

قال الله سبحانه وتعالى :

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الآية 35 من سورة النور

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DEDICATION

I dedicate this research with much love and appreciation:
To my wife Fatima
To my sons Ahmed, Awab, and Eiad
To my daughter Tassneem

ABSTRACT

The increasing demand for energy now a day makes the need for saving energy one of the top priorities in industry. The district cooling system is a good concept competitive in increasing energy efficiency, reducing maintenance, increasing system reliability, and environmental friendly. District cooling system provides this by use energy which is currently wasted in industry and nature. The objective of this project is to evaluate the feasibility of a cogeneration system that utilizes the waste energy of the hot gases of a generation unit, such as a gas turbine or diesel engine, to produce electricity and chilled water for Industrial Yarmouk complex, Factory A-30. To satisfy the aim of the research the below procedure would be followed:

- Estimate the thermal load of air conditioning
- Estimate the electrical load for equipments, lighting, etc
- Determination of the appropriate generation unit for the system
- Select suitable chillers for the required cooling capacity
- Conduct an economic analysis of the project

The final results of a techno-economic feasibility study of a cogeneration system for Industrial Yarmouk Complex that carried out for Factory A-30 will meet its requirements for both electricity and air-conditioning. But mechanical system is fairly due to technical and installation consideration.

الملخص

ان الطلب المتزايد على الطاقة فى الوقت الحاضر جعل الحاجة الى توفير الطاقة واحدة من أهم الأولويات في مجال الصناعة. ان نظام تبريد المناطق الصناعية هو من المفاهيم الجيدة القادره على المنافسه في زيادة كفاءة الطاقة ، والتقليل من أعمال الصيانة ، وزيادة موثوقية النظام ، وليس له اضرار بيئية إن هذا النوع من أنظمة التبريد يؤدي الى توفير الطاقة باستمرار بالاستفادة من الطاقات المبددة في المناطق الصناعية ، الطبيعة والمحطات الحرارية. إن الهدف من هذا المشروع هو تقييم جدوى نظام التوليد المشترك للطاقة والاستفادة من النفايات الناتجة للغازات الساخنة لوحدة التوليد ، مثل التوربينات الغازية و محركات дизيل ، لانتاج الكهرباء والمياه المبردة لمجمع اليرموك الصناعي متمثلا في المصنع ١ - ٣٠. ولتلبية هدف هذا البحث سوف تتبع الإجراءات أدناه :

- تقدير الحمل الحراري لتكيف الهواء
- تقدير الحمولة الكهربائية للمعدات ، والإضاءة ، الخ
- تحديد وحدة توليد المناسبة للنظام
- تحديد المبردات المناسبة لقدرة التبريد المطلوبة
- إجراء تحليل اقتصادي للمشروع

النتائج النهائية لدراسة الجدوى الفنية والاقتصادية لنظام التوليد المشترك ونظام تبريد المنطقة لمجمع اليرموك الصناعي التي نفذت للمصنع ١ - ٣٠ سوف توفر بمتطلبات كل من الكهرباء وتكيف الهواء. ولكن نظام التبريد الميكانيكي او التقليدي هو الانسب للاعتبارات الفنية والتركيبية.

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ABBREVIATION

CHP: Combined Heat and Power
CO₂: Carbon dioxide
AC: Air conditioning system
DCS: District cooling system
I.C: Internal combustion
Btu: British thermal unit
KWh: Kilowatt-hour
Kcal: Kilocalorie
VAM: Vapor absorption machine
MW: Megawatt
LPG: Liquefied petroleum gas
O₂: Oxygen
NO_X: Nitrogen oxide
SO_X: Sulfur oxide
CHCP: Combined heat, cooling, and power generation
TR : Ton of refrigeration
VCC: Vapor compression chiller
VAC: Vapor absorption chiller
YIC: Yarmouk Industrial Complex
Kg/h: Kilogram per hour
A-30: Number of case study Factory
CNC: Computer numerical control
HVAC: Heat ventilation and air conditioning
Hp: Horse power unit
SHF: Space sensible heat factor
DB: Dry Bulb for cooling coil temperature

WB: Wet Bulb for cooling coil temperature

RH: Relative humidity for cooling coil

Kap: Kilopascal, pressure unit

RTAC: Series R Trane Company Model Air-Cooled Chiller

RTAA: Series R Trane Company Model Air-Cooled Chiller

R-134a or HFC: Is a haloakane refrigerant with thermodynamic properties

Similar to R-12

COP: AC Coffined of performance

SDG: Sudanese currency pound

\$: USA currency

€ Europe Union currency

CFM: Cubic feet per minute air infiltration

°C: Celsius temperature

L/s: Liter per second