

Energy & System Studies Center

MONENCO IRAN
Consulting Engineers

Energy and System Studies Center

- Monenco Iran at a Glance
- System & Energy Studies Center
- Fields of Expertise
- Selected Projects
- Clients

MONENCO IRAN

مونهکو ایران

Monenco Iran at a Glance

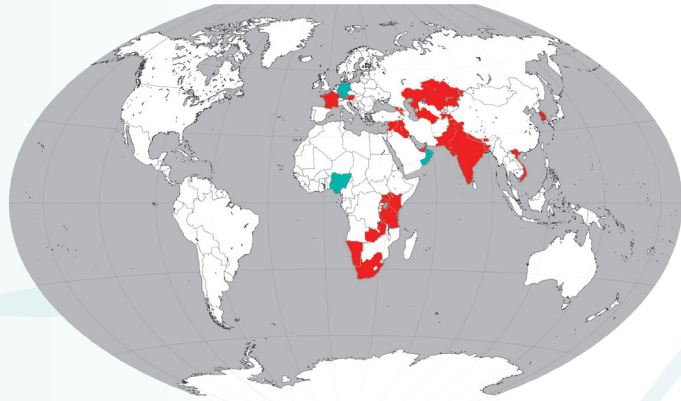
1000
Employees

43
years experience

200
Clients

Target markets

Telcommunication
Smart **S**olutions
Transmission Lines & **D**istribution
Dispatching
Power **G**eneration
Automation
Geology & **M**ining
Electrical **R**ailways
Oil & **G**as



Monenco global networking and project foot prints:
 Monenco Registered Companies Internationally
 Monenco International Presence



Engineering & Consultancy Services

- Feasibility Studies (technical, economic, environmental and social)
- Strategy & Business Planning
- Master Plan Development
- Conceptual, Basic & Detailed Design
- Design Review and Endorsement
- Tender & Material Requisition Preparation & Bid Evaluation
- Construction, Maintenance and Operation Supervision
- Factory & Site Acceptance Test Supervision
- Energy System & Integrated Network Studies
- Technical Training Courses and Knowledge Transfer



Energy and System Studies Center

Changes in business environment of electrical power industry and emerging competitive power markets have extended new horizons towards consultant-engineering activities that show lots of difference with its previous concepts. The success of each consulting company in this new environment does not necessarily come from its past experiences; hence, it needs an inclusive perspective of future developments while contriving technical and organizational maturity for the sake of powerful entrance into this novel business environment. This new trend covers the following domains: national and transnational power markets and power exchange, electrically interconnection of neighboring countries networks with the purpose of electric power import and export, codifying rules and regulations for power market, performing economical and strategic studies for investors, conducting transmission and generation master plan studies concerning new privatized industry and presence of new technologies, etc.



Monenco Iran Consulting Engineers, as one of the vanguards in Iran power industry, has established a proficient department named "Energy & System Studies Center" in 2008 in order to conquer the new business environment and enhance its technical capabilities. Since then, this center by means of its talented experts and devoting efforts has made it possible to take part in different consulting areas. Activities of ESSC can be categorized into four groups as follows:

Electricity Sector Strategic Planning & Management

- Reorganization & Restructuring
- Risk Management Plan
- Business Level Strategy

Economic Studies & Electricity Market

- Market Analysis
- Bidding Strategy

ESSC

Power System Studies

- System Operation
- System Planning
- Renewable energy Integration
- Smart Grid

Energy System Planning

- Energy Policy
- Energy Audit
- Master Plans of the grids

be briefly explained through the rest of this extended brochure. Moreover, ESSC has proved its capabilities by holding different trainings, workshops, and seminars to spread its achieved technical knowledge to everyone involved in electrical power industry. Yet, it has the provision to expand its project domains with experiences in other countries and exploring new prospect. This center as one of its long-term goals, aims at being the leading power system and energy studies group in the region and intends to expand its current presence in Middle East, Asia and Africa's grid studies projects during the upcoming years.



Electricity Sector Strategic Planning and Management Group

Strategic Planning and Management Group has been performing as a consultancy group to provide services in the areas of strategic planning and management, evaluation of effectiveness and efficiency and planning for cascading strategies in electricity sector. Besides, this group has experiences in management processes, operational planning, evaluating performance of related companies and organizations, etc.

Sample Projects:

- › Development of a Master Plan for Electricity Export
- › Reorganization of Electricity Distribution Sector of IRAN
- › Technical and Economical Marketing Studies for Sharing Purchase of Electrical Distribution Companies
- › Reorganizing the structure of Iran Electricity Industry



Energy System Planning Group

Energy System Planning Group has been responsible for comprehensive study of energy (Electricity, Oil and Gas, etc.), studying the effect of economic, environmental, and social aspects of using new technologies to optimize and reduce energy consumption, feasibility studies of power plants, establishment of energy management system, providing a road map for optimizing energy consumption in major processes, studies to identify bottlenecks and provide solutions to improve the energy consumption, energy auditing and proposing tactics to save energy.

Sample Projects:

- › Development of a Master Plan for Tehran Regional Electric Company in Generation, Transmission, and Sub-transmission Sectors (2014-2024)
- › Consultancy Services for Connection of Abadan Refinery to the National Grid
- › Studies on Static Voltage Stability Improvement and Reactive Power Compensators Placement in Khuzestan Regional Grid
- › Development of a master plan for transmission and sub-transmission network of Gilan Regional Electric Company (2016-2026)
- › Power Evaluation System Study for IPP-2 of Dhofar grid in Oman
- › Feasibility studies of constructing Qeshm power plant in Iran
- › Isfahan Refinery Network Study
- › Feasibility Study of 500 MW wind farm construction in Iran
- › Power System Study of Mobarakeh Steel Plant in Iran.
- › Power System Studies for Grid Connection of a Windfarm with the Capacity of 50 MW in Kouhin Regine of Iran

Power System Studies Group

Power System Studies Group as the main part of ESSC offers services and activities related to the generation, transmission and distribution sectors. It provides consultancy services for, analyzing power system events, studying application of new technologies in power system, studying power quality, reducing loss in electrical networks, etc.

Sample Projects:

- › Under Frequency Load Shedding and Islanding Scheme in Dhofar System of Oman
- › Operating Reserve Management in MIS and Dhofar systems of Oman
- › Synchronous Interconnection of Iran-Iraq Grids
- › Assessment of 400 kV Voltage Level Impact on Operation of MIS Grid of Oman
- › Reliability Study of Bangladesh Power System
- › Technical and Economical Feasibility Study of Converting Synchronous Generators to Condensers in Islamabad Power Plant
- › Power quality improvement of modern steel mill (MSM)
- › Application of FACTS Devices in Iran Power System
- › System Study for Semnan- Golpayegan HVDC Project in Iran
- › Reviewing and Coordination of Toos Power Plant Protection Systems
- › System Study for Asalouyeh-Esfahan 765 kV Transmission Line
- › Design and manufacturing of Power Plants Island Simulator
- › Supervision of SVC Designing & Manufacturing of Looshan Project
- › Feasibility Study for Allocation of Phase, Shifter Transformer(PST) in Iran power System
- › Assessment of Using Magnetically Controlled Shunt Reactor(MCSR) in Iran Power System
- › Electrical Network Study of South Pars Power plant
- › Electrical Network Study of Iran- LNG Plant

Economic Studies of Electricity Market Group

Economic Studies & Electricity Market Group activities cover all consulting services in the areas of economic feasibility and market studies. These services are not limited to electricity industry and cover all industrial projects. Some of the major tasks of this group are economic feasibility study for investment projects, developing regulations related to the local and regional electricity markets, electricity energy and services pricing, providing energy bidding strategy for private owners in the electricity market, competitive market analysis indicators, economic studies on electricity transit and exchange, studying and predicting the behavior of other market players and etc.. Moreover, this part has recently entered to Stock Valuation area and public private-partnership, and tried gaining experiences in the field of energy exchange, electricity market design, market policy and authority, market monitoring and organizations, etc.

Sample Projects:

- › Electricity Market Studies for Neighboring Counties with the Goal of Electricity Export of Iran
- › Carbon capture Storage from Power Generation Units
- › Technical and economical feasibility study for resumption of waste thermal energy in steel industry
- › Save to Export (SAVEX)
- › Detailed design of rules and tools for day-ahead spot market pricing
- › Iran Electricity Market Dispute Resolution Management System
- › Consultancy Services for Sixth Cost of Service Study in the Electric Power Sub-Sector of Kenya Power System

Under-Frequency Load Shedding and Islanding Scheme in Dhofar System

Project Explanation

Dhofar Transmission Power System is operated by Oman Electricity Transmission Company (OETC). Connection of Dhofar Power System to Main Interconnected System could shape dynamic behavior of the network especially from frequency control perspective. In fact, different control areas with specific characteristics might require different under frequency settings approach. Therefore, it is obligatory to harmonize and coordinate under frequency settings in Dhofar Power System by considering OETC's concerns. The goal of this project is to develop and coordinate Automatic under-frequency detection and appropriate load shedding and Islanding scheme to protect the network from collapse in case of any severe disturbances such as loss of a whole power station or main tie-lines.



Customer Value Proposition (CVP)

- Evaluation of Existing UFLS Effectiveness
- Designing Predictable Remedial Actions
- Increase in Reliability of the System

Client

Oman Electricity Transmission Company (OETC)

Monenco Role

- Identify Dhofar power system bottlenecks
- Propose contingency-based load shedding scheme
- Propose automatic under frequency load shedding (AUFLS) and Islanding scheme
- Provide implementation plan

Knowledge @ Monenco (Utilized Software@ Monenco)

Plexos, DigSILENT Power Factory

Operating Reserve Management in MIS and Dhofar Systems of OETC

Project Explanation

Oman Electrical Transmission Company (OETC) is comprised of MIS and Dhofar networks which are connected through 132 kV Petroleum Development Oman (PDO) network. Moreover, MIS network has an international interconnection to GCCIA system through Transco of Abdu Dhabi 220 kV. MIS and Dhofar systems must at all times have sufficient operating reserve in order to maintain the reliability of power system through economic operation. The goal of this project is to determine appropriate operating reserve for both MIS and Dhofar systems under following conditions:

- Operating isolated from PDO.(for MIS and Dhofar separately)
- Operating synchronously with MIS through PDO connection
- Operating synchronously with MIS through PDO connection in parallel with Transco

Based on the above conditions, the operating reserve requirements are determined and thereafter a comprehensive operating reserve policy and dispatch principles which comply with the standards of safety and reliability of the system subjected to economic operation is developed. Implementation of margin policy and dispatch procedures in cooperation with Load Dispatch Center (LDC) is in the scope of this project as well.

Customer Value Proposition (CVP)

- Identifying Optimum Operating Reserve Management.
- Determining the Spinning and non-Spinning Portion of the operating Reserve Security
- Constrained Economic Dispatch of the Power Plants

Client

Oman Electricity Transmission Company (OETC)

Monenco Role

- Performing hourly Production Simulation Studies for multiple levels of operating reserve
- Establishing relationship curve between outage level and level of operating reserve
- selecting the accepted level of outage and the corresponding level of operating reserve
- Evaluating effect of PDO and UAE connection in operating reserve determination
- Developing criteria and procedures for zonal operating reserve commitment/ procurement/ management using pro-rata zonal allocation based on zonal load share

Knowledge @ Monenco

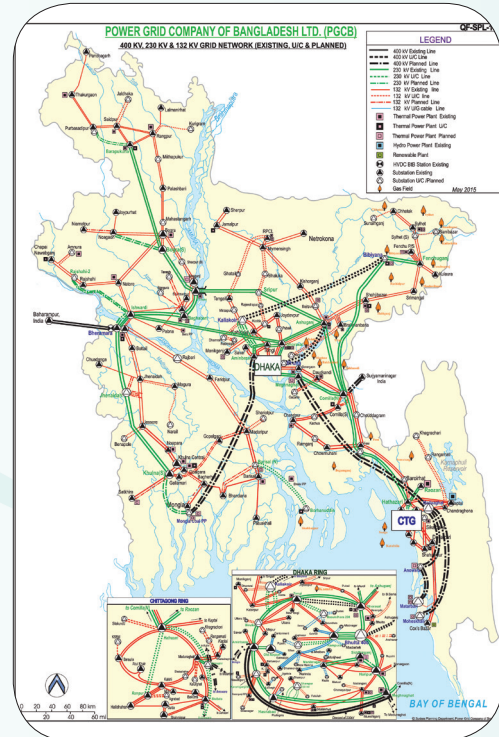
Plexos, DigSILENTPower Factory



Reliability Study of Bangladesh Power Grid

Project Explanation

The level of reliability of Bangladesh power grid is required to be substantially enhanced to address the increasing electricity demand, generation planning program, the operational problems, and equipment breakdowns. To improve the reliability of the system to international standards, his needed to upgrade/modernize with required protections so that the system can dispatch the load growth, and provide a safe operation. The system should be able to tolerate any unanticipated disturbances. This level of operation should prevail throughout the rapid development phase also. Therefore, a reliability-cum-protection study of the Bangladesh power grid system is required to assess system capacity and fragility; identify faults; recommend solutions & upgrading; required to improve the system for secured, safe and reliable operation. In this project, a reliability study of entire power system for stable system operation, with short-term, mid-term and long-term recommendations was done. As a result, technical recommendations for the system in 2021 to improve the reliability of the system was proposed.



Customer Value Proposition (CVP)

- Identification of Strength and weakness points of the grid
- improvement of existing Grid code
- Recieving of recommendations & proposals to enhance the Reliability of the System

Client

Power Cell, Power Division, Energy & Mineral Resources, Govt. of Bangladesh

Monenco Role

- Preparing Reserve Management Policy;
- Determining the Zonal Operating Constraints;
- Review of scope of a pump storage power plant (PSPP);
- Review of relay settings & protection philosophies for entire power system;
- Carrying out Islanding operation study for safe Islanded operation;
- Identifying suitable technology for system security, safety & reliability;
- Improvement of existing Grid code to ensure reliable & stable grid operation;
- Evaluating the utilizing of Smart Grid;
- Transfer of technology based on-the-job training

Knowledge @ Monenco

Plexos, DigSILENT Power Factory

Assessment of 400 kV Voltage Level Impact on Operation of Main Integrated System Grid

Project Explanation

Higher voltage levels in transmission network are capable of transmitting more power over longer distances. At the same time, there are more concerns and considerations for operation of such high voltage levels especially when the System Operator confronts them for the first time. Oman power system is going to introduce new voltage level by operation of 400 kV transmission lines. In order to assess and measure the impact of new 400 kV transmission lines (Sur-Jahlout and Sur-Izki) on the operation of MIS, it is necessary to conduct some studies. In this project, the proposed steps to address the issues concerning the operation of new 400 kV transmission lines in Oman power system and determine what kind of mitigation can be implemented to overcome such issues was proposed.



Customer Value Proposition (CVP)

- Development of Commissioning and Energizing/de-Energizing Procedures
- Development of Initial Standard Operating Procedure
- Development of Final Standard Operating Procedure

Client

Oman Electricity Transmission Company (OETC)

Monenco Role

- Reviewing Standards/Procedures for operation of transmission network
- Proposing required steps for commissioning of new 400 KV transmission lines
- providing guidelines for energizing / de-energizing of the lines

Knowledge @ Monenco

DIGSILENT Power Factory

Consultancy Services for the Sixth Cost of Service Study in the Electric Power Sub-Sector of Kenya

Project Explanation

The Kenyan electricity sector faces many critical challenges, mostly related to its transition towards an industrialized economy developed on sustainable principles. Moreover, the challenges are constantly evolving such that the environment under which the cost of service study is to be developed exhibits many different features and requirements to those facing the previous ones. Periodic cost of service and tariff studies represent an important tool for the responsible authority to estimate efficient costs across the electricity supply chain and address emerging issues, particularly those that affect the cost of service and end user tariffs. As a result of this project, information needed for the tariff review within 2018 and thereafter will be provided.

Customer Value Proposition (CVP)

- Updated Tariffs in the Electric power Sub-sector

Client

Ministry of Energy and Petroleum of Kenya

Monenco Role

- Calculating the cost of service for electricity
- Determining an efficient tariff design that allows the recovery of costs
- Development of cost reflective tariffs and tariff structures in transmission, distribution and supply of electric power.
- Evaluating the financial impact of proposed tariff on different stakeholders within the power sector
- Assessment of implications for net metering scheme implementation
- Evaluation of Demand Side Management (DSM) programs implementation



Island Simulator Design and Manufacturing

Project Explanation

In recent years, several major blackouts have occurred in Europe and North America. In order to mitigate the blackout consequences, the ability of island operation and reliable power restoration have become important issues. When operating close to the maximum, the risk of power system failure will increase. During such situations, it is necessary to be well prepared to restore the power system as fast and secure as possible. It is also important that the speed governors of power plants are tested and tuned for such conditions and ultimately for island operation.

On the other hand, with advancements in fast Real Time Digital Simulators, there is a trend toward Hardware In the Loop (HIL) simulation, referred to a system in which parts of a pure simulation have been replaced with actual physical components. In the case of power plant islanding, these components can be governors and turbines.

In this project, a technique was proposed to simulate island operation capability, control parameter identification and evaluating power plant process through step response and frequency analysis. This was done in partial fulfillment of fabricating a simulator-based piece of test equipment named "MAPSIM", for testing island operation performance. All tests is performed during normal operation of a generator, synchronized to the main grid. The principle of MAPSIM is replacing the normal frequency and active power feedback of the governor by a simulated frequency and active power from a real-time digital simulator (i.e. hardware in the loop), respectively.

Before any real case test on an actual governor, it is needed to verify the simulator operation in a totally simulated manner. Therefore, MAPSIM concept was designed using the DigSILENT power factory software. In the virtual grid, the modeled generators deliver the same active power and control their bus voltage in the same magnitude and frequency as in the real grid. Performance of the MAPSIM concept was examined and compared to the real islanding scenario for different operating conditions successfully.

Customer Value Proposition (CVP)

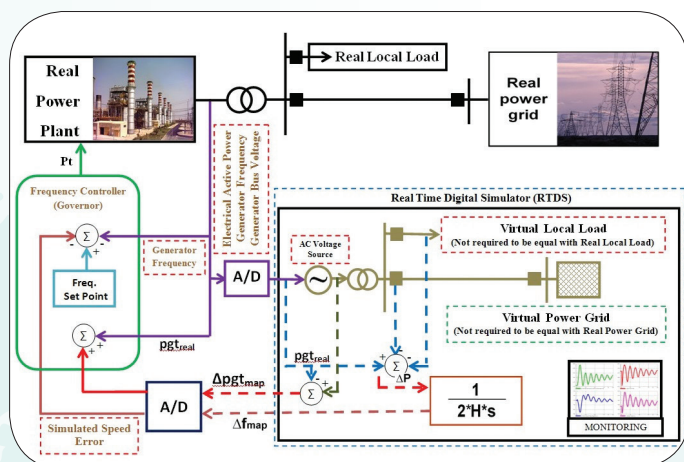
- Performing Island tests using a professional simulator
- Developing and validating dynamic model of the
- power plants using the results of the tests

Client

MAPNA Group

Monenco Role

- Developing software concept for the simulator and examining the concept performance
- Optimization and examining of governor parameter using a simulator software
- Supervision of hardware and software design and application
- Testing MAPSIM functionality with the power system simulator
- Hardware and software tests and verifications in a power plant



Clients:

We offer our services to a wide range of clients as mentioned below:

Electrical Power System Studies:

- Ministry of Energy of Iran
- Oman Electricity Transmission Company (OETC)
- Power Cell, Power Division, Energy & Mineral Resources, Govt. of Bangladesh
- Ministry of Electricity & Petroleum of Kenya
- Ministry of Electricity & Petroleum of Kenya
- MAPNA Group
- Electricity Ministry of Iraq & TAVANIR Co.
- Abadan Refinery
- Oman Modern Steel Mill (MSM)
- Yazd Regional Electric Company
- TAVANIR Company
- Semnan Regional Electric Company
- Khorasan Regional Electric Company
- Power Generation Division of Monenco Iran
- Isfahan Refinery Company
- Iran Grid Management Company (IGMC)
- Fulad Mobarakeh Steel Co.
- MECO (MAPNA)
- Gilan Regional Electric Company
- Tehran Regional Electric Company (TREC)
- Khuzestan Regional Electric Company (KZREC)
- National Iranian Gas Company (NIGO)



Electricity Market Studies

- Iran Grid Management Company (IGMC)
- MOFID Economical group

Certificates of appreciation

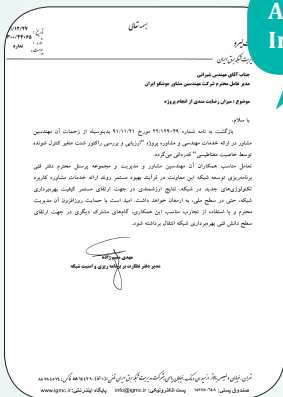
Certificates



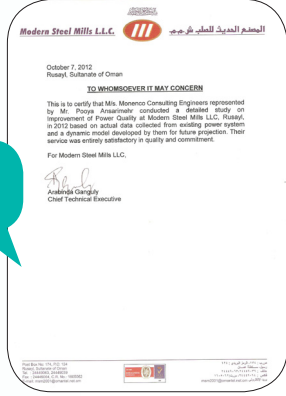
Consultancy Services for Connection of Abadan Refinery to the National Grid (Abadan Refinery)



Isfahan Refinery Network Study (Isfahan Refinery Company)



Assessment of Using Magnetically Controlled Shunt Reactor (MCSR) in Iran Power System (IGMC-Iran Grid Management Company)



Power Quality Improvement of modern Steel Mill (MSM- Modern Steel Mails Company)



Assessment of 400 KV Voltage Level Impact on Operation of MIS Grid (Oman Electricity Transmission Company- OETC)

Under Frequency Load Shedding and Islanding Scheme in Dhofar System of Oman (Oman Electricity Transmission Company- OETC)



Operating Reserve management in MIS and Dhofar System of OETC (Oman Electricity Transmission Company)



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Note



Note

Note:

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