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Supplying and Demanding Energy in Industrial Part

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ABSTRACT

Background: The basis of industry in the world is very vast and diverse and it includes stages such as: abundant production, extraction, building and other actions that finally changes raw materials to final products. As a whole, one third of energy that is used all over the world is used at industry part and as a result this part is responsible for the pollution that is caused by carbon and other gases. Although much tries have been done to reduce energy consumption and it's results, but carbon of industries is spreading all over the world increasingly. **Objective:** According to above statements this paper reviews optimization supply and demanding of energy in industrial part of Iran. The used methods for optimization energy consumption are peruses in this project. Results: Results of this research shows that oil ministry and its companies have done some activities for optimizing energy consumption. Optimizing fuel consumption in companies in relation with paying subsidy is one of these activities. The aim of this project is to improve efficiency and increase capacity. Other activities are in process. **Conclusion:** Above statements show that there is a big attempt for optimization of supplying and demanding of energy in Iran, and a great number of project are undergoing in this way, so it can be assume a good future for saving energy in industrial part in Iran. Also these project in resent years are undergoing with faster speed.

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INTRODUCTION

The use of energy has been a key in the development of the human society by helping it to control and adapt to the environment. Managing the use of energy is inevitable in any functional society. In the industrialized world the development of energy resources has become essential for agriculture, transportation, waste collection, information technology, communications that have become prerequisites of a developed society. The increasing use of energy since the Industrial Revolution has also brought with it a number of serious problems, some of which, such as global warming, present potentially grave risks to the world [1,2,3]. In society and in the context of humanities, the word energy is used as a synonym of energy resources, and most often refers to substances like fuels, petroleum products and electricity in general. These are sources of usable energy, in that they can be easily transformed to other kinds of energy sources that can serve a particular useful purpose. This difference is energy in natural sciences can lead to some confusion, because energy resources are not conserved in nature in the same way as energy is conserved in the context of physics. The actual energy content is always conserved, but when it is converted into heat for example, it usually becomes less useful to society, and thus appears to have been "used up" [4,5,6]. Ever since humanity discovered various energy resources available in nature, it has been inventing devices, known as machines that make life more comfortable by using energy resources. Thus, although the primitive man knew the utility of fire to cook food, the invention of devices like gas burners and microwave ovens has increased the usage of energy for this purpose alone manifold. The trend is the same in any other field of social activity, be it construction of social infrastructure, manufacturing of fabrics for covering; porting; printing; decorating, for example textiles, air conditioning; communication of information or for moving people and goods [7,8,9,10]. Applying and speeding optimized methods in industry has controlled carbon spread noticeably and at the same time has decreased other results of industrialization that aren't suitable for environment. Anyway, optimizing energy usage in industry is faced with special challenges and solving the problem needs correct management and suitable actions. In Iran, industry part is the third main part that uses energy after the parts such as "commercial, general and internal" and "transport part". The total of final energy consumption in industry part at the end of 2010 reached to equivalent 274/6

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barrel of oil and it's growth in comparison with the previous year was %6/42. During recent years many actions have been executed for optimizing energy consumption. Performing saving projects, defining standards of using energy for industrial processes and helping this part economically have been some ways for helping this part [11,12,13].

Performing saving designs and controlling energy:

In 2010, on the basis of studies that have been done in 2006, 2007 and 2008 in a food factory and 220 factories in an industrial state, their energy usage was controlled and total of energy saving in these factories during this year was 183300 Gigajoules [10].

Table 1: Estimating potential of saving energy in controlled factories to the end of 2010 by Energy Efficiency Organization of Iran

Name of industry	Number of controlled factories	Potential of saving in proportion to standard	Total of saving in these factories in the years 2006-2009	Total of saving in these factories in the years 2010
	2006-2007	2010		
Food industries of three small and medium industrial state	3	1	86561	29300
	-	220 factories	-	154000
Total	3	221	-	183300

Studies and full control of situation of energy usage in milk industries of the country:

One of the projects that was finished in 2010 is the studies and full control of energy usage in milk industries of the country. In this study information of 15 Pegah milk factories were collected from deferent provinces and one of them was chosen as a sample and the results were surveyed and calculated.

For calculating specific energy consumption, at first the amount of delivery milk to the factories and the amount of different energies that have been used has been calculated. By dividing total energy usage at a certain time to the amount of delivered milk the amount of specific energy consumption is gotten. Generally, on the basis of studies and the results of controls all over the world, potential of reducing energy usage in all level is possible and some of the proposed ways don't need so much primary investing capital.

It is expected that using the results of controls in old factories leads to decrease of heating energy by %50 and decrease usage of electrical energy by %20. Tables 2 and 3 considers specific energy consumption in those factories.

Table 2: The amount of electrical energy and natural gas consumption in milk industry factories

Pegah Milk Factory	Electrical energy (Megawatt/h)			Natural Gas ($M^3 \times 1000$)		
	2006	2007	2008	2006	2007	2008
Factory 1	21416	22024	17622	8366	7680	6224
Factory 2	7146	11646	11613	1850	2561	2041
Factory 3	6559	6294	5649	2191	1838	1991
Factory 4	10109	11175	11344	3782	4089	4873
Factory 5	5552	5672	6062	1887	1593	1703
Factory 6	11323	14142	11040	4677	5406	5778
Factory 7	4872	4360	3672	1414	1400	1178
Factory 8	5512	5259	4885	319	326	352
Factory 9	14106	14171	12620	-	-	-
Factory 10	6606	8364	8519	1349	1710	1553
Factory 11	6393	6322	6646	-	-	-
Factory 12	-	-	7148	-	-	1408
Factory 13	7778	8434	7867	2398	2629	2221
Factory 14	4846	4681	4668	1797	1936	2028
Factory 15	5450	6464	6482	2069	2287	1899

Table 3: The amount of specific energy consumption and heat energy in different factories of milk industries according to the milk delivered to them.

Pegah Milk Factory						
	2006	2007	2008	2006	2007	2008
Factory 1	110/0	94/2	83/8	458/4	350/4	316/0
Factory 2	62/6	91/6	93/1	172/8	215/0	174/7
Factory 3	121/2	123/4	145/2	432/1	384/4	546/0
Factory 4	197/8	149/7	159/2	789/4	584/4	729/7
Factory 5	97/0	87/6	94/9	351/7	262/4	284/4
Factory 6	103/5	113/9	94/1	456/0	464/6	525/4
Factory 7	152/5	135/4	111/7	472/4	463/8	382/4
Factory 8	2637/3	3313/8	2723/0	1628/6	2191/8	2093/6

Factory 9	102/8	104/9	110/7	-	-	-
Factory 10	136/8	185/5	159/3	289/1	404/6	309/8
Factory 11	121/7	114/6	121/8	-	-	-
Factory 12	-	-	144/4	-	-	303/6
Factory 13	80/8	88/7	91/3	265/8	295/0	275/0
Factory 14	127/0	123/3	114/8	502/5	544/2	532/4
Factory 15	137/8	124/2	100/3	558/1	468/8	313/6

Improving energy consumption in industrial states:

One of the other controlling project was done in 2010 in energy efficiency organization of Iran was the project of "Improving energy consumption in industrial states". The aim of this project was to decrease energy consumption to %10 by performing saving ways. Ways that can decrease energy consumption. We can say that there are about 592 active industrial states in the country that about 23,000 industrial units work in them and about 500,000 people are working in these work shops (units). Electrical capacity of these industrial states has been about 4550 Megawatt that is about %10 of total capacity of power stations of the country. Because many of industrial states are too small, these aren't any specialists for optimizing energy consumption and these workshop continue their works and activities without having any information about optimizing energy consumption. So, for performing these projects, measuring potential and controlling energy of three industrial states was done, for helping them to save their energy and decrease energy consumption. These states were: industrial state of Caspian in Qazvin, Parand in Tehran and Alavijeh in Isfahan. For controlling these states they have done the following activities:

(1) Preparing information of industrial states such as information about products, energy consumption, machinery and so on.

(2) Analyzing information energy including grouping industrial sites and separating energy consumption for them and doing studies for small power stations.

(3) Controlling energy very quickly including measuring electrical inputs and other equipments in this field.

(4) Presenting ways of saving energy including non and low-expense ways, amount of energy that has been saved and benefit of performing these ways.

It should be said that total of energy saving potential in controlled factories during 2010 is about 154000 Gigajoule.

Controlling project of energy in the following factories plant oil, sugar, beet, sugar cane, tire and tube, cement, glass, plaster and lime:

Because responsibility of supervising on energy usage in comparison with production is on ministry of oil, this project was done by optimizing fuel consumption Company in 2010 that is related to ministry of oil. This project has been completed in: three plant oil factories, three sugar factories, two sugar cane factories, one tire and tube factory, six cement factories, nine plaster and lime factories, six glass factories, six steel factories, three copper ores and six zinc and lead factories.

The aim of this project are reviewing energy consumption in those industries and presenting suitable ways for optimizing energy consumption and giving the results of final standard reviewing to industrial sites in order to become familiar with these standards and obeying them.

Table 4: Estimating energy saving potential in controlled factories to the end of 2010 by optimizing energy consumption Company

Name of Industry	Activities	Number of factories in 2010	Whole saving Potential in 2010 (Gigajoule)
Metal industries	Steel	6	17182000
	Copper	3	3868000
	Zinc and Lead	6	Zinc 159000
			Lead 186000
Non-Metal industries	Cement	6	686000
	Plaster	7	16100
	Lime	2	900
	Glass	4	485500
Food industries	Oil	3	187631
	Sugar	5	1297994
Tire industries	-	1	200517

Table 5: Estimating the amount of energy saving in chosen industries in 2010

Industry		
Cement	12	2/20
Brick	19	3/24
Glass	8	0/29
Plaster	14	0/34
Lime	14	0.08
Tire	27	0/22
Steel	18	5/38
Sugar	23	1/93
Oil	25	0/47
Ceramic & Tile	8	0/30
Refinery of oil	8	2/76
Petrochemical company	11	3/83

Subsidy of bank facility profits for optimizing energy consumption in industry part:

In this direction oil ministry and its companies have done some activities for optimizing energy consumption. One of the projects that has been done by optimizing fuel consumption company in relation with paying subsidy, is paying subsidy to Mazandaran cement factory for optimizing fuel consumption that has been done in 2010. The aim of this project is to improve efficiency and increase capacity in production is 2000 tons. The total of investment capital for performing the project is 1410 Milliard Rials that %35 of it is related to improving efficiency.

The total of profit that should be payed back to the bank is 76/6 Milliard Rials that 20 milliard rials is payed by the above mentioned company. By performing this project, specific energy for producing klinger decreased from 820 to 748 Kilo calorie.

The amount of saving energy by this project is 11 million meters (M^3) of natural gas and 19/3 Kilowatt hours of electrical energy.

Improving pattern of energy consumption in water and Sewage Company of Isfahan and two cement factories in Abadeh and Kurdistan:

by giving 32/8 milliard rials of profit of subside for doing and performing optimizing ways including changing and improving water pumps and installing VSD, the following results were achieved. It is estimated that potential of saving energy is over 17283 Megawatt hours of electrical energy and the investment is payed back during 18 months. So, about 11/6 milliard rials was payed as subside for optimizing energy consumption in cement factories of Abadeh and Kurdistan. By performing this project, they could save about 10375 Megawatt hours of energy and the return of investment in these projects will be about 10 months.

Compiling standards for energy consumption for industrial processes and equipments:

In 2010, compiling standards of 5 petrochemical production has been ended in ministry of oil including olphin, methanol, ammoniac, urea and aromatic.

Table 6: Determining standard of specific energy consumption in present processes and producing five productions including olphin, methanol, ammoniac, urea and aromatic.

Olphin	
Lummus-1372	SEC≤22/2
TPL-1375	SEC≤20/2
	SEC≤25/7
	SEC≤20
Ammoniac	
KELLOGG-1356	SEC≤46/9
M/W/KELLOGG-1375	SEC≤33/2
ICI-1364	SEC≤38/6
M/W/KELLOGG	SEC≤29/6
Ammonia Casle-2007	SEC≤49/7
M/W/KELLOGG	SEC≤38/4
	SEC≤31
Methanol SEC	
Topso-1383	SEC≤29/4
Lurgi-1369	SEC≤36/1
Lurgi-2006	SEC≤30/1
Lurgi-1378	SEC≤34/8
	SEC≤29/5
Aromatic	
Engelhard-UOP-HRI-1375	SEC≤18/1
Axens-UHDE-SINOPEC-1383	SEC≤20/1

UHDE-2007	SEC≤19
	SEC≤24/3
	SEC≤11/6
Urea	
Engelhard-UOP-HRI-1375	SEC≤18/1
Axens-UHDE-SINOPEC-1383	SEC≤20/1
UHDE-2007	SEC≤19
	SEC≤24/3
	SEC≤11/6

Conclusion:

Above statements show that there is a big attempt for optimization of supplying and demanding of energy in Iran, and a great number of project are undergoing in this way, so it can be assume a good future for saving energy in industrial part in Iran. Also these project in resent years are undergoing with faster speed.

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