92.3	
Bus1251	0.400	91.037	-9.2	0	0	0.127	0.051	Bus1252	-0.127	-0.051	217.8	92.7	
Bus1252	11.000	91.816	-8.6	0	0	-0.021	0.001	Bus1328	-0.107	-0.054	6.8	89.3	
								Bus1251	0.128	0.053	7.9	92.4	
Bus1253	0.400	91.113	-9.2	0	0	0.155	0.062	Bus1254	-0.155	-0.062	264.1	92.8	
Bus1254	11.000	91.802	-8.6	0	0	-0.021	0.001	Bus1328	-0.134	-0.065	8.5	90.0	
								Bus1253	0.155	0.064	9.6	92.4	
Bus1255	0.400	90.621	-9.5	0	0	0.153	0.062	Bus1256	-0.153	-0.062	263.4	92.7	
Bus1256	11.000	91.802	-8.6	0	0	-0.021	0.001	Bus1328	-0.133	-0.066	8.5	89.6	
								Bus1255	0.154	0.065	9.6	92.1	
Bus1257	0.400	90.333	-9.7	0	0	0.187	0.076	Bus1258	-0.187	-0.076	322.8	92.7	
Bus1258	11.000	91.784	-8.6	0	0	-0.021	0.001	Bus1328	-0.168	-0.081	10.7	90.0	
								Bus1257	0.189	0.080	11.7	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1259	0.400	91.020	-9.2	0	0	0.106	0.043	Bus1260	-0.106	-0.043	180.7	92.8	
Bus1260	11.000	91.828	-8.6	0	0	-0.022	0.001	Bus1328	-0.085	-0.045	5.5	88.4	
								Bus1259	0.106	0.044	6.6	92.4	
Bus1261	0.400	90.303	-9.8	0	0	0.079	0.032	Bus1262	-0.079	-0.032	136.8	92.7	
Bus1262	11.000	91.841	-8.6	0	0	-0.022	0.001	Bus1328	-0.058	-0.035	3.9	85.8	
								Bus1261	0.080	0.034	5.0	92.0	
Bus1263	0.400	90.554	-9.7	0	0	0.264	0.106	Bus1264	-0.264	-0.106	453.5	92.7	
Bus1264	11.000	91.744	-8.7	0	0	-0.020	0.001	Bus1328	-0.245	-0.113	15.5	90.8	
								Bus1263	0.265	0.112	16.5	92.1	
Bus1265	0.400	91.029	-9.3	0	0	0.171	0.069	Bus1266	-0.171	-0.069	292.6	92.8	
Bus1266	11.000	91.794	-8.6	0	0	-0.021	0.001	Bus1328	-0.151	-0.072	9.6	90.2	
								Bus1265	0.172	0.071	10.6	92.3	
Bus1267	0.400	90.407	-9.8	0	0	0.292	0.118	Bus1268	-0.292	-0.118	503.2	92.7	
Bus1268	11.000	91.729	-8.7	0	0	-0.020	0.001	Bus1328	-0.274	-0.126	17.3	90.8	
								Bus1267	0.294	0.125	18.3	92.0	
Bus1269	0.400	89.678	-10.0	0	0	0.064	0.026	Bus1270	-0.064	-0.026	111.2	92.7	
Bus1270	11.000	91.849	-8.6	0	0	-0.022	0.001	Bus1328	-0.043	-0.029	2.9	83.1	
								Bus1269	0.065	0.028	4.0	91.8	
Bus1271	0.400	90.591	-9.6	0	0	0.100	0.041	Bus1272	-0.100	-0.041	172.6	92.7	
Bus1272	11.000	91.830	-8.6	0	0	-0.022	0.001	Bus1328	-0.079	-0.043	5.2	87.7	
								Bus1271	0.101	0.043	6.3	92.1	
Bus1273	0.400	91.043	-9.3	0	0	0.168	0.068	Bus1274	-0.168	-0.068	287.9	92.8	
Bus1274	11.000	91.795	-8.6	0	0	-0.021	0.001	Bus1328	-0.148	-0.071	9.4	90.2	
								Bus1273	0.169	0.070	10.5	92.3	
Bus1275	0.400	90.602	-9.6	0	0	0.255	0.103	Bus1276	-0.255	-0.103	437.5	92.7	
Bus1276	11.000	91.749	-8.7	0	0	-0.020	0.001	Bus1328	-0.236	-0.109	14.9	90.7	
								Bus1275	0.256	0.108	15.9	92.1	
Bus1277	0.400	90.875	-9.3	0	0	0.123	0.050	Bus1278	-0.123	-0.050	210.8	92.7	
Bus1278	11.000	91.819	-8.6	0	0	-0.021	0.001	Bus1328	-0.102	-0.052	6.6	89.0	
								Bus1277	0.124	0.052	7.7	92.3	
Bus1281	0.400	90.644	-9.6	0	0	0.246	0.099	Bus1282	-0.246	-0.099	423.1	92.8	
Bus1282	11.000	91.754	-8.7	0	0	-0.020	0.001	Bus1328	-0.228	-0.106	14.3	90.7	
								Bus1281	0.248	0.105	15.4	92.1	
Bus1283	0.400	90.551	-9.6	0	0	0.162	0.065	Bus1284	-0.162	-0.065	277.8	92.7	
Bus1284	11.000	91.798	-8.6	0	0	-0.021	0.001	Bus1328	-0.142	-0.070	9.0	89.8	
								Bus1283	0.163	0.069	10.1	92.1	
Bus1285	0.400	90.739	-9.5	0	0	0.228	0.092	Bus1286	-0.228	-0.092	391.2	92.8	
Bus1286	11.000	91.764	-8.7	0	0	-0.020	0.001	Bus1328	-0.209	-0.097	13.2	90.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1285	0.229	0.096	14.2	92.2	
Bus1287	0.400	90.333	-9.7	0	0	0.187	0.076	Bus1288	-0.187	-0.076	322.8	92.7	
Bus1288	11.000	91.784	-8.6	0	0	-0.021	0.001	Bus1328	-0.168	-0.081	10.7	90.0	
								Bus1287	0.189	0.080	11.7	92.0	
Bus1289	0.400	90.786	-9.5	0	0	0.219	0.088	Bus1290	-0.219	-0.088	375.2	92.8	
Bus1290	11.000	91.768	-8.7	0	0	-0.020	0.001	Bus1328	-0.200	-0.093	12.6	90.6	
								Bus1289	0.220	0.092	13.6	92.2	
Bus1291	0.400	90.960	-9.4	0	0	0.185	0.074	Bus1292	-0.185	-0.074	316.6	92.8	
Bus1292	11.000	91.786	-8.6	0	0	-0.021	0.001	Bus1328	-0.165	-0.078	10.4	90.3	
								Bus1291	0.186	0.077	11.5	92.3	
Bus1293	0.400	90.330	-9.7	0	0	0.188	0.076	Bus1294	-0.188	-0.076	323.6	92.8	
Bus1294	11.000	91.784	-8.6	0	0	-0.021	0.001	Bus1328	-0.168	-0.081	10.7	90.0	
								Bus1293	0.189	0.080	11.8	92.0	
Bus1295	0.400	90.762	-9.5	0	0	0.224	0.090	Bus1296	-0.224	-0.090	383.2	92.8	
Bus1296	11.000	91.766	-8.7	0	0	-0.020	0.001	Bus1328	-0.204	-0.095	12.9	90.6	
								Bus1295	0.225	0.094	13.9	92.2	
Bus1297	0.400	90.070	-10.0	0	0	0.357	0.144	Bus1298	-0.357	-0.144	616.1	92.7	
Bus1298	11.000	91.695	-8.7	0	0	-0.020	0.001	Bus1328	-0.340	-0.156	21.4	90.9	
								Bus1297	0.359	0.155	22.4	91.8	
Bus1299	0.400	91.015	-9.3	0	0	0.174	0.070	Bus1300	-0.174	-0.070	297.4	92.8	
Bus1300	11.000	91.792	-8.6	0	0	-0.021	0.001	Bus1328	-0.154	-0.074	9.8	90.2	
								Bus1299	0.175	0.073	10.8	92.3	
Bus1301	0.400	90.959	-9.4	0	0	0.185	0.074	Bus1302	-0.185	-0.074	316.4	92.8	
Bus1302	11.000	91.786	-8.6	0	0	-0.021	0.001	Bus1328	-0.165	-0.078	10.4	90.3	
								Bus1301	0.186	0.077	11.5	92.3	
Bus1303	0.400	90.484	-9.7	0	0	0.278	0.112	Bus1304	-0.278	-0.112	477.7	92.8	
Bus1304	11.000	91.737	-8.7	0	0	-0.020	0.001	Bus1328	-0.259	-0.119	16.3	90.8	
								Bus1303	0.280	0.119	17.4	92.1	
Bus1305	0.400	90.775	-9.4	0	0	0.135	0.054	Bus1306	-0.135	-0.054	231.5	92.7	
Bus1306	11.000	91.812	-8.6	0	0	-0.021	0.001	Bus1328	-0.114	-0.058	7.3	89.3	
								Bus1305	0.136	0.057	8.4	92.2	
Bus1307	0.400	89.416	-10.4	0	0	0.188	0.076	Bus1308	-0.188	-0.076	326.7	92.7	
Bus1308	11.000	91.783	-8.6	0	0	-0.021	0.001	Bus1328	-0.169	-0.084	10.8	89.5	
								Bus1307	0.190	0.084	11.9	91.5	
Bus1309	0.400	90.427	-9.7	0	0	0.176	0.071	Bus1310	-0.176	-0.071	303.5	92.7	
Bus1310	11.000	91.790	-8.6	0	0	-0.021	0.001	Bus1328	-0.157	-0.076	10.0	89.9	
								Bus1309	0.178	0.075	11.0	92.1	
Bus1311	0.400	90.528	-9.6	0	0	0.164	0.066	Bus1312	-0.164	-0.066	282.7	92.7	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1312	11.000	91.797	-8.6	0	0	-0.021	0.001	Bus1328	-0.144	-0.071	9.2	89.8	
								Bus1311	0.166	0.070	10.3	92.1	
Bus1313	0.400	89.862	-10.1	0	0	0.101	0.041	Bus1314	-0.101	-0.041	174.3	92.7	
Bus1314	11.000	91.829	-8.6	0	0	-0.022	0.001	Bus1328	-0.080	-0.045	5.2	87.2	
								Bus1313	0.102	0.044	6.3	91.7	
Bus1315	0.400	90.355	-9.7	0	0	0.077	0.031	Bus1316	-0.077	-0.031	132.3	92.7	
Bus1316	11.000	91.842	-8.6	0	0	-0.022	0.001	Bus1328	-0.055	-0.034	3.7	85.5	
								Bus1315	0.077	0.033	4.8	92.0	
Bus1317	0.400	91.252	-9.1	0	0	0.127	0.051	Bus1318	-0.127	-0.051	216.7	92.8	
Bus1318	11.000	91.817	-8.6	0	0	-0.021	0.001	Bus1328	-0.107	-0.053	6.8	89.4	
								Bus1317	0.127	0.052	7.9	92.5	
Bus1321	0.400	90.547	-9.6	0	0	0.162	0.065	Bus1322	-0.162	-0.065	278.9	92.8	
Bus1322	11.000	91.798	-8.6	0	0	-0.021	0.001	Bus1328	-0.142	-0.070	9.1	89.8	
								Bus1321	0.163	0.069	10.1	92.1	
Bus1326	11.000	91.821	-8.6	0	0	-0.023	0.000	Bus1328	-0.097	-0.051	6.2	88.4	
								Bus1327	0.119	0.051	7.4	92.0	
Bus1327	0.400	90.356	-9.7	0	0	0.118	0.048	Bus1326	-0.118	-0.048	203.7	92.7	
# Bus1328	11.000	91.874	-8.6	0	0	0.678	-1.033	Bus1196	0.135	0.066	8.6	89.7	
								Bus1198	0.142	0.068	9.0	90.1	
								Bus1200	0.195	0.091	12.3	90.6	
								Bus1202	0.176	0.083	11.1	90.5	
								Bus1204	0.178	0.084	11.3	90.5	
								Bus1206	0.161	0.076	10.2	90.3	
								Bus1208	0.109	0.056	7.0	88.8	
								Bus1210	0.087	0.046	5.6	88.6	
								Bus1212	0.118	0.058	7.5	89.7	
								Bus1214	0.126	0.062	8.0	89.6	
								Bus1216	0.112	0.056	7.1	89.3	
								Bus1218	0.148	0.071	9.3	90.2	
								Bus1220	0.154	0.075	9.8	90.0	
								Bus1222	0.209	0.097	13.2	90.7	
								Bus1224	0.200	0.093	12.6	90.6	
								Bus1226	0.107	0.054	6.9	89.2	
								Bus1228	0.165	0.078	10.4	90.4	
								Bus1230	0.121	0.059	7.7	89.8	
								Bus1236	0.167	0.079	10.6	90.4	
								Bus1238	0.178	0.086	11.3	90.1	
								Bus1240	0.144	0.069	9.1	90.2	
								Bus1242	0.126	0.064	8.1	89.2	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1244	0.173	0.081	10.9	90.5	
								Bus1246	0.061	0.036	4.0	86.2	
								Bus1248	0.172	0.081	10.8	90.4	
								Bus1252	0.107	0.054	6.8	89.4	
								Bus1254	0.134	0.065	8.5	90.0	
								Bus1256	0.133	0.066	8.5	89.7	
								Bus1258	0.168	0.081	10.7	90.1	
								Bus1260	0.085	0.045	5.5	88.5	
								Bus1262	0.058	0.035	3.9	86.0	
								Bus1264	0.246	0.113	15.5	90.8	
								Bus1266	0.151	0.072	9.6	90.2	
								Bus1268	0.275	0.126	17.3	90.9	
								Bus1270	0.043	0.028	2.9	83.3	
								Bus1272	0.079	0.043	5.2	87.9	
								Bus1274	0.148	0.071	9.4	90.2	
								Bus1276	0.236	0.109	14.9	90.8	
								Bus1278	0.102	0.052	6.6	89.1	
								Bus1282	0.228	0.105	14.3	90.7	
								Bus1284	0.142	0.069	9.0	89.8	
								Bus1286	0.209	0.097	13.2	90.7	
								Bus1288	0.168	0.081	10.7	90.1	
								Bus1290	0.200	0.093	12.6	90.6	
								Bus1292	0.165	0.078	10.4	90.4	
								Bus1294	0.168	0.081	10.7	90.1	
								Bus1296	0.204	0.095	12.9	90.6	
								Bus1298	0.340	0.156	21.4	90.9	
								Bus1300	0.154	0.073	9.7	90.3	
								Bus1302	0.165	0.078	10.4	90.4	
								Bus1304	0.260	0.119	16.3	90.8	
								Bus1306	0.115	0.057	7.3	89.4	
								Bus1308	0.169	0.084	10.8	89.5	
								Bus1310	0.157	0.076	9.9	90.0	
								Bus1312	0.144	0.071	9.2	89.9	
								Bus1314	0.080	0.045	5.2	87.4	
								Bus1316	0.055	0.033	3.7	85.7	
								Bus1318	0.107	0.053	6.8	89.5	
								Bus1322	0.142	0.069	9.0	89.8	
								Bus1326	0.097	0.051	6.2	88.5	
								Bus1329	-9.777	-3.365	590.7	94.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
# Bus1329	33.000	99.442	-0.1	0	0	0.570	-0.662	Bus1	-10.495	-4.508	201.0	91.9	
								Bus1328	9.925	5.170	196.9	88.7	
Bus1366	0.400	95.146	-4.2	0	0	0.164	0.066	Bus1367	-0.164	-0.066	268.2	92.8	
Bus1367	11.000	97.074	-2.9	0	0	-0.004	0.001	Bus1591	-0.162	-0.072	9.6	91.4	
								Bus1366	0.166	0.071	9.8	91.9	
Bus1368	0.400	96.207	-3.5	0	0	0.123	0.049	Bus1369	-0.123	-0.049	199.2	92.8	
Bus1369	11.000	97.095	-2.9	0	0	-0.004	0.001	Bus1591	-0.120	-0.052	7.1	91.7	
								Bus1368	0.124	0.051	7.2	92.4	
Bus1372	11.000	97.096	-2.9	0	0	-0.004	0.001	Bus1591	-0.117	-0.052	6.9	91.4	
								Bus1373	0.122	0.051	7.1	92.2	
Bus1373	0.400	95.691	-3.8	0	0	0.121	0.048	Bus1372	-0.121	-0.048	196.1	92.8	
Bus1374	11.000	97.029	-2.9	0	0	-0.004	0.001	Bus1591	-0.255	-0.109	15.0	91.9	
								Bus1375	0.259	0.108	15.2	92.3	
Bus1375	0.400	95.936	-3.8	0	0	0.258	0.103	Bus1374	-0.258	-0.103	418.4	92.8	
Bus1376	11.000	97.065	-2.9	0	0	-0.004	0.001	Bus1591	-0.180	-0.078	10.6	91.7	
								Bus1377	0.184	0.077	10.8	92.2	
Bus1377	0.400	95.737	-3.8	0	0	0.183	0.073	Bus1376	-0.183	-0.073	297.1	92.8	
Bus1382	0.400	96.232	-3.5	0	0	0.196	0.079	Bus1383	-0.196	-0.079	317.4	92.8	
Bus1383	11.000	97.059	-2.9	0	0	-0.004	0.001	Bus1591	-0.193	-0.083	11.4	92.0	
								Bus1382	0.197	0.082	11.5	92.4	
Bus1386	0.400	96.263	-3.5	0	0	0.190	0.076	Bus1387	-0.190	-0.076	306.8	92.8	
Bus1387	11.000	97.062	-2.9	0	0	-0.004	0.001	Bus1591	-0.187	-0.080	11.0	92.0	
								Bus1386	0.191	0.079	11.2	92.4	
Bus1388	11.000	97.032	-2.9	0	0	-0.004	0.001	Bus1591	-0.248	-0.106	14.6	91.9	
								Bus1389	0.252	0.105	14.8	92.3	
Bus1389	0.400	95.972	-3.7	0	0	0.251	0.100	Bus1388	-0.251	-0.100	406.2	92.8	
Bus1390	11.000	97.068	-2.9	0	0	-0.004	0.001	Bus1591	-0.173	-0.075	10.2	91.7	
								Bus1391	0.178	0.074	10.4	92.3	
Bus1391	0.400	95.788	-3.8	0	0	0.176	0.071	Bus1390	-0.176	-0.071	286.4	92.8	
Bus1392	0.400	95.680	-3.8	0	0	0.190	0.076	Bus1393	-0.190	-0.076	308.8	92.8	
Bus1393	11.000	97.062	-2.9	0	0	-0.004	0.001	Bus1591	-0.188	-0.081	11.1	91.7	
								Bus1392	0.191	0.080	11.2	92.2	
Bus1394	0.400	95.996	-3.7	0	0	0.246	0.098	Bus1395	-0.246	-0.098	397.8	92.8	
Bus1395	11.000	97.035	-2.9	0	0	-0.004	0.001	Bus1591	-0.243	-0.104	14.3	91.9	
								Bus1394	0.247	0.103	14.5	92.3	
Bus1396	0.400	95.606	-3.9	0	0	0.199	0.080	Bus1397	-0.199	-0.080	324.2	92.8	
Bus1397	11.000	97.057	-2.9	0	0	-0.004	0.001	Bus1591	-0.197	-0.086	11.6	91.7	
								Bus1396	0.201	0.085	11.8	92.2	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1424	11.000	97.100	-2.9	0	0	-0.004	0.001	Bus1591	-0.108	-0.048	6.4	91.4	
								Bus1425	0.112	0.047	6.6	92.2	
Bus1425	0.400	95.807	-3.8	0	0	0.111	0.045	Bus1424	-0.111	-0.045	180.8	92.8	
Bus1426	0.400	95.812	-3.8	0	0	0.173	0.069	Bus1427	-0.173	-0.069	281.3	92.8	
Bus1427	11.000	97.070	-2.9	0	0	-0.004	0.001	Bus1591	-0.171	-0.074	10.1	91.7	
								Bus1426	0.175	0.073	10.2	92.3	
Bus1428	0.400	95.848	-3.8	0	0	0.276	0.111	Bus1429	-0.276	-0.111	448.1	92.8	
Bus1429	11.000	97.019	-2.9	0	0	-0.004	0.001	Bus1591	-0.274	-0.117	16.1	91.9	
								Bus1428	0.278	0.116	16.3	92.2	
Bus1430	0.400	95.096	-4.4	0	0	0.429	0.172	Bus1431	-0.429	-0.172	702.0	92.8	
Bus1431	11.000	96.942	-2.9	0	0	-0.004	0.001	Bus1591	-0.429	-0.187	25.4	91.7	
								Bus1430	0.433	0.186	25.5	91.9	
Bus1432	11.000	97.096	-2.9	0	0	-0.004	0.001	Bus1591	-0.117	-0.051	6.9	91.7	
								Bus1433	0.121	0.050	7.1	92.4	
Bus1433	0.400	96.227	-3.5	0	0	0.121	0.048	Bus1432	-0.121	-0.048	195.1	92.8	
Bus1434	11.000	97.022	-2.9	0	0	-0.004	0.001	Bus1591	-0.268	-0.117	15.8	91.6	
								Bus1435	0.272	0.117	16.0	91.9	
Bus1435	0.400	95.043	-4.3	0	0	0.269	0.108	Bus1434	-0.269	-0.108	440.4	92.8	
Bus1436	11.000	97.077	-2.9	0	0	-0.004	0.001	Bus1591	-0.156	-0.067	9.2	91.7	
								Bus1437	0.160	0.067	9.4	92.3	
Bus1437	0.400	95.928	-3.7	0	0	0.159	0.064	Bus1436	-0.159	-0.064	257.4	92.8	
Bus1438	0.400	96.409	-3.4	0	0	0.097	0.039	Bus1439	-0.097	-0.039	156.8	92.8	
Bus1439	11.000	97.108	-2.9	0	0	-0.004	0.001	Bus1591	-0.094	-0.041	5.5	91.6	
								Bus1438	0.098	0.040	5.7	92.5	
Bus1440	11.000	97.056	-2.9	0	0	-0.004	0.001	Bus1591	-0.198	-0.086	11.7	91.7	
								Bus1441	0.202	0.085	11.9	92.2	
Bus1441	0.400	95.596	-3.9	0	0	0.201	0.080	Bus1440	-0.201	-0.080	326.2	92.8	
Bus1442	11.000	97.069	-2.9	0	0	-0.004	0.001	Bus1591	-0.173	-0.074	10.2	92.0	
								Bus1443	0.177	0.073	10.4	92.5	
Bus1443	0.400	96.328	-3.5	0	0	0.176	0.071	Bus1442	-0.176	-0.071	284.8	92.8	
Bus1444	0.400	95.243	-4.3	0	0	0.400	0.160	Bus1445	-0.400	-0.160	652.4	92.8	
Bus1445	11.000	96.957	-2.9	0	0	-0.004	0.001	Bus1591	-0.399	-0.173	23.6	91.7	
								Bus1444	0.403	0.173	23.7	91.9	
Bus1446	0.400	95.193	-4.3	0	0	0.410	0.164	Bus1447	-0.410	-0.164	669.4	92.8	
Bus1447	11.000	96.952	-2.9	0	0	-0.004	0.001	Bus1591	-0.410	-0.178	24.2	91.7	
								Bus1446	0.413	0.177	24.3	91.9	
Bus1448	0.400	96.219	-3.5	0	0	0.199	0.080	Bus1449	-0.199	-0.080	321.9	92.8	
Bus1449	11.000	97.058	-2.9	0	0	-0.004	0.001	Bus1591	-0.196	-0.084	11.5	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1448	0.200	0.083	11.7	92.4	
Bus1476	11.000	97.022	-2.9	0	0	-0.004	0.001	Bus1591	-0.267	-0.117	15.8	91.6	
								Bus1477	0.271	0.116	16.0	91.9	
Bus1477	0.400	95.050	-4.3	0	0	0.268	0.107	Bus1476	-0.268	-0.107	438.9	92.8	
Bus1478	0.400	96.343	-3.5	0	0	0.173	0.069	Bus1479	-0.173	-0.069	279.6	92.8	
Bus1479	11.000	97.071	-2.9	0	0	-0.004	0.001	Bus1591	-0.170	-0.073	10.0	92.0	
								Bus1478	0.174	0.072	10.2	92.5	
Bus1480	0.400	96.580	-3.3	0	0	0.123	0.049	Bus1481	-0.123	-0.049	198.2	92.8	
Bus1481	11.000	97.095	-2.9	0	0	-0.004	0.001	Bus1591	-0.120	-0.051	7.0	91.9	
								Bus1480	0.123	0.050	7.2	92.6	
Bus1482	0.400	95.943	-3.8	0	0	0.257	0.103	Bus1483	-0.257	-0.103	416.1	92.8	
Bus1483	11.000	97.029	-2.9	0	0	-0.004	0.001	Bus1591	-0.254	-0.109	15.0	91.9	
								Bus1482	0.258	0.108	15.1	92.3	
Bus1484	11.000	97.096	-2.9	0	0	-0.004	0.001	Bus1591	-0.117	-0.051	6.9	91.7	
								Bus1485	0.121	0.050	7.1	92.4	
Bus1485	0.400	96.227	-3.5	0	0	0.121	0.048	Bus1484	-0.121	-0.048	195.1	92.8	
Bus1488	11.000	97.077	-2.9	0	0	-0.004	0.001	Bus1591	-0.156	-0.067	9.2	91.7	
								Bus1489	0.160	0.067	9.4	92.3	
Bus1489	0.400	95.928	-3.7	0	0	0.159	0.064	Bus1488	-0.159	-0.064	257.4	92.8	
Bus1490	0.400	96.290	-3.5	0	0	0.184	0.074	Bus1491	-0.184	-0.074	297.7	92.8	
Bus1491	11.000	97.065	-2.9	0	0	-0.004	0.001	Bus1591	-0.181	-0.077	10.7	92.0	
								Bus1490	0.185	0.076	10.8	92.4	
Bus1492	11.000	97.022	-2.9	0	0	-0.004	0.001	Bus1591	-0.268	-0.115	15.8	91.9	
								Bus1493	0.273	0.114	16.0	92.2	
Bus1493	0.400	95.873	-3.8	0	0	0.271	0.108	Bus1492	-0.271	-0.108	439.7	92.8	
Bus1494	11.000	97.068	-2.9	0	0	-0.004	0.001	Bus1591	-0.173	-0.075	10.2	91.7	
								Bus1495	0.178	0.074	10.4	92.3	
Bus1495	0.400	95.788	-3.8	0	0	0.176	0.071	Bus1494	-0.176	-0.071	286.4	92.8	
Bus1496	0.400	95.794	-3.9	0	0	0.287	0.115	Bus1497	-0.287	-0.115	466.4	92.8	
Bus1497	11.000	97.014	-2.9	0	0	-0.004	0.001	Bus1591	-0.285	-0.122	16.8	91.9	
								Bus1496	0.289	0.121	17.0	92.2	
Bus1498	0.400	95.233	-4.1	0	0	0.246	0.098	Bus1499	-0.246	-0.098	401.2	92.8	
Bus1499	11.000	97.033	-2.9	0	0	-0.004	0.001	Bus1591	-0.244	-0.107	14.4	91.6	
								Bus1498	0.248	0.106	14.6	92.0	
Bus1500	0.400	95.017	-4.4	0	0	0.445	0.178	Bus1501	-0.445	-0.178	728.4	92.8	
Bus1501	11.000	96.934	-2.9	0	0	-0.004	0.001	Bus1591	-0.445	-0.195	26.3	91.6	
								Bus1500	0.449	0.194	26.5	91.8	
Bus1526	11.000	97.055	-2.9	0	0	-0.004	0.001	Bus1591	-0.201	-0.086	11.8	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1527	0.205	0.085	12.0	92.4	
Bus1527	0.400	96.195	-3.6	0	0	0.204	0.082	Bus1526	-0.204	-0.082	330.2	92.8	
Bus1530	0.400	96.207	-3.5	0	0	0.123	0.049	Bus1531	-0.123	-0.049	199.2	92.8	
Bus1531	11.000	97.095	-2.9	0	0	-0.004	0.001	Bus1591	-0.120	-0.052	7.1	91.7	
								Bus1530	0.124	0.051	7.2	92.4	
Bus1532	0.400	95.866	-3.7	0	0	0.107	0.043	Bus1533	-0.107	-0.043	172.9	92.8	
Bus1533	11.000	97.103	-2.9	0	0	-0.004	0.001	Bus1591	-0.103	-0.046	6.1	91.4	
								Bus1532	0.107	0.045	6.3	92.3	
Bus1534	11.000	97.050	-2.9	0	0	-0.004	0.001	Bus1591	-0.211	-0.092	12.5	91.7	
								Bus1535	0.215	0.091	12.6	92.1	
Bus1535	0.400	95.492	-4.0	0	0	0.214	0.085	Bus1534	-0.214	-0.085	347.7	92.8	
Bus1538	0.400	95.680	-3.8	0	0	0.190	0.076	Bus1539	-0.190	-0.076	308.8	92.8	
Bus1539	11.000	97.062	-2.9	0	0	-0.004	0.001	Bus1591	-0.188	-0.081	11.1	91.7	
								Bus1538	0.191	0.080	11.2	92.2	
Bus1542	11.000	97.069	-2.9	0	0	-0.004	0.001	Bus1591	-0.173	-0.074	10.2	92.0	
								Bus1543	0.177	0.073	10.4	92.5	
Bus1543	0.400	96.328	-3.5	0	0	0.176	0.071	Bus1542	-0.176	-0.071	284.8	92.8	
Bus1546	0.400	95.731	-3.8	0	0	0.184	0.073	Bus1547	-0.184	-0.073	298.1	92.8	
Bus1547	11.000	97.065	-2.9	0	0	-0.004	0.001	Bus1591	-0.181	-0.078	10.7	91.7	
								Bus1546	0.185	0.078	10.8	92.2	
Bus1548	0.400	96.219	-3.5	0	0	0.199	0.080	Bus1549	-0.199	-0.080	321.9	92.8	
Bus1549	11.000	97.058	-2.9	0	0	-0.004	0.001	Bus1591	-0.196	-0.084	11.5	92.0	
								Bus1548	0.200	0.083	11.7	92.4	
Bus1562	11.000	97.096	-2.9	0	0	-0.004	0.001	Bus1591	-0.117	-0.052	6.9	91.4	
								Bus1563	0.122	0.051	7.1	92.2	
Bus1563	0.400	95.691	-3.8	0	0	0.121	0.048	Bus1562	-0.121	-0.048	196.1	92.8	
Bus1564	0.400	96.409	-3.4	0	0	0.097	0.039	Bus1565	-0.097	-0.039	156.8	92.8	
Bus1565	11.000	97.108	-2.9	0	0	-0.004	0.001	Bus1591	-0.094	-0.041	5.5	91.6	
								Bus1564	0.098	0.040	5.7	92.5	
Bus1566	11.000	97.069	-2.9	0	0	-0.004	0.001	Bus1591	-0.173	-0.074	10.2	92.0	
								Bus1567	0.177	0.073	10.4	92.5	
Bus1567	0.400	96.328	-3.5	0	0	0.176	0.071	Bus1566	-0.176	-0.071	284.8	92.8	
Bus1568	0.400	96.241	-3.5	0	0	0.195	0.078	Bus1569	-0.195	-0.078	314.3	92.8	
Bus1569	11.000	97.060	-2.9	0	0	-0.004	0.001	Bus1591	-0.192	-0.082	11.3	92.0	
								Bus1568	0.195	0.081	11.4	92.4	
Bus1570	0.400	95.287	-4.1	0	0	0.153	0.061	Bus1571	-0.153	-0.061	249.7	92.8	
Bus1571	11.000	97.079	-2.9	0	0	-0.004	0.001	Bus1591	-0.151	-0.067	8.9	91.4	
								Bus1570	0.154	0.066	9.1	92.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1572	0.400	96.219	-3.5	0	0	0.199	0.080	Bus1573	-0.199	-0.080	321.9	92.8	
Bus1573	11.000	97.058	-2.9	0	0	-0.004	0.001	Bus1591	-0.196	-0.084	11.5	92.0	
								Bus1572	0.200	0.083	11.7	92.4	
Bus1582	11.000	97.066	-2.9	0	0	-0.004	0.001	Bus1591	-0.178	-0.076	10.5	92.0	
								Bus1583	0.183	0.075	10.7	92.4	
Bus1583	0.400	96.301	-3.5	0	0	0.182	0.073	Bus1582	-0.182	-0.073	293.9	92.8	
Bus1584	11.000	97.022	-2.9	0	0	-0.004	0.001	Bus1591	-0.267	-0.116	15.8	91.8	
								Bus1585	0.272	0.115	15.9	92.1	
Bus1585	0.400	95.450	-4.0	0	0	0.269	0.108	Bus1584	-0.269	-0.108	438.6	92.8	
Bus1586	0.400	96.229	-3.5	0	0	0.120	0.048	Bus1587	-0.120	-0.048	194.6	92.8	
Bus1587	11.000	97.096	-2.9	0	0	-0.004	0.001	Bus1591	-0.117	-0.051	6.9	91.7	
								Bus1586	0.121	0.050	7.1	92.4	
Bus1588	0.400	95.732	-4.0	0	0	0.408	0.163	Bus1589	-0.408	-0.163	662.5	92.8	
Bus1589	11.000	96.954	-2.9	0	0	-0.004	0.001	Bus1591	-0.406	-0.175	23.9	91.9	
								Bus1588	0.410	0.174	24.1	92.1	
# Bus1590	33.000	99.399	-0.1	0	0	0.067	-0.157	Bus1	-11.412	-4.730	217.4	92.4	
								Bus1591	5.672	2.444	108.7	91.8	
								Bus1591	5.672	2.444	108.7	91.8	
# Bus1591	11.000	97.154	-2.9	0	0	0.091	-0.593	Bus1367	0.162	0.072	9.6	91.5	
								Bus1369	0.120	0.052	7.1	91.8	
								Bus1372	0.118	0.052	6.9	91.5	
								Bus1374	0.255	0.109	15.0	91.9	
								Bus1376	0.180	0.078	10.6	91.8	
								Bus1383	0.194	0.082	11.4	92.0	
								Bus1387	0.187	0.080	11.0	92.0	
								Bus1388	0.248	0.106	14.6	92.0	
								Bus1390	0.174	0.075	10.2	91.8	
								Bus1393	0.188	0.081	11.0	91.8	
								Bus1395	0.243	0.104	14.3	92.0	
								Bus1397	0.197	0.085	11.6	91.8	
								Bus1424	0.108	0.048	6.4	91.5	
								Bus1427	0.171	0.074	10.0	91.8	
								Bus1429	0.274	0.117	16.1	91.9	
								Bus1431	0.430	0.188	25.4	91.7	
								Bus1432	0.117	0.051	6.9	91.8	
								Bus1434	0.268	0.117	15.8	91.6	
								Bus1436	0.156	0.067	9.2	91.8	
								Bus1439	0.094	0.041	5.5	91.7	
								Bus1440	0.198	0.086	11.7	91.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus1442	0.173	0.074	10.2	92.0	
								Bus1445	0.400	0.174	23.6	91.7	
								Bus1447	0.410	0.179	24.2	91.7	
								Bus1449	0.196	0.084	11.5	92.0	
								Bus1476	0.267	0.117	15.8	91.6	
								Bus1479	0.170	0.072	10.0	92.0	
								Bus1481	0.120	0.051	7.0	92.0	
								Bus1483	0.255	0.109	15.0	92.0	
								Bus1484	0.117	0.051	6.9	91.8	
								Bus1488	0.156	0.067	9.2	91.8	
								Bus1491	0.181	0.077	10.6	92.0	
								Bus1492	0.269	0.115	15.8	91.9	
								Bus1494	0.174	0.075	10.2	91.8	
								Bus1497	0.286	0.122	16.8	91.9	
								Bus1499	0.245	0.107	14.4	91.7	
								Bus1501	0.446	0.195	26.3	91.6	
								Bus1526	0.201	0.086	11.8	92.0	
								Bus1531	0.120	0.052	7.1	91.8	
								Bus1533	0.103	0.046	6.1	91.5	
								Bus1534	0.211	0.092	12.4	91.7	
								Bus1539	0.188	0.081	11.0	91.8	
								Bus1542	0.173	0.074	10.2	92.0	
								Bus1547	0.181	0.078	10.7	91.8	
								Bus1549	0.196	0.084	11.5	92.0	
								Bus1562	0.118	0.052	6.9	91.5	
								Bus1565	0.094	0.041	5.5	91.7	
								Bus1566	0.173	0.074	10.2	92.0	
								Bus1569	0.192	0.082	11.3	92.0	
								Bus1571	0.151	0.066	8.9	91.5	
								Bus1573	0.196	0.084	11.5	92.0	
								Bus1582	0.179	0.076	10.5	92.0	
								Bus1584	0.268	0.116	15.7	91.8	
								Bus1587	0.117	0.051	6.9	91.8	
								Bus1589	0.407	0.175	23.9	91.9	
								Bus1590	-5.652	-2.122	326.1	93.6	
								Bus1590	-5.652	-2.122	326.1	93.6	

جامعة النجاح الوطنية
كلية الدراسات العليا

تحليل وتحسين شبكة التوزيع الكهربائية لمدينة نابلس عن طريقة إضافة نقطة ربط جديدة في قرية صرة ومحطتي تحويل لتغذية الشبكة

اعداد
محمد توفيق نصوح قصاب

إشراف
د. ماهر خماش

قدمت هذه الرسالة استكمالا لمتطلبات الحصول على درجة الماجستير في هندسة القوى الكهربائية،
كلية الدّراسات العليا في جامعة النّجاح الوطنية، نابلس، فلسطين.
2022

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إعداد

محمد توفيق نصوح قصاب

إشراف

د. ماهر خماش

الملخص

تعد مشكلة نقص الطاقة الكهربائية المزودة في فلسطين من الامور التي نعاني منها في فترة السنوات الاخيرة، حيث ان الزيادة السكانية والتطور العمراني باستمرار والزيادة على الطاقة الكهربائية تجاوزت الحد المسموح، حيث ان مصادر الطاقة الكهربائية قليلة ومعظم الطاقة الكهربائية يتم تزويدنا بها من خلال الشركة القطرية الاسرائيلية، لذا يعاني سكان فلسطين من الشح الدائم للطاقة الكهربائية بسبب الحاجة لرفع كمية الطاقة الكهربائية من طرف الشركة القطرية الاسرائيلية والتي لا تسمح بذلك بالوقت الحالي.

في مدينة نابلس ايضا تعاني من نقص الطاقة الكهربائية حيث التوسع العمراني والمباني الجديدة والكثافة السكانية بازدياد، حيث ان مجموع الطاقة الكهربائية المزودة لمدينة نابلس من نقاط الربط بسعة 65 ميجا وات وان الطلب على الطاقة الكهربائية قد تجاوز 85 ميجا وات، وفي حالة وصول الاحمال الكهربائية الى وقت الذروة وخاصة في فصل الشتاء تقوم الشركة بفصل بعض الاحمال عن مناطق معينة لفترات زمنية تتجاوز الساعة في اليوم وذلك للتقليل من الضغط الواقع على نقاط الربط وتجاوز الحد المسموح الذي يؤدي اعطال في المحولات الكهربائية وخطوط النقل والأجهزة المستخدمةفي احدى نقاط الربط التابعة لمدينة نابلس تسمى نقطة ربط صرة حيث ان سعة المحطة 150 ميجا وات والمستخدم منها 40 ميجا وات، حيث ان حاولنا في هذه الاطروحة " تحليل وتحسين شبكة نابلس الكهربائية بإضافة محطتين تحويل جديدتين"، حيث تم اضافة محطة تحويل في منطقتين سعة كل محطة تحويل 20 ميجا وات، الاولى في منطقة نابلس الجديدة والثانية في منطقة مستشفى النجاح الوطني، حيث ان تم رفع سعة الطاقة الكهربائية الى 105 ميجا وات

لمدينة نابلس وفي هذه الدراسة تم حل المشكلة بشكل ملحوظ من خلال تزويد مناطق جديدة بالطاقة الكهربائية واعادة توزيع الاحمال من نقاط الربط الاخرى الموجودة في مدينة نابلس وخاصة في المنطقة الصناعية الشرقية حيث ان الاحمال هناك تصل معدل الذروة من الطاقة الكهربائية المسحوبة، وتم انشاء خطوط نقل كهربائية اوفر هيد وتحت الارض جديدة تخدم المناطق وايضا نلاحظ من خلال النتائج الملحوظ التي ظهرت في هذه الدراسة ان قيمة القدرة الكهربائية المزودة من نقاط الربط لمدينة نابلس قد قلت وان هناك امكانية للتوسع المستقبلي وتزويد المناطق في المستقبل لوجود سعة للطاقة الكهربائية في نقاط الربط الجديدة. وايضا تم في هذه الدراسة عمل جدوى اقتصادية للمشروع وحساب قيمة التكلفة الاولية.

الكلمات المفتاحية: أحمال كهربائية، شركة الكهرباء الإسرائيلية، توزيع الكهرباء في فلسطين.