What Is The Role of Turkey's Forest Products Industry on Consumption of Energy & How It Is Affected by The Prices and Taxes[i]

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Abstract

The main goal of this study is; examining the energy needs of forest products industry sector; the amount and value of energy consumption and analyzing how is the sector affected by the taxes and prices. For proving the effects of high prices and taxes, a comparative analysis done with the other leading European Union countries. The amounts and values of production and energy consumption were investigated in some sub sectors of forest products industry, such as; Furniture, Fiberboard, Particleboard, Round wood, Pulp and Paper industry. The sub sectors were decided according to their importance in the forest products industry. Although this selection some of the data and findings were based on the whole forest products industry. The answer of "Is there a correlation between energy prices and taxes with the amount of production?" was investigated. The data in this research; were taken from the databases and annual reports of Turkish Statistical Institute (TUIK), International Energy Agency (IEA) and Food and Agriculture Organization of The United Nations (FAOSTAT).

According the gotten data; first of all the situation of Turkish manufacturing industry on consumption of energy was investigated and then the sub sector; forest products industry was examined too. Afterwards to analyse the effects of price and taxes on industry, the energy indexes of the world and Turkey were compared.

As a result of this study; Especially for pulp and paper mills. Because of Turkey's geographical position it is very important for the international markets but due to high energy prices and taxes there is not any pulp mill in Turkey. The international enterprises could fulfill this gap if the prices and taxes of energy were lower. Also about the energy we can say that; Energy is so much expensive in Turkey. Turkey nearly pays the most in the world.

Keywords: Energy consumption, Turkey, Forest, Products, Industry

Türkiye'de Orman Ürünleri Endüstrisinin Enerji Tüketimindeki Rolü Nedir & Fiyat ile Vergilerden Nasıl Etkilenmektedir

Özet

Bu çalışmanın amacı; orman ürünleri endüstrisinin eneri ihtiyaçlarını incelemek, kullanılan enerjinin miktar ve fiyatını analiz ederek sektörün fiyat ve vergilerden nasıl etkilendiğini ortaya koymaktır. Bu doğrultuda diğer Avrupa Birliği Ülkeleri ile Türkiye arasında karşılaştırmalı bir analiz yapılmıştır. Araştırma kapsamında orman ürünleri endüstrisinin; mobilya, liflevha, yongalevha, tomruk, kağıt hamuru ve kağıt gibi bazı alt sektörleri incelenmiştir. Bu sektörler endüstri içerisindeki mevcut önemlerine göre seçilmiştir. Araştırma kapsamındaki veriler Türkiye İstatistik Kurumu, Uluslararası Enerji Ajansı ve Birleşmiş Milletler Gıda ve Tarım Örgütü veritabanları ve yıllık raporlarından temin edilmiştir.

Elde edilen verilerle öncelikle Türkiye imalat sanayisindeki enerji tüketimi analiz edilmiş, sonrasında orman ürünleri sektörünün mevcut durumu incelenmiştir. Daha sonra Türkiye ile dünyadaki bazı ülkelerin enerji indeksleri karşılaştırılmıştır.

Çalışmanın sonucunda; Özellikle kağıt ve kağıt hamuru sektörünün geleceği açısından önemli bulgular elde edilmiştir. Türkiye coğrafi konumu neticesinde uluslararası pazarda önemli bir yer teşkil etmektedir. Fakat yüksek vergi ve fiyatlardan ötürü Türkiye'de kağıt hamuru üretim fabrikası bulunmamaktadır. Mevcut fiyatlar ve vergiler düşürüldüğünde uluslararası firmalar yatırım yaparak bu boşluğu doldurabilecektir. Ayrıca mevcut bulgulara göre; Enerji Türkiye'de son derece pahalıdır. Türkiye; neredeyse dünya üzerinde enerjiye en çok para ödeyen ülke konumundadır.

Anahtar Kelimeler: Enerji tüketimi, Türkiye, Orman, Ürünleri, Endüstrisi

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Introduction

Because of globally increasing privatization and the principles of comparative advantages come to the fore: The forest products industry sector has begun to turn rapidly from labor intensive business to; the capital intensive and technology intensive business (Akyüz et al., 2010). Hence; the energy takes an important role for the forest products industry enterprises future. As it known; forest products industry is a sub sector of manufacturing industry and in the manufacturing industry energy is one of the primary needs because of technology. If the enterprises got the cheaper energy they will automatically earn more and their prices will be lower for the consumers. When the prices are lower, it is possible that; the demand of consumers will raise and according to this increment; the supply amount of factories will raise too.

Forest Products Industry

Forest products industry is a sector, has thousands of large and small enterprises which work on the primary and secondary forest products and produce semi finished product or end product. In the manufacturing industry; forest products industry can be defined as primary and secondary manufacturing industry groups. In the main group of primary manufacturing industry; Timber and Packaging Industry, Panel Industry (Veneer Sheets, Particleboard, Fiberboard, Plywood), Paper Pulp and sub sectors of Paper Industry are using the wood directly as raw materials. In the main group of secondary manufacturing industry; Furniture, Joinery, Parquet, Prefabricated house and etc. industries are using the products of primary manufacturing industry main group as raw materials (Akyüz et al., 2010). Here are the some of the most important products in forest products industry;

Particleboard is a wood-based panel product manufactured under pressure and temperature from particles of wood or other lingo-cellulosic materials and a binder. It is used widely in the manufacture of furniture, floor underlayment, cabinets, stair treads, home constructions, tabletops, vanities, speakers, sliding doors, lock blocks, interior signs, displays, table tennis, pool tables, electronic game consoles, kitchen worktops, and work surfaces in offices, educational establishments, laboratories, and other industrial product (Nemli and Aydın, 2007).

Particleboard is a versatile engineered material within the group of nonstructural wood composite panels. Industrial grade particleboard has been recognized throughout the wood industry as an ideal substrate for laminated panel constructions, utilizing various types of overlay surfacing materials (Nemli et al., 2007).

Fiberboard; structural and decorative is a fibrous-felted, homogeneous panel made from lignocellulosic fibers, combined with a synthetic resin or other suitable bonding system, and then bonded together under heat and pressure. Additives may be introduced during manufacturing to improve certain properties. Fiberboards are classified by density. A fiberboard with specific gravity between 0.50 and 0.80 (density between 31 and 50 lb/ft3) is classified as medium density fiberboard (MDF) and a fiberboard with specific gravity greater than 0.80 (density greater than 50 lb/ft3) is classified as hardboard. Fiberboards are manufactured primarily for use as panels, insulation, and cover materials in buildings and construction where flat sheets of moderate strength are required. The furniture industry is by far the dominant fiberboard market (Ye et al., 2007).

They are also used to a considerable extent as components in doors, cabinets, cupboards, and millwork. Fiberboard frequently takes the place of solid wood, plywood, and particleboard for many furniture applications. Comparing to particleboard, overlaying with sheet materials and veneering, fiberboard has tight edges that need not be banded and can be routed and molded like solid wood. The potential use of fiberboard in other interior and exterior markets such as moldings, exterior trim, and pallet decking has been explored by the industry and the market for fiberboard is fast expanding (Ye et al., 2007).

Pulps can be made in two ways, either by mechanical separation of wood fibers (mechanical pulps) or by chemical removal of lignin (chemical pulps) (Sjostrom, 2007). The amount of lignin remaining in the pulp

affects both the physical properties, such as strength and flexibility, and the chemical stability of the finished paper. Chemical pulps are used for the manufacture of high strength paper products, such as cardboard, and for high quality printing and writing papers and the mechanical pulps are used for the manufacture of newsprint and lower quality paper (Weinstock et al., 1997).

Material and Method

The data in this research; are taken from the databases and annual reports of Turkish Statistical Institute, International Energy Agency and Food and Agriculture Organization of The United Nations (FAOSTAT).

According the gotten data; first of all the situation of Turkish manufacturing industry on consumption of energy is investigated and then the sub sector; forest products industry is examined too. Afterwards to analyse the effects of price and taxes on industry, the energy indexes of the world and Turkey are compared.

Results and Discussion

For showing the situation of energy in Turkish manufacturing industry, Turkish Statistical Institute reports are used. The data in the reports are composed of 1999-2001 years values. Because; the reports of the last decade are not created yet, Turkish Statistical Institute updates the whole data about Turkey in every 10 years. According to these reports; all the public sector and establishments with 25 and more person engaged in private sector were covered in 1992. In 1999,2000 and 2001 all establishments with 500 TOE and more energy consumption according to 1992 were covered (TUIK, 2004).

Total energy consumption of 1138 establishments in the manufacturing industry was found as 15.10 million TOE in 2001. Ministry of Energy and Natural Resources has presented total energy consumption of the industry sector as 21,07 million TOE for the year 2001. Of this total energy, the manufacturing industry establishments constitute 71.66 % and the rest of the energy consumed by the small scale industry establishments. 39.29 % of this energy consumed by the establishments in the public sector and the rest 60.71 % consumed by the private sector establishments (TUIK, 2004).

The Table 1 shows the energy consumption in the sub sectors of manufacturing industry, establishments with 500 Tons of Oil Equivalent and More Energy Consumption, 1992, 1995-2001.

According to Table 1, it is shown that; the energy consumption of forest products industry was totally increased from 1992 to 2001. Even this; the consumption in 2000-2001 was decreased. Between 2000-2001 years the amount of fuel consumption is nearly same but the value of consumed fuel in 2001 is nearly 2 times of the 2000. Unfortunately; the situation is almost the same for the electricity. Although the consumption of electricity is decreased in 2000-2001, the prices were nearly raised 1.5 times.

It is so shown that the prices and taxes affected the amount of production n and thus the consumption of energy was decreased in 2000-2001. Even though the amount of consumed energy was decreased, the establishments paid much more for the less used energy. The effects of prices will be more shown when the energy price index is investigated.

Figure 1 shows the amount of forest products industry energy consumption within the manufacturing industry in 2001. If the rates are compared it's clearly shown that; forest products industry is in the last 4.

According to Figure 2; hard coal, electricity and natural gas are the top 3 energy resources for the manufacturing industry in 1999-2001.

Table 1. Number of establishments, energy consumption and value of energy consumption by industry group

Industry group		Number of establishments	Energy consumption			Energy consumption value		
			Total	Fuel	Electricity	Total	Fuel	Electricity
	Year		TEP - TOE			'000 000 TL		
Manufacture of wood and wood, products including furnish	1992	22	68 090	56 336	11 754	151 770	58 483	93 287
	1995	23	70 640	52 645	17 995	1 198 618	324 219	874 399
	1996	25	72 958	51 088	21 870	2 394 221	740 800	1 653 421
	1997	25	89 505	68 102	21 403	4 923 849	2 158 059	2 765 790
	1998	25	82 479	62 032	20 447	6 696 616	2 697 913	3 998 703
	1999	26	103 561	77 967	25 594	15 626 732	6 690 410	8 936 322
	2000	22	107 676	82 295	25 381	22 221 626	9 869 888	12 351 738
	2001	24	106 641	83 093	23 548	37 582 326	18 038 971	19 543 355
Manufacture of paper of paper products, printing and publishing	1992	43	449 560	372 440	77 120	1 023 829	463 257	560 572
	1995	45	478 161	396 077	82 084	5 950 611	3 021 514	2 929 097
	1996	46	575 665	505 150	70 515	10 247 096	4 794 824	5 452 272
	1997	44	600 537	529 042	71 495	19 793 212	11 261 004	8 532 208
	1998	45	637 202	559 549	77 653	35 139 706	19 521 267	15 618 439
	1999	40	585 620	515 224	70 396	54 676 148	30 636 136	24 040 012
	2000	40	681 413	595 117	86 296	97 923 912	56 517 143	41 406 769
	2001	38	709 661	630 355	79 306	153 338 798	90 194 634	63 144 164

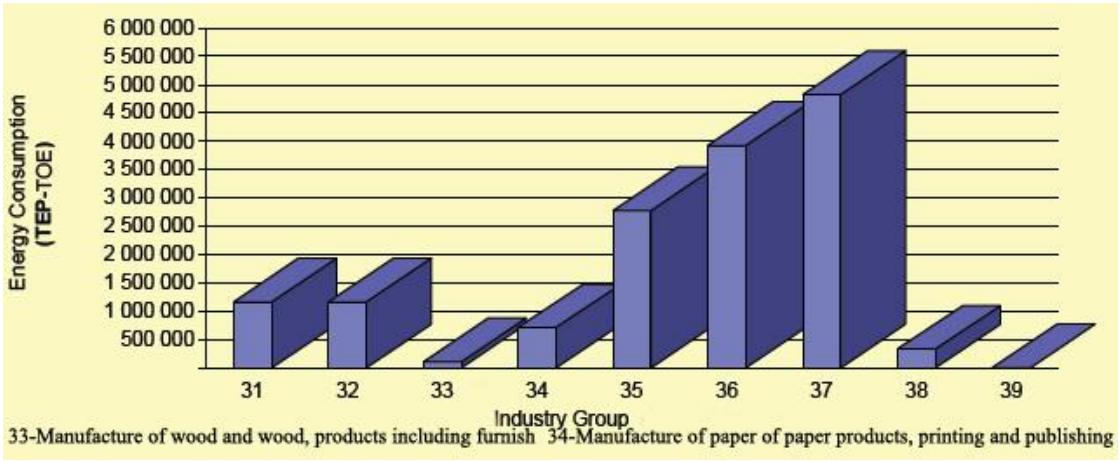

Figure 1. Energy consumption in the manufacturing industry by industrial groups in 2001

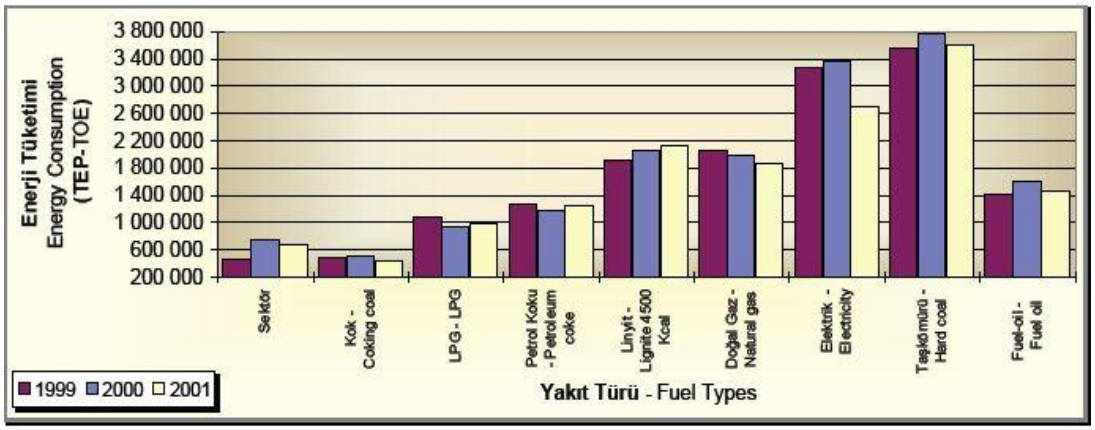

Figure 2. Energy consumption in the manufacturing industry by fuel types 1999-2001

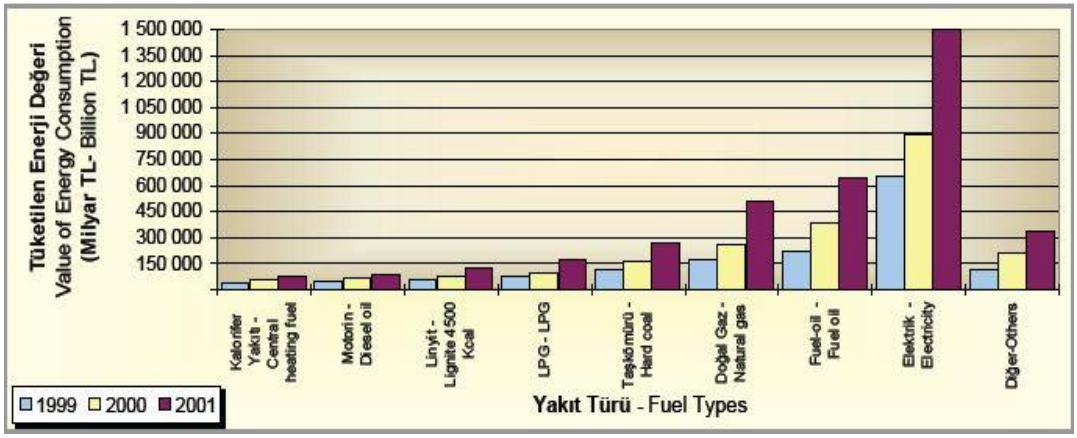

Figure 3. Value of energy consumption in the manufacturing industry by fuel types in 1999-2001

As it shown on the Figure 3; According to usage amount, electricity looks the most valuable energy resource. If we look at the Figure 2 electricity takes the 2nd space about consumption and the hard coal is the 1st and in the Figure 2 hard coal is the 5th most valuable energy resource. This means electricity is pretty much expensive than the hard coal. The same situation is also valid on the fuel oil. Fuel oil is the 5th energy resource on the consumption but it is the 2nd valuable one. Shortly if there is a comparison will done about the prices and values; it is possible to say that; electricity and fuel oil is the most valuable and expensive energy resources and natural gas is the 3rd one.

Table 2 shows the production amount of Turkish forest products industry in 1991-2008. Especially in 1997-1998 it's clear that the production amount decreased pretty much and if the price of energy is investigated during that years, it is easy to understand why there is decrease on the amount of production. The same story goes on in the recent years too. The tables are showing that when the energy prices and taxes got increased; the amount of production falls down. And this proves a strong correlation between energy prices and the amount of production.

The Table 3 and Table 4 show the energy index, energy taxes and prices of Turkey. This view is the best explanation about Turkey's situation in the world. The energy is cheaper in countries of the organization for economic co-operation and development than Turkey. Although Turkey is the member of this organization the costs are pretty much different and according to this the production amount of other countries are ahead of Turkey.

Table 2. The Production Quantity of Turkey's Forest Products in 1999-2009 (FAOSTAT, 2011)

Year	Element	Hardboard	MDF	Other Indust Roundwd(C)	Particle Board	Plywood	Sawlogs+Veneer Logs (C)	Sawnwood (C)	Veneer Sheets
1999	Production (CUM)	0.00	348000.00	988000.00	1643000.00	35000.00	2345000.00	2694000.00	16000.00
2000	Production (CUM)	0.00	388000.00	1049000.00	1884000.00	47000.00	2493000.00	3118000.00	17000.00
2001	Production (CUM)	0.00	355000.00	857000.00	1664000.00	35000.00	2243000.00	2391000.00	13000.00
2002	Production (CUM)	0.00	570000.00	1033000.00	1999000.00	55000.00	2822000.00	3015000.00	60000.00
2003	Production (CUM)	77000.00	700000.00	885000.00	2264000.00	57000.00	2344000.00	2986000.00	65000.00
2004	Production (CUM)	120000.00	850000.00	866000.00	2700000.00	60000.00	2503000.00	3625000.00	70000.00
2005	Production (CUM)	210000.00	1500000.00	887000.00	2890000.00	64000.00	2394000.00	3787000.00	75000.00
2006	Production (CUM)	270000.00	1798000.00	1007000.00	2750000.00	55000.00	2869000.00	4103000.00	84000.00
2007	Production (CUM)	185000.00	1952000.00	215000.00	3047000.00	117000.00	4672000.00	4226000.00	95000.00
2008	Production (CUM)	250000.00	1921000.00	181000.00	3181000.00	111000.00	4992000.00	4076000.00	96000.00
2009	Production (CUM)	626000.00	2290000.00	217000.00	2350000.00	100000.00	4757000.00	3777000.00	82000.00

Table 3. Some OECD countries - Indices of nominal energy prices for industry (total energy) (IEA, 2009)

Some OECD countries - Indices of nominal energy prices for industry (total energy)												2000=100
	2000	2001	2002	2003	2004	2005	2006	2007	2008	4Q2008	1Q2009	2Q2009
Denmark	100.0	100.0	101.5	104.2	103.2	109.4	115.2	116.2	132.9	118.2	108.5	111.3
Finland	100.0	99.1	99.9	114.4	117.9	125.9	134.7	133.1	159.8	154.9	145.2	145.3
France	100.0	97.2	93.7	96.7	104.8	120.3	128.5	128.6	150.6	140.4	120.3	118.4
Germany	100.0	104.1	106.8	114.5	121.3	137.1	147.3	152.4	168.2	154.7	143.1	147.6
Italy	100.0	108.9	108.7	114.6	118.4	134.9	151.8	153.3	178.6	176.4	162.4	162.3
Japan	100.0	101.9	96.6	96.3	98.6	107.6	115.9	117.0	139.1	136.9	121.3	112.0
Spain	100.0	99.5	100.4	99.5	105.3	129.2	141.3	139.1	168.3	155.7	140.8	142.0
Turkey	100.0	181.4	272.3	313.6	324.8	383.0	423.7	434.9	548.3	572.9	533.8	530.9
UK	100.0	98.8	96.0	98.2	104.1	122.9	138.4	137.6	171.5	175.5	164.2	168.2
US	100.0	103.6	94.4	110.4	124.5	155.5	166.8	174.1	217.7	181.8	150.7	149.9
OECD Europe	100.0	105.2	108.9	116.0	123.3	141.0	154.7	156.8	185.3	180.1	165.7	166.7

Table 4. TURKEY / Average prices and taxes in New Turkish Lira (IEA, 2009)

	High Sulphur Fuel Oil for Industry (per tonne)					Heavy Fuel Oil for Electricity Generation (per tonne)				
	Ex-Tax Price	Excise Tax	VAT	Total Tax	Total Price	Ex-Tax Price	Excise Tax	VAT	Total Tax	Total Price
1998	25.5	9.3	5.2	14.5	40.0	25.5	9.3	5.2	14.5	40.0
1999	52.2	11.2	9.5	20.7	72.8	52.2	11.2	9.5	20.7	72.8
2000	100.9	9.4	18.6	28.0	128.9	100.9	9.4	18.6	28.0	128.9
2001	160.9	28.2	33.5	61.7	222.6	160.9	28.2	33.5	61.7	222.6
2002	262.9	76.5	61.1	137.6	400.5	262.9	76.5	61.1	137.6	400.5
2003	291.2	96.5	69.8	166.2	457.4	291.2	96.5	69.8	166.2	457.4
2004	291.5	126.8	75.3	202.1	493.6	291.5	126.8	75.3	202.1	493.6
2005	415.6	204.0	111.5	315.5	731.1	415.6	204.0	111.5	315.5	731.1
2006	572.9	204.0	139.8	343.8	916.7	572.9	204.0	139.8	343.8	916.7
2007	661.9	204.0	155.9	359.9	1021.8	661.9	204.0	155.9	359.9	1021.8
2008	885.8	214.0	198.0	412.0	1297.7	885.8	214.0	198.0	412.0	1297.7

Conclusion

The forest products industry is an important part of Turkey's manufacturing industry also; energy's got great importance for the future of this sub sector. When the production amounts of Turkish forest industry is investigated and a comparison of energy price done with the other European Union countries, the result is; Energy is so much expensive in Turkey. Turkey nearly pays the most in the world. The production amounts of forest industry in the last decade proved that the sector is directly affected from the energy prices. The economic crisis years are the proofs of this idea. If those years are investigated it is shown that; when the prices are low the amount of production is high and when the opposite of this happens the production amounts directly decrease. Also as another results it is possible to say; even Turkey's got an important marketing potential for paper production, because of the expensive energy, there is not any pulp mills.

References

Akyüz I., Aydın İ., Bayram B. Ç., 2010. "Comparative Analysis of The Production, Importation And Exportation Quantities and Values Of Wood Based Panels Of Turkey And Japan In The Last Decade", The 1st International Symposium on Turkish and Japanese Environment And Forestry 4-6 November 2010 Trabzon/Turkey.

Nemli G., Aydın, A., 2007. "Evaluation of The Physical and Mechanical Properties of Particleboard Made From The Needle Litter of *Pinus pinaster* Ait." Industrial Crops and Products, 26, 252-258.

Nemli G., Aydın I., Zekoviç E., 2007. "Evaluation of Some of The Properties of Particleboard As Function of Manufacturing Parameters". Materials and Design, 28, 1169–1176.

Ye Z.P., Julson J., Kuo M., Womac A., Myers, D., 2007. "Properties of Medium Density Fiberboards Made From Renewable Biomass." Bioresource Technology, 98, 1077–1084.

Sjostrom, E. 2007. "Wood Chemistry: Fundamentals and Applications", 2nd Ed. Academic Press, San Diego, CA, p. 114-164. 1992.

Weinstock, Ira A., Atalla, Rajai H., Reiner, Richard S., Moen, Mark A., Hammel, Kenneth E., Houtman, Carl J., Hill, Craig L. and Harrup, Mason K. 1997. "A new environmentally benign technology for transforming wood pulp into paper Engineering polyoxometalates as catalysts for multiple processes". Journal of Molecular Catalysis A: Chemical 116 59-84.

Energy Consumption In The Manufacturing Industry (Establishments with 500 Tons of Oil Equivalent or more energy consumption) 1999-2001, 2004. State Institute of Statistics Prime Ministry Republic Of Turkey, Ankara.

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IEA, 2009. Energy Prices & Taxes Quarterly Statistics Third Quarter 2009, International Energy Agency.