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BETTER BUILDING

Certifying VET teachers as Energy Saving Advisers

A transfer system into three different European societies

Better Building Guidelines – TURKEY

This publication was developed in the course of the Leonardo da Vinci Transfer of Innovation project "Better Building – Certifying VET teachers as energy saving advisers. Transfer system into three different European societies."
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The project partnership:

- IAL Emilia Romagna, Bologna, Italy (Project promoter)
- BEST Institut für berufsbezogene Weiterbildung und Personaltraining GmbH, Vienna, Austria (Coordinator)
- Fundatia Romano-Germana Timisoara, Timisoara, Romania
- GLOBAL Training and Consulting, Istanbul, Turkey
- PAPILOT - Zavod za vzpodbujanje in razvijanje kvalitete življenja, Ljubljana, Slovenia
- Rogaland Kurs og Kompetansesenter, Stavanger, Norway
- Tekniker Eğitim Sağlık Kültür Vakfı (TEK-SAV), Ankara, Turkey

Certification of Vocational and Technical Education Teachers and Trainers as Energy Saving Consultants

Guidance Document

Contents

Introduction

This guidance document was prepared in order to enable the usage of "**Better Building**" educational materials and the project module training programme. The instructors, teachers and consultants who inform about the topic of heat insulation in buildings will contribute to the economy of their countries.

The project documents are simple, comprehensible and usable in daily living as much as possible. These documents are primarily aimed at instructors, teachers and consultants, who are the target group of the project. Others who need can use the "Energy Saving Consultants in Buildings" documents. People who successfully finish this course can serve as "Energy Saving Consultants in Buildings". On one the hand, courses are given as classroom or applied laboratory education, on the other hand, theoretical information can be internet based and practices can be conducted in laboratories. For the productive and efficient usage of the project documents, an analysis of the situation in Turkey will be realised before making suggestions and recommendations on using the documents in Turkey.

The course for heat isolation in buildings consists of 11 topics. Those topics are listed as follows. The content of the course can be found in the handbook.

1. Interactive effects between environment and structure.
2. Old and new building codes and laws.

3. Heat isolation entailment and expectations
4. Comfort and energy budget in existing buildings
5. Acceptable heat values of panels.
6. Humidity in buildings and condensation.
7. Isolation materials used in restructuring the buildings thermo-technically.
8. Thermo technical restructuring and amendment methods according to material categories.
9. Economical feasibility of additional heat isolation.
10. Usage of solar energy.
11. Recycling the remains of construction.

Participants who finish this course will be certified as Energy Saving Consultants. Moreover, the following steps are offered in the "Guide for Proposers" table in the handbook as a practical path to be followed in heat isolated buildings.

Step 1: Forming Infrastructure

Step 2: Gathering information

Step 3: Getting in touch with the owners of the buildings or flats (1st Meeting)

Step 4: Information research on amendment alternatives (2nd Meeting)

Step 5: Recommendations about thermal amendment and enlightenment (3rd Meeting)

Step 6: Evaluation and assigning the dates

Step 7: Suggestions for solution (4th Meeting)

Step 8: Start of amendment. Preparations / Decision of building owners

Step 9: Assessment of Application.

PART 1

Energy Efficiency in Buildings

1. Energy Efficiency in Buildings

1.1 Energy Efficiency Studies

Energy efficiency in buildings is one of the most important matters in all countries. It has 2 basic reasons:

- Decrease in energy costs
- Preventing environmental pollution

The United Nations in a global sense, the European Union in a regional sense and the situation in Turkey in a local sense will be examined. The Kyoto Protocol, which was signed on 11 December 1997 in Kyoto, Japan and put into practice on 16 February 2005, is the most important international agreement on climate and environment.

EU-countries also make important decisions on energy efficiency in buildings and put them into practice. Especially the applications in northern countries (such as Norway, Sweden and Finland) are cited as an example for the other European countries.

EU countries, according to the current state, will meet 90% of their petroleum needs and 80% of their natural gas needs by importing until 2030.

Currently Turkey meets 93% of its petroleum needs and 97% of its natural gas needs by importing. If the necessary precautions aren't taken, 99% of petroleum and 100% of natural gas will be imported in 2020.

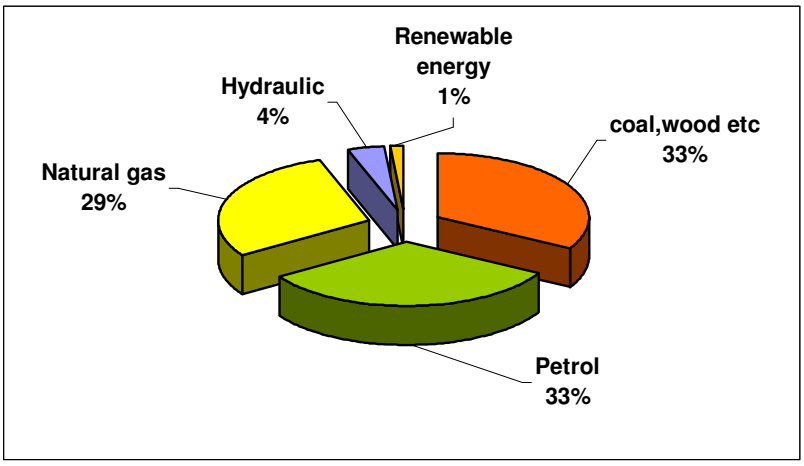

Figure 1. Energy use in Turkey by Fuel Type (2006)

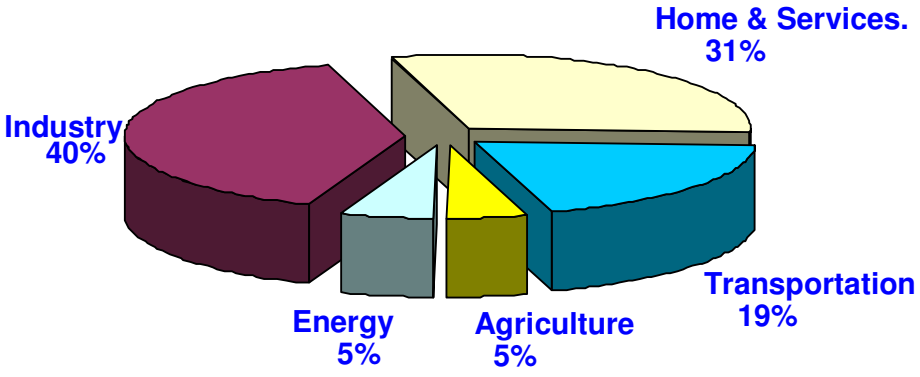

Figure 2. Energy Use Rate in Turkey by Sector (2006)

According to a research conducted in 2006, homes in Turkey are 88% single

and only 12% double glazed and isolated. The usage of double glazing in European countries is over 50 %. (100% in Finland and Sweden, 80% in Denmark and Ireland.)

10% of homes in our country have roof insulation whereas the rate in EU countries is over 40%.
In public buildings, 62% single and 36% double glazing windows are used. At the same time, the rate of roof insulation in public buildings is 28%.

The state of homes in Turkey

The total number of homes is currently about 17 million (2008 data).

55% of all homes are unauthorized and not licensed.

The rate of home ownership is % 60.

60% of housing stock is over 20 years old.
40% of all homes need amendment.

In terms of energy efficiency, Turkey is 3 times behind from Japan and 2 times behind from OECD countries. For this reason, Turkey has a lot to do in terms of energy efficiency.

Turkey is a dependent country in terms of energy and pays about 50 billion USD annually and this rate is on the increase per annum. Efficient use of energy at homes and attempts to use renewable energy sources are intense in recent years and legal regulations are made.

The General Directorate of Electrical Power Resources Survey and Development Administration (EIE), an affiliate of the Ministry of Energy and Natural

Resources, provides trainings and prepares educational packages for energy saving in buildings, industry and transportation and gives support service for laws and regulations in this area.

The Ministry of National Education and universities provide trainings on energy efficiency and heat isolation in buildings. You can find the studies on this topic under "Sources" at the end of this document.

The documents developed in the scope of "Better Building" can be generalized all over the country in cooperation with educational establishments and organizations.

1.2. Energy Efficiency Laws, Regulations and Circulars

There have been a lot of important legal regulations on developing energy efficiency in buildings. Those can be sequenced as follows.

There have been legal regulations in the building sector to recover this important energy savings potential. TS 825 "Insulating Rules Standard in Buildings" and "Insulation Regulation" of Ministry of Public Works and Settlement are constitutionalized to EU legal regulations and put into force in 2000.

TS 825 Standards and Insulation Regulation:

TS 825 "Insulating Rules Standard in Buildings" and "Insulation Regulation" of Ministry of Public Works and Settlement are constitutionalized to EU legal regulations and put into force in 2000.

Law of Energy Efficiency:

One of the most important developments in recent years on using energy efficiently is the Law of Energy Efficiency, which was put into force on 2 May 2007 after being published in Official paper no. 5627. This law is aimed at using energy efficiently, preventing waste, mitigating the load of energy costs on the economy and saving the environment.

Energy Performance Regulation in Buildings:

The regulations aimed at the improvement of energy performance in buildings fit with the Law of Energy Efficiency for the purpose of the EU Energy Performance Directive in Buildings.

Prime Ministry Energy Efficiency Circular (15 February 2008, Number 26788)

The year 2008 was announced as the "Energy Efficiency Year" in Turkey with the circular no. 26788 published the Official Gazette on 15 February 2008.

Regulation on Improving Productivity of Energy Resources and Energy Management (dated 25 October 2008, Official Gazette no. 27035)

The aim of this regulation is to organise the forms and guidelines concerning efficient use of energy, to prevent the waste of energy, to lower energy costs on the economy and to save the environment through the development of energy efficiency and energy management.

All of the legal regulations mentioned above are aimed at employing energy efficiently. While law constructs the frame, training is essential for application. Regarding buildings and insulation training, cooperation on energy efficiency with the firms working on this area is practicable. The INTES Training Centre established by sector representatives in the Ankara Chamber of Industry is the most important training centre where the representatives of building trade train directly.

Instructors and teachers of Vocational colleges and high schools can be trained for a week on heat insulation in this centre. They can introduce the training they received to their colleagues in their own training centres.

PART 2
Classes and Courses
On Energy Efficiency and Heat Insulation

2. Classes and Courses on Energy Efficiency and Heat Insulation

The educational studies on energy efficiency and heat insulation can be evaluated in 3 groups.

- Heat Insulation classes in Vocational High Schools
- Energy Management Classes in Vocational Colleges,
- Certificate Training Programs in EIE,
- Certificate Programs of Unions and Employers

2.1 Heat Insulation Classes in Vocational High Schools

In the scope of MEGEP (The Project of Empowering VET in Vocational High Schools), there are insulation classes in construction programmes in Vocational High Schools. http://www.megep.meb.gov.tr/indextr.html

2.2 Energy Management Classes in Vocational Colleges

There are two-hour Energy Management Classes in all programmes in Vocational Colleges in the scope of the MEB-YÖK Programme Development Project for Vocational Colleges. Many of the Vocational colleges have that class since 2002. You can access the content of the class from the following internet address:

http://karatekin.cmyo.ankara.edu.tr/proje/arsiv/

2.3 EIE Energy Manager Courses in Buildings

EIE offers Energy Manager in Buildings Certificate Training for two weeks. You can access the details from the following internet site:

http://www.eie.gov.tr/duyurular/EV/bina/kurslar/binenyoneg.html

2.4 Certificate Courses of Unions and Sector Representatives

Yol-İş Union INTES Training Site is established in cooperation with the Ankara Chamber of Trade 1st Organized Industrial Region, union and representatives of sector. With the contributions of sector representatives there are short-term applied training sessions. You can find detailed information on the training site from the following web page:

http://www.tes.org.tr

Part 3

Better Building Training Documents

3. Better Building Project Training Documents

3 training documents have been developed within the scope of "Better Building"

- Module Training Programme and Teaching materials (Modular Curriculum and Teaching Materials)
- Consultancy Document (Guidelines)
- Application Booklet (Implementation Concept)

3.1 Module Training Programme and Teaching Materials

Content Analysis:

Hand Book:

- Energy saving consultant curriculum attained from the adaptation of the contents existing in ECOS-A Project applications and experiences of the conditions in Turkey,
- insulation applications in prefabricated buildings,
- account methods,
- necessity of amendments,
- importance of energy saving,
- collecting data from the buildings to be improved and processing the data,
- flow sheet for amendments,
- modern heat insulation materials and their specialties,
- performing the application,
- waste recycling,

- alternative energy resources.

The content includes the things that Turkey should do for energy saving. As we know, Turkey is poor in regard to energy and imports nearly ¾ of its energy. For this reason, trainings and earnings in the scope of the project are vitally important. Very poor insulation applications because of traditional building techniques must be improved.

Comments:

- The content to be transferred is quite rich and appropriate. It consists of both the applications in Europe and also the appendix considering the deficiencies in Turkey. The study has become a good adaptation.
- The applications in Romania may not be good examples for Turkey since prefabricated structures are used across the country, but they include important information in terms of the importance of insulation.
- There are two different methods in terms of accounting. Both methods can be used and the best one can be chosen after comparing the results. Software used in Turkey can be obtained from the firms and used for the ease of accounts.
- Amendments in buildings in terms of heat insulation are very important for the purpose of both reducing the costs and preserving the building against external influences. Maintenance and heating costs of the insulated buildings decrease and their appearance change.
- Energy saving is very important for Turkey which imports ¾ of its energy. Moreover, the year 2008 was announced as the official saving year because of energy needs and it has been supported by public and private organizations.

- A good Project must be prepared before amendments can take place. Each building may need separate work. Since the buildings constructed with traditional structure techniques are poor in terms of heat insulation, the project should focus on insulation.
- There is a well prepared guideline for the amendment. All the operations are given in detail according to their process order.
- The samples are chosen from the materials that are used recently and have high thermal insulation values. There are various materials; some provide both thermal and sound insulation; some provide thermal insulation, and some sound insulation with fire protection.
- A few operations are required to apply thermal insulation in the buildings.
    - A draft study to provide the surface smoothness of the building,
    - Fixing the insulation material and fastening the dowels,
    - Upper coating
    - Placing the netting
    - Last layer
    - Painting

All these activities should be done carefully.

- Recycling the waste materials that have emerged during the amendment and using the ones that are eligible requires another study. These waste materials can be wooden, glass, plastics, marble, etc. From these materials, old wooden and glass materials can be used.
- From now on alternative energy sources are important for all countries. Our country which is rich in solar and thermal energy should use these energy sources rapidly.

3.2 Need Analysis

Such a study is needed in Turkey, since there are serious home deficits on the one hand and large housing investments on the other. But there are problems in using insulation in buildings. There are individuals, small entrepreneurs, big building companies and the Housing Development Administration of Turkey (TOKI) in the building sector. Big building companies and TOKI are under supervision in terms of building techniques and insulation usage. At least they give importance to this for the prestige. In this section insulation problems can be solved through supervision.

However, the small entrepreneurs and individuals, who represent a big share of the building sector, are unaware of giving importance to both building and insulation. As insulation increases the cost of the building they usually ignore insulation. Conversely, insulation will provide great advantages to home owners, as it will provide savings in the future. As the supervision is not widespread, it decreases the effects of legislations. Moreover the consumers are not conscious about this issue and thus the need for insulation is not understood well. The energy consuming is not necessarily increasing. Energy consuming affects the economy negatively and the ups and downs in the energy prices bother the consumers.

For this reason, in the buildings:

- Thermal insulation is required for energy saving and comfort.
- Energy saving is compulsory for the contribution to the country's economy.
- Protecting the environment is much more important than everything.
- The usage of alternative and renewable energy sources should be increased.

From these points of view, increasing the awareness of the importance of insulation, inserting respective training programmes to Vocational Education, and training the required workforce for energy saving become a need in Turkey. From now on, certificated energy experts are demanded in Turkey. The government made it compulsory to acquire this certificate in the energy sector from 2009 onwards.

The aim of this project is to enable teachers and managers in the VET sector to become energy saving consultants and thus to support the introduction of energy saving education into VET.

3.3. Design of Applied Internet Based Courses

The energy saving education in the buildings should be done practically. Otherwise the education will not be able to reach its target. The target groups of the educational programme are teachers, teaching staff, and consultants in building or construction education.

Education has two dimensions: theoretical and practical education. Theoretical education is prepared to be delivered via internet. It is supported with pictures and short videos. Computer programmes for the calculation of insulation materials provide an important support to education.

The applications should be done in workshops or building areas for the educational applications.

All calculations and applications related to the insulation are given with their samples within the content of the project. Insulation and helping education materials can be provided by cooperating with the insulation materials manufacturing companies.

The contents and weekly hours of the offered courses related to the thermal insulation are in the project documents. The application of the courses can be modified according to the conditions of that country. Obviously there are different climatic conditions in each country. The thermal insulation in the buildings is done according to these conditions. The target group to be educated is divided into two groups:

- Students in diploma education,
- Certificate education for adults.

There can be an attendance problem for adults due to their job conditions. Thus, internet based theoretical courses provide important facilities for these people. The students in diploma education can gain from classroom-workshops or internet based education.

3.4 Cooperation among educational institutions

Cooperation among related institutions in the course of "Better Building" is quite important for the success of the project. The cooperated institutions have important features for the dissemination of the project.

The representatives of the below listed institutions came together in a meeting held in Ankara on June 4th, 2008.

- MoNE Educational research and Development Directorate
- Electrical Power Resources Survey and Development Administration
- YOL İŞ – INTES Education Worksite
- Çankırı Karatekin University Technical and Business College,
- Sakarya University Technical Education Faculty Construction Department

The communication among the partners that participated in the meeting continued via phone and e-mails. The teaching staff of Çankırı Karatekin University Technical and Business College contributed to the pilot testing of the project documents.

The cooperation will be continued after the completion of the project documents.

PART 4

Consultancy Manual for VTE Consultants

4. Consultancy Manual for VTE Consultants

This 4th section including recommendations for the consultants of the manual is prepared to help the consultants. During their consultancy, teaching staff and the consultants will find important information in this section related to the thermal insulation in buildings and energy efficiency. The analysis of the CSV's and vocational prerequisites should always be done by the consultants.

The consultants should know the educational and vocational competences of the potential participants in order to give professional consultancy. It is important for the analysis and evaluation of some points, such as whether the participants have time for homework or not, or also concerning their status of health or employment status.

The consultants should also know the history of the vocational lives of the participants. They should know the competences that they acquired during work or their professional interests that they were not yet able to realize.

The consultant should take a look at the private life of the applicant or the participant. Related to the participant or applicant, he/she should know the number of children, where he/she lives, and his/her remaining energy and time for vocational education. The culture and environment that he/she is in should be taken into consideration for delivering the most suitable education.

It is necessary to respect the previous knowledge and experiences of the participants and be ready to see them acting and thinking differently. The consultant should think about how to adopt them to the target group by looking at their past. Different types of consultancy studies can be required.

PART 5

Recommendations for Equal Opportunity and Variety Education

5. Recommendations for Equal Opportunity and Variety Education

In the 5th section of the manual, there are some suggestions on how to plan the thermal insulation and energy efficiency in the buildings. So, this section addresses the VET providers, education designers and teachers delivering education on thermal insulation in buildings.

Please take a look at the previous sections of the manual for thermal insulation and energy efficiency in buildings.

The final target of the energy efficiency and thermal insulation in buildings project is seeing the applications in daily life.

The suggestions and pathways for energy efficiency and thermal insulation in buildings should provide possibilities to use and adopt them into daily life.

5.1 Sample Course Programme

Aim: Informing and practically training the teaching staff of colleges and teachers of high schools in the VET sector on energy efficiency and thermal insulation in buildings through EU principle decisions for two days.

Objectives

- Informing the VET teaching staff and teachers on energy efficiency and thermal insulation in buildings,
- Explaining the principle decisions of international organizations and EU,
- Demonstrating the developed educational materials on energy efficiency and thermal insulation in buildings in the VET sector,
- Teaching how to measure and evaluate the studies.

5.2 Explanations

- The usage of the "Module education programme and teaching materials" and "Guidance Document" that were developed in the context of Better Building is suggested during the delivery of this course. Throughout the course, the teaching staff and teachers chosen as target group should be considered central and the course should be continued practically. In the applications, samples from daily life should be given and these samples should enjoy the attention of the target group.
- This course aims at the usage of the Better Building concept in courses in colleges and Vocational High Schools. For this reason, the applications should be chosen from daily life and the applications of the companies. Behaviour changes in teaching staff and teachers should occur according to the determined criteria in the project documents. Finding the problem is not enough, true solutions are required.
- During the delivery of the course, the teaching staff and the teachers should gain the following knowledge and skills related to the subject.

The teachers / trainers …

… should have self confidence on energy efficiency and thermal insulation in buildings,

- access to information sources and use them easily,
- express his/her ideas,
- share the acquired knowledge,
- give rapid and true decisions,
- use the multi media technologies in his/her presentations,

…solve the problem,

offer,
comment,
use the acquired knowledge and skills in his/her daily life effectively,
generalize the acquisitions externally.

Evaluation Table

The courses should be delivered as brief theoretical inputs in class and then practical training (individually and in groups) should be provided. The topics should be shifted according to the tendency and experiences of the target group. The success of the participants and whether they have reached the targets or not is assessed through observations and course end questionnaires.

Topics	Topic Rate (%)
I. A general view on energy efficiency and thermal insulation in buildings	20
II. Energy efficiency and thermal insulation in buildings in VET	20
III. Materials that will be used during education	30
IV. Recommendations for energy efficiency and thermal insulation in buildings	15
V. Education Model Suggestion	15

5.3 Measurement and Evaluation

This section is concerned with the impact of traditional and standardized measurement tools on the curriculum programme that are used by teachers. The measurement tools in the schools define what and how to teach to the teachers. As the teachers have to educate in accordance with the targets of the exams, other targets of education are often forgotten and the success of the student is ignored. Thus, traditional measurement techniques withhold the teachers from reaching the desired behaviour of the students. With the standardized measurement tools, it is measured whether knowledge exists or not. The existence of knowledge, however, does not give any information on whether the student is able to use it or not. In this situation, the tests are only aimed at the curriculum programme and education and training diverge from its main target. There should be a relation between course activities and measurement and evaluation. The test results are a tool that evaluates both the teacher and the student in many educational institutions.

Schools should leave the traditional measurement techniques and start to use alternative measurement. Some features of these new measurement techniques are given below.

Alternative measurement techniques measure if the activities are completed, adapted to the environment and where competencies and the usage of knowledge are connected.

Alternative measurement is placed in the curriculum programme. It can be separated from the directed activities which measure just the aim. In other words, alternative measurement means meaningful learning experiences.

Alternative measurement is flexible. It allows different presentation types and the preferred learning style of the students.

PART 6

Related Internet Sites

6. Internet Sites

T.C Bayındırlık ve İskan Bakanlığı
Republic of Turkey, The Ministry of Public Works and Settlement (English)
www.bayindirlik.gov.tr

T.C Enerji ve Tabii Kaynaklar Bakanlığı
Republic of Turkey ,The Ministry of Energy and Natural Resources (Turkish)
www.enerji.gov.tr

T.C. Çevre ve Orman Bakanlığı
Republic of Turkey, Ministry of Environment and Forestry (Turkish)
http://www.cevreorman.gov.tr

Elektrik İşleri Etüd İdaresi Genel Müdürlüğü
Electrical Power Resources Survey and Development Administration (EIE) (English)
www.eie.gov.tr/turkce/en_tasarrufu/konut_ulas/bina_ulas.html

EİE Enerji Verimliliği Çalışmaları (Turkish)
EIE The Studies for Energy Efficiency
http://www.eie.gov.tr/turkce/en_tasarrufu/uetm/uetm_index.html

İstanbul Teknik Üniversitesi, Enerji Enstitüsü
The Energy Institute at Istanbul Technical University
http://www.energy.itu.edu.tr/EN/about.htm

İstanbul Büyükşehir Belediyesi Şehir Aydınlatma ve Enerji Müdürlüğü
Istanbul ,Directorate of City Lighting and Energy Directorate of City Lighting and Energy
http://application2.ibb.gov.tr/aydinlatmaenerji/pages/enerji_verimliligi.asp

TMMOB İnşaat Mühendisleri Odası (Turkish)
Union of Chambers of Turkish Engineers and Architects Chamber of Civil Engineers, Ankara
http://e-imo.imo.org.tr/Portal/Web/IMOindex.aspx

İnşaat Mühendisliği Paylaşım Platformu (Turkish)
Sharing Platform of Civil Engineering
http://www.insaatmuhendisligi.net/index.php/board,94.0.html

TMMOB Elektrik Mühendisleri Odası
The Chamber of Electrical Engineers (EMO)
http://www.emo.org.tr/

Temiz Enerji Vakfı
Clean Energy Foundation
http://www.temev.org.tr/yayinlar.htm

Enerji Teknolojileri ve Mekanik Tesisat Dergisi
The Journal of Energy Technologies and H.V.A.C System
http://www.tesisat.com.tr

Türk Tesisat Mühendisleri Derneği
Turkish Society of HVAC & Sanitary Engineers
http://www.ttmd.org.tr

TES İnşaat Eğitim Merkezi (Turkish)
TES Building and Construction Training Centre, Ankara
www.tes.org.tr/index2.html

Enerji Ekonomisi Derneği
The Turkish Association for Energy Economics (TRAEE) (English)
www.traee.org/index.html

İZODER, Isı Su Ses ve Yangın Yalıtımcıları Derneği (Turkish)
IZODER , Association of Isolation of Heat, Water, Suond and Fire
http://www.izoder.org.tr/hakkimizda.asp

İMSAD İnşaat Malzemesi Sanayicileri Derneği
İMSAD, the Association of Turkish Building Material Producers
http://www.imsad.org/eng/index.asp?sid=2

ISKID, İklimlendirme Soğutma Klima İmalatçilari Derneği
Association of manufacturers of Air Conditioning and Refrigeration Systems
http://www.iskid.org.tr/tr.htm

IZOCAM Firması (Bina Yalıtım malzemesi Üreten Özel Kuruluş)
IZOCAM insulation Company (Private Isolation Company)
http://www.izocam.com.tr (English)

SOLEN Enerji (Yenilenebilir Eneri Sistemleri Üzerine Çalışan Özel Kuruluş)
SOLEN Energy (Private Energy Company)
http://www.solenenerji.com.tr

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