

# **DRAFT BY LAW ON IMPROVING ENERGY EFFICIENCY FOR THE UTILISATION OF ENERGY RESOURCES AND ENERGY**

## **SECTION ONE**

### **Objective, Scope, Legal Basis, Definitions and Acronyms**

#### **Objective**

**ARTICLE 1-** (1) The objective of this Regulation is to set out the principles and procedures applicable to increasing efficiency in the use of energy resources and energy in order to use energy effectively, avoid extravagancy, reduce the burden of energy costs on the economy and protect the environment.

#### **Scope**

**ARTICLE 2-** (1) This Regulation covers the implementation principles and procedures applicable to authorization of universities, professional chambers and energy efficiency consulting firms; energy management practices; duties and responsibilities of energy managers and energy management units; training and certification activities relating to energy efficiency; energy studies and efficiency increasing projects; supporting efficiency increasing projects and voluntary agreements at industrial enterprises; demand side management; increasing energy efficiency in electricity generation, transmission and distribution; and administrative sanctions.

#### **Legal Basis**

**ARTICLE 3-** (1) This Regulation has been prepared on the basis of Article 2 and 28 of Law No. 3154 on the Organization and Duties of Ministry of Energy and Natural Resources, and the Energy Efficiency Law No. 5627 dated 18 April 2007.

#### **Definitions and Acronyms**

**ARTICLE 4-** (1) The following terms shall bear the following meanings for the purposes of this Regulation:

- a) Ministry: Ministry of Energy and Natural Resources,
- b) Directorate General: Electricity Affairs Survey Administration Directorate General,
- c) Director General: Electricity Affairs Survey Administration Director General,
- ç) Board: Energy Efficiency Coordination Board,
- d) Law: Energy Efficiency Law No. 5627,
- e) Public sector: Public agencies and institutions covered by tables (I), (II), (III and (IV) annexed to Public Financial Management and Control Law No. 5018; state economic enterprises and their subsidiaries; entities included in the scope and program of privatization with more than 50% shares owned by the state and subject to provisions of private law; funds, revolving funds; public banks and all other public agencies and institutions, municipalities, special provincial administrations as well as the unions, institutions and enterprises established by such, the professional organizations in the form of public agency,
- f) Professional chambers: Union of Chambers of Architects and Engineers of Turkey, Chamber of Electric or Mechanical Engineers,
- g) Firm: The energy efficiency consulting firms to which authorization certificates are issued to execute energy efficiency services within the framework of authorization agreements they have signed with the Directorate General or authorized agencies,

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ğ) Authorized agencies: The professional organizations and universities authorized by the Directorate General through a Board approval, to execute training, authorization and monitoring activities within the framework of authorization agreements,

h) TEP: Ton Equivalent Petroleum,

i) Waste: Used tires, paint sludge, solvents, plastic materials, waste oils and other wastes that are approved for use as fuel by the Ministry of Environment and Forestry,

i) Building Owner: Owner or beneficiary owner of a building, or in the absence of both, the real person or legal entity who acts as the owner of the building,

j) Building management: Real person or legal entity responsible for the operation of building,

k) Electrical home appliance: Products like refrigerator, freezer, air-conditioner, washing machine, washing machine with dryer, oven, dish washer, water heater, kettle, bulb and fluorescent lamp, iron, television, computer, music player, etc. which directly or indirectly consume electricity during operation,

l) Energy label: the certificate including information regarding the energy consumption of equipment which consumes electricity,

m) Energy study: The studies consisting of the stages of information collection, measurement, evaluation and reporting in connection with increasing energy efficiency,

n) Industrial Enterprise: Any enterprise that operates and produces any type of good as affiliated with chambers of industry and commerce, chambers of commerce or chambers of industry and that has a total annual energy consumption of minimum 1,000 TEP, other than the licensees engaged in electricity generation activities,

o) Energy efficiency: Decreasing energy consumption at buildings without compromising on living standards and service quality, and at industrial enterprises without compromising on production quality and quantity,

ö) Energy efficiency services: The energy manager training, study and efficiency-increasing project preparation, project implementation and consulting services relating to energy efficiency,

p) Energy density: The quantity of energy consumed to produce a unit product,

r) Energy Manager: The person holding energy manager certificate or consultancy certificate, and responsible for performing energy management activities at the industrial enterprises and buildings,

s) Energy manager certificate: The certificate indicating that its holder can provide energy manager services,

ş) Energy management: The training, study, measurement, monitoring, planning and implementation activities executed for ensuring that energy resources and energy be used efficiently,

t) Consultancy certificate: The certificate indicating that its holder can provide energy manager training, energy study, efficiency increasing project preparation and energy manager services for buildings,

u) Recovery period: The period in which the investment costs in the designs prepared by industrial enterprises or by firms hired by them, for increasing energy efficiency in existing systems are recovered through the saving foreseen in the designs,

ü) Cogeneration: Generation of heat and electricity and/or mechanical energy at the same facility simultaneously,

v) EIP: Efficiency increasing project prepared by the industrial enterprise or firm, aimed at implementing the measures identified through energy study at industrial enterprises and restoring the energy saving potential,

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y) Implementation Agreement: The agreement signed by Firms with industrial enterprises for the implementation EIP,

z) Service agreement: The agreements signed with industrial enterprises, building owners or managements for the provision of training, study, EIP and consulting services,

aa) Total construction area: Total of the constructed areas of buildings, excluding open ground terraces, courtyards, light holes, aeration chimneys and eaves; and in case of multiple independent buildings receiving heat or power from a single center in the same campus, the sum of the total constructed areas of each building,

bb) Authorization Certificate: The certificate issued within the framework of authorization agreements, by the Directorate General to universities and professional chambers, upon Board approval, for the execution of training, authorization and monitoring activities; and by the General Directorate and authorized agencies to firms for the execution of energy manager training, study, consulting and EIP implementation services.

## **SECTION TWO**

### **Authorization, Monitoring and Inspection of Agencies and Firms**

#### **Authorization, activities, monitoring and inspection of agencies**

**ARTICLE 5-** (1) Authorization certificate shall be issued by the Directorate General, upon Board approval, to universities, branches of professional chambers so that they can perform applied training and authorize firms. These certificates shall be renewed every five years in the absence of any contradiction to the Law and this Regulation. The procedures relating to the authorization certificates issued to firms by the agencies whose authorization certificates are not renewed and are cancelled shall be executed by the Directorate General until their duration expires.

(2) Authorized agencies shall provide energy manager training for industrial enterprises and buildings, and consultancy training for firms.

(3) Within the framework of authorization agreement they have signed with firms, authorized agencies shall provide laboratory support to the firms for which they have issued authorization certificates, for the purposes of applied energy manager training. The authorized agencies with no laboratory facility may provide this support through agreements with the Directorate General or other authorized agencies.

(4) Authorization agreements shall be signed between the Directorate General and the universities and branches of professional chambers which have been approved by the Board for authorization. Following this agreement, category "A" authorization certificate shall be given to universities or branches of professional chambers which want to execute energy manager and consultancy trainings, and category "B" authorization certificate shall be given to universities or branches of professional chambers which want to execute only energy manager training. Authorization certificates shall be prepared according to the format defined in the communiqué to be published by the Directorate General in the Official Gazette.

(5) Universities and professional chambers shall apply to the Directorate General in April and October every year to receive authorization certificate or change the category of authorization certificate, together with the following documents:

a) an application letter containing a statement that they will execute the trainings covered by the requested authorization certificate category, by fulfilling the requirements stipulated in Annex-1 of this Regulation,

b) one printed and one electronic copy of the documents to be used in the trainings covered by the requested authorization certificate category,

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c) documents proving that the indoor areas, furniture, tools, equipment and laboratory facilities to be used in the training activities satisfy the conditions stipulated in Annex-1 of this Regulation,

d) Curriculum vitae of minimum three persons to be employed as trainer in each of the trainings covered by the requested authorization certificate category, and their energy manager and/or consultancy certificates received from the Directorate General.

(6) In January every year, an evaluation commission consisting of three persons shall be set up under the related department head of Directorate General. The evaluation report to be prepared by the evaluation commission on the basis of documents and on-site examinations shall be submitted to the Director General within maximum thirty calendar days following the application date, and to the Board in the first meeting following application date. The Board shall decide to issue, modify or re-activate authorization certificate, or shall set up a commission consisting of minimum three persons from the Board to make on-site examinations and report its results to the Board in the next meeting. The Board decision to issue, modify or re-activate authorization certificate shall be taken latest in two subsequent Board meeting following the application. Authorization certificate shall be issued for universities and branches of professional chambers which satisfy the requirements specified in paragraph (5) as depicted by their documents or on-site examinations.

(7) Authorized agencies shall submit the activity report they prepare according to the format defined in the communiqué to be published by the Directorate General in the Official Gazette, to the Directorate General by the end of March every year. These reports shall be reviewed by the evaluation commission. Additional time, which shall be limited to maximum 6 months, shall be given to the authorized agencies to correct the deficiencies observed in their activities as depicted by their reports or on-site examinations. During this period, the category of authorization certificate may be changed or the certificate may be suspended, through a Board approval. In order to be able to re-activate a suspended authorization certificate, the deficiencies leading to the suspension of the certificate and the documents proving that these deficiencies have been eliminated shall be submitted to the Directorate together with an application letter. The documents submitted shall be evaluated according to the provisions of paragraph 6. In case the documents are found to be unsatisfactory or in case an authorization certificate is suspended for minimum two times in a period of five years, the authorization certificate of authorized agency shall be cancelled through Board approval.

(8) The complaints submitted to the Directorate by the energy managers certified by authorized agencies or industrial enterprises or buildings where they work or by the firms authorized by the agency or by the clients of these firms, and the training evaluation forms filled in by the participants during trainings shall be evaluated by the Directorate General in order of submission. Depending on the justifiability, number and impacts of complaints, the authorization certificate of authorized agency may be cancelled through Board approval.

(9) The authorized agencies for which authorization certificate is issued, modified, suspended, re-activated or cancelled shall be posted on the website of the Directorate General within five days following the completion date of these procedures.

(10) Directorate General shall organize a coordination meeting in December every year with the participation of authorized agencies, and a concluding report including developments, bottlenecks and suggestions for solution shall be published at the end of these meetings.

### **Authorization, activities, monitoring and inspection of Firms**

**ARTICLE 6-** (1) Authorization certificates shall be issued by the Directorate General or authorized agencies to Firms for the execution of energy efficiency services. These certificates

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shall be renewed every three years in the absence of any contradiction to the Law and this Regulation.

(2) The category of authorization certificates issued to Firms, which may be building, energy-intensive industrial sectors, heat-mechanics and electricity, shall be determined by the Firms according to the preference form during application, within the framework of the communiqué published by the Directorate General in the Official Gazette.

(3) Firms shall provide the following services to industrial enterprises, building owners or managements:

(a) energy manager training, energy study and EIP preparation, project implementation, consultancy and energy manager services for buildings, within the framework of service agreement.

(b) Implementation of EIP with the assurance of energy saving amount, within the framework of Implementation Agreement.

(4) Firms shall apply to the Directorate General or authorized agencies together with the following documents in order to receive authorization certificate or change its category, in January and July every year:

a) an application letter including a statement that they will offer energy efficiency services in line with the provisions of this Regulation,

b) one printed and one electronic copy of the documents to be used in energy manager trainings,

c) Firm's articles of incorporation including energy efficiency services and documents of registration with related chambers,

ç) A preference form indicating in which sectors the Firm will offer energy study, EIP implementation and consultancy services,

d) For energy manager trainings; documents indicating that the requirements of Annex-1 of this Regulation are satisfied, curriculum vitae of three persons to work as trainer and their energy manager and/or consultancy certificates,

e) For consultancy services; curriculum vitae and consultancy certificates of minimum two staff members to be commissioned in each sector or the persons from whom service will be procured,

f) For use in study services; invoices indicating that the Firm has the equipment with list and specifications provided in Table-1 of Annex-3 of this Regulation, and the contract indicating that such equipment may be used throughout the duration of authorization,

g) An application for modification for Firms which want to change their authorization certificate by updating their preferences under their existing authorization certificate.

(5) Authorization certificate shall be issued for the Firms that completely submit the documents listed in paragraph 3 and satisfy the requirements under such documents, upon concluding an authorization agreement and the approval of Directorate General. The authorization certificate shall be prepared according to the format specified in the communiqué to be published by the Directorate General in the Official Gazette.

(6) The applications of Firms shall be evaluated by an evaluation commission established by the Directorate General or authorized agencies. The result of evaluation shall be notified to the applicant within thirty calendar days following application date, at the latest. Authorized agencies shall also notify the Directorate General of the evaluation results.

(7) The firms that have received authorization certificate shall, by the end of January every year, submit an activity report prepared according to the format specified in the communiqué to be published by the Directorate General in the Official Gazette, to its authorizing agency. Any nonconformity detected in the activity report through on-site examinations shall be corrected by

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the firm within fifteen calendar days. For the correction of any nonconformity observed in activities such as lack of certified staff and training facilities, lack of equipment required to be used in energy studies and calibration problems in the equipment used, the related firm shall be given a period which shall not be longer than six months, and the authorization certificate shall be suspended during this period. The authorization certificate of a firm whose certificate has been suspended for minimum two times in a period of three years shall be cancelled. The following principles and procedures shall be followed in re-activating suspended authorization certificates:

a) The related firm shall notify the Directorate General or authorized agency from which it has received its authorization certificate, the deficiencies leading to the suspension of the certificate and the documents proving that these deficiencies have been eliminated, together with an application letter. The documents submitted to the authorized agencies shall be sent to the Directorate General within ten calendar days for information.

b) The Directorate General or authorized agency which has issued the authorization certificate for the firm shall evaluate these documents together with on-site examinations, and shall re-activate the authorization certificate of the firm that has eliminated the deficiencies, within thirty calendar days following the receipt of application letter. In case the documents submitted are found to be unsatisfactory, authorization certificate of the firm shall be cancelled.

c) The provisions in this paragraph, other provisions relating to cancellation of authorization and the provisions relating to settlement of disputes shall be included in the authorization agreement signed between the firm and the Directorate General or authorized agency.

(8) The firms which fail to prove, in the presence of its client and authorizing agency representatives, the energy saving amount guaranteed under the implementation agreement through pre-implementation and post-implementation measurements, shall be made public by the Directorate General or authorized agency that has issued the authorization certificate via internet. The authorization certificate of a firm which has failed to fulfill commitments under maximum three implementation agreements shall be cancelled for a period of one year.

(9) The firms whose authorization certificates have been issued, modified, suspended, re-activated or cancelled by authorized agencies shall be notified to the Directorate General by the related authorized agency within five working days following the completion of these procedures. The Directorate General shall post such data on its website within five working days following the notification of such information.

(10) The saving amounts proven through measurements by firms within the framework of their implementation agreements shall be posted on the internet by the authorizing Directorate General or authorized agency.

(11) The calibration certificates received from accredited national or international institutions for the calibration status of the equipment used by firms in their studies shall be submitted together with annual activity reports.

(12) Other facts detected in the monitoring and inspection of firms by authorized agencies, which constitute a violation of the provisions of this Regulation, shall be notified to the Directorate General by the related authorized agency within thirty calendar days at the latest.

(12) In the studies conducted by firms at industrial enterprises and buildings, equipment calibrated and labeled by accredited national and international institutions shall be used.

### **Authorization certificate and energy manager certificate fees**

**ARTICLE 7-** (1) The authorization certificate and energy manager certificate fees and the portion of certificate fees that will be paid to authorized agencies determined by the Board in January every year shall be published in the Official Gazette. In order to obtain these certificates,

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firms shall pay the Board-determined portion of the energy manager certificate fee and authorization certificate fee to the Directorate General or authorized agency with which they have signed the authorization agreement.

### **SECTION THREE**

#### **Energy Management, Energy Manager and Energy Management Unit, Efficiency Increasing Measures, Energy Study and Efficiency Increasing Project**

##### **Energy Management**

**ARTICLE 8-** (1) Under energy management, energy managers or energy management units shall perform the following activities:

a) determine and promote the measures and procedures relating to the improvement of consumption habits and prevention of extravagance, and organize training programs as necessary.

b) Determine and coordinate the implementation of possible modifications on energy consuming systems, processes or equipment.

c) conduct market researches regarding the preparation and implementation of energy studies and EIPs, prepare agreements and control implementation.

ç) monitor the efficiency of energy consuming equipment, coordinate the timely performance of their maintenance and calibration.

d) prepare and submit to senior management the plans, budget needs, benefit and cost analyses of energy needs and efficiency increasing practices.

e) monitor and evaluate energy consumption and costs, produce periodic reports.

f) take initiatives for the procurement and installation of meters and measurement equipment needed for monitoring energy consumption.

ğ) monitor specific energy consumption, relationship between goods production and energy consumption, energy costs, and energy intensity of enterprise at industrial enterprises; prepare recommendations for improving them.

g) explore the possibilities for changing energy composition and using alternative fuels; prepare measures for protecting environment, reducing emissions and not exceeding threshold values; coordinate their implementation.

ı) prepare alternative plans to reduce the use of petroleum and natural gas if requested by the Directorate General, to be implemented in case of energy supply interruption.

h) prepare the information required to be submitted to Directorate General by the end of every March pursuant to the Law, and submit it to the management for submission to the Directorate General.

##### **Commissioning of energy manager and establishment of energy management unit**

**ARTICLE 9-** (1) Industrial enterprises with annual total energy consumption of 1,000 TEP and more shall appoint an energy manager from amongst their employees.

(2) The managements of commercial buildings, service buildings and government buildings with total construction area of minimum 20,000 square meters or with total annual energy consumption of 500 TEP, or the owners of buildings in the absence of managements, shall commission an energy manager or shall receive energy manager service via Firms.

(3) In organized industrial zones, energy management unit shall be established under the responsibility of energy manager, to serve the industrial facilities in the zone with total annual energy consumption of less than 1,000 TEP. In these units, at least one mechanical and one electrical or electrical-electronic engineer shall be employed apart from the energy manager.

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(4) At non-public industrial facilities with total annual energy consumption of 50,000 TEP and more, energy management unit shall be established under the responsibility of energy manager. In these units, at least one mechanical and one electrical or electrical-electronic engineer shall be employed apart from the energy manager. Industrial enterprises which have, in their organizational structure, quality management units responsible for total quality studies and involving energy manager, may appoint these units as energy management unit.

(5) Industrial enterprises, managements of organized industrial zones owners or managers of buildings shall commission energy managers in accordance with the following procedures, and shall notify the names, curriculum vitae, addresses and contact information of the energy managers they have commissioned to the Directorate General;

a) by 2 May 2009, for those already existing as of the effectiveness date of the Law,

b) within ninety calendar days following the receipt of building usage permit, for the buildings with building usage permit received after 2 May 2009 and with total construction area of more than 20,000 square meters,

c) within ninety calendar days buildings, industrial enterprises or organized industrial zones included in the scope within the framework of calculations made pursuant to provisions of paragraph 8 and with building usage permit received, and activated or installed after 2 May 2009,

d) changes of energy managers shall be notified to the Directorate General within thirty calendar days.

(6) With regard to the commissioning of energy manager and the fulfillment of activities specified in Article 8, necessary facilitation shall be ensured for the on-site examinations and inspection by the Directorate general.

(7) Priority shall be given to mechanical, electric or electric-electronic engineers in the commissioning of energy managers in industrial enterprises, organized industrial zones and buildings. In case it is not possible to commission persons from these professions, the persons with engineering degree may be commissioned as energy manager at industrial enterprises and organized industrial zones; and persons with engineering, architecture or technical education degree or post-graduate degree on energy or energy technologies may be commissioned as energy manager at buildings. Building owners or managements may procure service from energy managers with degree in mechanical, electric or electric-electronic engineering.

(8) In the commissioning of energy manager and establishment of energy management units, the average of total annual energy consumption values in the last three years shall be taken as a basis. In the calculation of annual average total energy consumption, the amounts of any fuel and electricity energy shall be converted to TEP using the coefficients defined in Annex-2 of this Regulation.

### **Energy Efficiency Increasing Measures**

**ARTICLE 10-** (1) The following measures shall be taken into consideration with priority in the fulfillment of the duties of energy managers under this Regulation, in energy studies and EIPs:

a) efficiently burning fuels in burning systems through burning control and optimization,  
b) obtaining highest efficiency in heating, cooling, air-conditioning and heat transfer,  
c) making heat isolation according to standards on hot and cold surfaces; isolating all heat producing, distributing and using units in order to minimize undesired heat losses or gains,

ç) waste heat recovery,

d) increasing efficiency in converting heat to operation,

e) preventing losses in electricity generation,

f) increasing efficiency in converting electric energy to heat or mechanical energy,

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- ğ) minimizing human factor by applying automatic control practices,
- g) being careful in the selection of inputs that will ensure uninterrupted energy supply,
- ı) selecting machines from amongst technologies with high energy efficiency, by paying attention to the requirements of standardization and quality assurance system,
- h) developing designs such that undesired heat losses or gains will be minimized, and ensuring that application is realized according to designs,
- ı) procuring and installing measurement equipment relating to energy efficiency at the construction and assembly stages,
- j) analyzing renewable energy, heat pump and cogeneration practices,
- k) using highly-efficient fittings and lamps, electronic ballasts and enlightenment control system for enlightenment purposes, and benefiting more from daylight,
- l) satisfying the minimum efficiency criteria defined under the applicable legislation, for energy consuming or converting equipment.

## **SECTION FOUR**

### **Training and Certification**

#### **Energy manager trainings**

**ARTICLE 11-** (1) Energy manager certificate shall be given to the real persons who participate and succeed in the energy manager training programs organized by the Directorate General, authorized agencies or firms, who have a professional experience of minimum two years and who bear the qualifications specified in the seventh paragraph of Article 9. In the certification of energy managers who will work industrial enterprises outside the public sector; the condition to have been registered in professional chambers shall be required. The energy manager certificates issued by authorized agencies and firms shall be notified to the Directorate General within fifteen days following the date of issue. Energy manager certificates shall be prepared according to the format provided in the communiqué published by the Directorate General in the Official Gazette, separately for industrial enterprises and buildings.

(2) In energy manager training programs, the curricula defined in Annex-1 of this Regulation, as categorized according to buildings and industrial sectors and consisting of theoretical and/or applied courses, shall be applied.

(3) The Directorate General shall issue energy manager certificates to persons who participate in the energy manager training programs organized by Turkish Armed Forces, Ministry of National Defense and affiliated institutions, and National Intelligence Organization in cooperation with the Directorate General according to the provisions of this Regulation, and who have graduated from degree programs at minimum.

#### **Consultancy trainings**

**ARTICLE 12-** (1) Consultancy certificate shall be issued to persons who have participated and succeeded in the consultancy training programs organized by the Directorate General or authorized agencies, who have minimum two years of professional experience and who have graduated from degree programs in engineering, architecture or technical education faculties or have post-graduate degree in the field of energy or energy technologies. The consultancy certificates issued by authorized agencies shall be notified to the Directorate General within fifteen days following the date of issue. Consultancy certificates shall be prepared

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according to the format provided in the communiqué published by the Directorate General in the Official Gazette, in the categories specified in the second paragraph of Article 6.

(2) In consultancy training programs, the curricula defined in Annex-1 of this Regulation and consisting of theoretical and/or applied courses, shall be applied.

(3) For real persons other than those working in the public sector to obtain consultancy certificate, they are required to have been registered with related professional chambers.

### **Monitoring and supervision of training programs**

**ARTICLE 13-** (1) The Directorate General, authorized agencies and firms shall enter the information regarding the training programs they plan or execute, to the energy efficiency portal of the Directorate General.

(2) The Directorate General shall monitor on-site the training programs executed by the authorized agencies and the firms authorized thereby, and the authorized agencies shall monitor the training programs executed by the authorized firms. The measures for eliminating the deficiencies shall be notified to the related authorized agency or firm in writing. The implementation status of these measures shall be controlled by the Directorate General and/or related authorized agency.

### **Course and trainer fees**

**ARTICLE 14-** (1) The base and ceiling fess to be received from the participants of training programs to be organized in the following year, including Value Added Tax, shall be determined by the Board in December every year and shall be made public on the website of the Directorate General.

(2) The lecturing fees specified in Law No. 3803 dated 21 May 1992 amending Article 176 of Civil Servants Law No. 657 shall be paid to the Directorate General staff who are appointed as trainer in training programs. The lecturing fees as well as travel and accommodation expenses of the trainers coming outside the Directorate General shall be paid within the framework of the applicable legislation.

## **SECTION FIVE**

### **Subsidizing Efficiency Increasing Projects**

#### **General principles**

**ARTICLE 15-** (1) The EIPs prepared by industrial enterprises or by firms on behalf of industrial enterprises shall be subsidized according to the following principles:

a) The implementation projects which are submitted to the Directorate General by industrial enterprises and are approved by the Directorate general and Then by the Board, which have a recovery period of maximum five years and which have a project cost of maximum 500,000 Turkish Lira shall be subsidized by 20 percent of project cost.

b) The legal entities whose EIPs are subsidized shall implement these projects in their enterprises within two years. Any implementation project exceeding this period or executed differently from the project design shall not be subsidized. The implementation reports containing pre-implementation and post-implementation data and videos shall be sent to the Directorate General. Implementation results shall be controlled on site by the Directorate General.

#### **Application and evaluation**

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**ARTICLE 16-** (1) The industrial enterprises which want their EIPs to be subsidized shall submit their projects prepared according to the principles specified in Annex-3 of this Regulation together with the study report prepared according to the same principles, to the Directorate General in February or July every year.

(2) In any given year, an industrial enterprises may apply only once for benefiting from subsidy, with maximum two EIPs. The industrial enterprises whose EIPs are approved by the Board for subsidy, cannot apply for the subsidization of a new EIP until the approval of the implementation report for their previous EIPs.

(3) EIPs shall be evaluated as follows:

a) The EIPs with recovery period of maximum 5 years and project cost of maximum 500,000 Turkish Liras shall be evaluated by the Directorate General.

b) By the end of February every year, the Directorate General shall establish an evaluation commission consisting of five staff members from the Directorate General under the related branch director, in order to evaluate the projects under applications to be filed in that year.

c) The evaluation commission shall;

1) first request the applicant industrial enterprise to eliminate any deficiency or inadequacy determined in the project file,

2) check the saving potential, recovery methods, implementation costs and recovery periods under the project by conducting market researches,

3) notify to the applicant industrial enterprise the suggestions that may ensure greater saving and/or reduce project cost in the implementation of project,

(4) The applicant industrial enterprise shall provide the necessary facilitation for the on-site examinations of evaluation commission, and if it accepts the improvement recommendations of the evaluation commission, shall submit the final project file to the Directorate General for the second time.

(5) Evaluation reports shall be prepared according to the format determined by the Directorate General. The projects which are approved for subsidization within the framework of this report shall be submitted to the Board for approval, in the meetings held in June or December every year. The projects approved by the Board shall be made public on the website of Directorate General and/or on the energy efficiency portal.

### **Subsidization**

**ARTICLE 17-** (1) EIPs shall be subsidized as follows:

a) Any payment for the subsidization of implementation projects shall be made following the Directorate General's approval for the implementation reports submitted to the Directorate General by the industrial enterprise, as a result of on-site examinations and controls.

b) The EIPs with long recovery period and which can be implemented in one year at maximum shall be subsidized with priority.

c) The legal entities whose EIPs are subsidized shall implement these projects in their enterprises within two years. Any implementation which exceeds this period or carried out differently from the project design shall not be subsidized. The project components which lead to less energy saving or higher cost as compared with the project design shall be regarded as practices different from project design and the project cost pertaining to that component shall not be subsidized.

ç) The amount of subsidy to be provided for projects approved by the Board shall be determined according to the following formula. In the application of this formula, the recovery periods exceeding six months shall be taken as one year.

$$D = (M/500,000)^{0.1} \times (S/5)^{0.5} \times (M-F) \times 0.2$$

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where,

D: Subsidy amount (Turkish Lira)

M: Implementation cost of project (Turkish Lira)

F: Cost of project component executed differently from the project design (Turkish Lira)

S: Recovery period (years)

d) The implementation reports prepared according to the format specified by the Directorate General and containing pre-implementation and post-implementation data and videos shall be sent to the Directorate General.

e) The Directorate General shall conclude subsidy agreement with the owners of projects approved by the Board, according to the format specified by the Directorate General. Under this agreement;

1) the payment plan of the subsidy shall be determined by the Directorate General according to the fund allocation status of the Directorate General, and no interest shall accrue for any delay.

2) the legal entity with subsidized project cannot claim any right from the Directorate General regarding the implementation performance of this project.

## **SECTION SIX**

### **Voluntary Agreements**

#### **Application and agreement**

**ARTICLE 18-** (1) The legal entities which want to sign voluntary agreements with the Directorate General by committing to reduce energy density of any of its industrial enterprise by 10 percent on average in three years shall apply to the Directorate General by the end of June every year, by filling in an application form with format specified by the Directorate General.

(2) In the calculation of rate of decrease in energy density, the arithmetic mean of the differences that occur each year as compared with the energy density value in the year of agreement shall be taken as a basis.

(3) Voluntary agreement applications shall be evaluated as follows:

a) By the end of February every year, the Directorate General shall establish an evaluation commission consisting of five staff members from the Directorate General under the related branch director, in order to evaluate the projects under applications to be filed in that year.

b) The legal entities applying to the Directorate General shall eliminate the deficiencies and inadequacies detected by the evaluation commission in the application form and documents required to be annexed thereto, and shall provide the necessary facilitation for the on-site examinations of the commission.

c) The applications filed by legal entities which have fulfilled their commitments under the voluntary agreement concluded with the Directorate General but have increased their energy densities in subsequent years shall not be evaluated.

ç) Except for the force majeure conditions, the applications of legal entities which have failed to fulfill their commitments under voluntary agreements with the Directorate General shall not be evaluated for five years.

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### **Signing of voluntary agreements**

**ARTICLE 19-** (1) The voluntary agreements concluded between the Directorate General and industrial enterprises shall be prepared according to the following format specified by the Directorate General, according to the following principles:

a) Energy density shall be calculated as follows:

$$\text{Energy density} = E / D$$

where;

$$E = E_t - E_d - E_{yk}$$

$E_t$ : the enterprise's annual total energy consumption, in TEP terms,

$E_d$ : the enterprise's energy consumption in general management and support services, in TEP terms,

$E_{yk}$ : the energy generated within the year under sub-paragraph (ç), in TEP terms,

$$D = (1/\ddot{U}FE) \times \sum (P_i \times F_i)$$

$D$ : economic value of annual goods production, in 2000 prices and in thousand (1,000) Turkish Lira terms,

$\ddot{U}FE$ : producer prices index of the related sector,

$P_i$ : amount of goods produced in the year,

$F_i$ : market prices of the goods produced in the year, in 2000 prices and in thousand (1,000) Turkish Lira terms.

b) In signing voluntary agreements, the industrial enterprises with high average energy density in the last 5 years shall be given priority.

c) The voluntary agreement shall be signed by the Directorate General and authorized representative of the related industrial enterprise following Board approval, and shall take effect in January of the following year.

ç) Of the energy generated by the legal entities with voluntary agreement in their industrial enterprises; the energy generated at facilities converting wastes to heat and electric energy through modern combustion techniques, the energy generated at cogeneration facilities manufactured in the country with total cycle efficiency of 80 percent and more or the energy generated from hydro, wind, geothermal, solar or biomass resources shall be deducted from the industrial enterprise's annual total energy consumption in the calculation of energy density, on the condition that such facilities are commissioned during the term of agreement and that such deduction will be applied only once.

d) The real persons or legal entities who are party to a voluntary agreement shall provide the Directorate General with the information needed for the monitoring of energy density at the subject industrial enterprise by the Directorate General. The Directorate General and officials acting on behalf of the Directorate General shall preserve the confidentiality of such information. The persons who are obliged to preserve the confidentiality of such information cannot use such information in their own interest or in others' interest, even if they have ceased working.

(2) Force majeure conditions:

a) For an event to be considered as force majeure, it must be unavoidable or unpreventable although the affected party has paid due care and attention and taken all necessary measures, and this event must prevent the affected party from fulfilling his obligations. The following cases shall be considered as force majeure condition:

1) natural disasters and epidemics,

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2) warfare, nuclear and chemical fallout, mobilization order, public riot, attacks, terrorist acts and sabotage,

3) strike, lock-out or other labor movements,

4) general economic crisis,

5) other force majeure conditions specified in voluntary agreements.

b) In case the force majeure condition notified by the industrial enterprise party to the agreement and accepted by the Directorate General lasts shorter than three months in a calendar year, the duration of voluntary agreement may be extended by maximum one year through Board decision. In case the force majeure condition lasts longer than three months, the voluntary agreement shall be terminated.

### **Subsidization**

**ARTICLE 20-** (1) Twenty percent of the energy expenditures of the related industrial enterprise of the real person or legal entity that has signed a voluntary agreement with the Directorate General and fulfilled his commitment, in the year in which the agreement is signed, shall be subsidized by the Directorate General, taking into consideration the fund allocation status of the Directorate General and as limited to maximum 100,000 Turkish Liras.

(2) In effecting the payment, the invoices and payment documents relating to the year in which the agreement is signed, and audited by certified accountant, shall be taken as a basis.

(3) The payment plan of the subsidy to be provided shall be determined by the Directorate General taking into consideration the fund allocation status of the Directorate General, and the payment plan shall be incorporated into the agreement. No interest payment or right shall be claimed for any delay in payment.

## **SECTION SEVEN**

### **Demand Side Management**

#### **Monitoring of the sales of energy-efficient electrical home appliances and heating systems**

**ARTICLE 21-** (1) The manufacturers and importers of electrical home appliances and boilers used for heating buildings shall notify to the Directorate General, in January every year, the amount of products they sold in the country, on the basis of energy label categories.

#### **Reducing demand for electric energy and power**

**ARTICLE 22-** (1) Legal entities with electricity retail sale license shall exert the following efforts to reduce the electric energy and power demands of their subscribers:

a) concluding voluntary agreements with industrial and commercial subscriber categories with high consumption values, so that they participate in the interrupted energy programs and to shift their loads to other time periods from time to time,

b) organize campaigns for promoting the use highly energy-efficient electrical home appliances and tools present in the market, primarily including air-conditioners, refrigerators, lamps and bulbs, in cooperation with manufacturing companies or their associations or unions.

#### **Outdoor area enlightening**

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**ARTICLE 23-** (1) Legal entities with electricity retail sale license and municipalities shall undertake the following practices:

a) For road enlightenment purposes; the lower limits set out in the fittings and lamps specifications issued by Turkish Electricity Distribution Corporation (TEDAS) relating to enlightenment voltage shall be applied. The conformity of road enlightenment designs of roads other than the city entry and exit roads and motorways within the authorization area of Highways Directorate General to these specifications shall be inspected by TEDAS or related electricity distribution company.

b) High-pressure sodium vapor lamps shall be used for road enlightenment, and electronic ballast fluorescent lamps shall be used for street, park and garden enlightenment.

#### **Use of cogeneration, heat pump and solar energy systems in mass housing projects**

**ARTICLE 24-** (1) The Mass Housing Administration shall primarily analyze the possibilities of using cogeneration and heat pump systems and solar energy in mass housing projects. The applications not exceeding ten percent of house cost shall be carried out.

#### **Awareness raising activities**

**ARTICLE 25-** (1) Public agencies and institutions shall organize promotion and awareness raising activities to contribute to the development of energy culture and awareness in the society, in coordination with the Directorate General, or shall provide in-kind and/or cash contribution to the activities organized by the Directorate General.

(2) Legal entities selling electricity and/or natural gas under their licenses shall post on their website the information regarding the consumption values of their subscribers in the pervious year and the consumption cost corresponding to these values, in comparison with the average values of the same consumer categories.

(3) The Ministry of National Defense, Ministry of National Education and related public agencies and institutions shall make the necessary arrangements to provide theoretical and practical information on basic concepts regarding energy and energy efficiency, general energy status of Turkey, energy resources, energy generation techniques, efficient use of energy in daily life, and importance of energy efficiency in climate change and environmental protection, in the course and education programs of military schools and soldier training centers, in the teaching programs of formal and extensive education institutions and in-service training programs of public agencies and institutions.

### **SECTION EIGHT**

#### **Practices for Increasing Energy Efficiency in the Generation, Transmission and Distribution of Electric Energy**

##### **Energy management at electricity generation facilities**

**ARTICLE 26-** (1) Energy manager shall be commissioned at electricity generation facilities with installed power capacity of 100 MW and more.

(2) Legal entities with generation license shall, by the end of March every year, send the information in the format specified by the Directorate General, including primary energy consumption, electricity generation, system cycle efficiency at minimum, to the Directorate General.

##### **Increasing energy efficiency in the transmission and distribution of electricity**

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**ARTICLE 27-** (1) Necessary measures shall be taken to reduce the technical losses on the transmission system to three percent, and the technical losses on the distribution system to eight percent.

(2) The existing values in the regulations in effect shall be ensured in terms of the efficiency criteria of transmission system and for parameters that affect the power quality such as voltage, frequency, harmonic, flicker strength, reactive and active power rates (CosØ), outage, N-1, etc.

#### **Using efficiency increasing criteria and waste heat of thermal power plants**

**ARTICLE 28-** (1) For inclusion in the minimum conditions to be required for licensing fossil fuel-fired electricity generation facilities, the net cycle efficiency values found by taking as a basis the minimum calorific value of fuel under full-load operation conditions of the power plant shall be published by the Ministry in January every year, according to types of power plants.

(2) Studies shall be conducted for using the waste heat of thermal power plants primarily at buildings for heating and cooling purposes as well as in industrial, agricultural, water products, cold air warehouse and fresh water production sectors. The projects with recovery period of maximum 10 years shall be carried out through municipality and private sector cooperation.

(3) In opening mass housing areas to settlement, Municipalities and Mass Housing Administration shall give priority to “regions where central and local heating and cooling is possible through thermal power plant waste heat” and shall plan the heat distribution infrastructure.

#### **Cogeneration applications**

**ARTICLE 29-** (1) In applications covered by sub-paragraph (b-3) of the first paragraph of Article 8 of the Law, sub-paragraph (a) of the first paragraph of Article 9 of the Law and Article 3 of Law No. 4628, the total cycle efficiency calculated according to the minimum calorific value of the fuel used by cogeneration facilities shall be required to be 85 percent at minimum.

#### **Other provisions**

**ARTICLE 30-** (1) Materials conforming to national and international standards shall be used in the generation, transmission and distribution of electricity.

(2) Measures shall be taken for preserving the quality of lignite at lignite-fired thermal power plants.

(3) Efficient combustion techniques and large installed power capacities shall be used with priority at coal-fired thermal power plants.

(4) In order to reduce internal consumption at thermal power plants, automation and protective maintenance practices as well as system rehabilitations for reducing faults and installing spare part and stock control system shall be carried out in a timely manner.

(5) Provisions relating to efficiency increasing measures and reduction of technical losses shall be included in the specifications for the privatization of electricity generation, transmission and distribution facilities.

### **SECTION NINE**

#### **Obligation to Provide Information, Administrative Sanctions and Other Provisions**

##### **Obligation to Provide Information**

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**ARTICLE 31-** (1) Industrial enterprises, building owners and/or managements obliged to employ energy manager and public agencies and institutions shall, by the end of March every year, send the information relating to energy consumption as specified on the website of Directorate General and in the format determined by the Directorate General, to the Directorate General in writing, and shall enter them to the energy efficiency portal via the internet, so that they can be recorded to the Directorate General's database. Industrial enterprisers shall provide the necessary facilitation for the on-site examinations by the Directorate General.

(2) The Ministry of Industry and Trade shall provide information support in the monitoring of the consumption information of all industrial enterprises by the Ministry. Governorates and municipalities shall provide information support in the compilation of total construction area and energy consumption data of the buildings with total construction area of more than 20,000 square meters and with building usage permit issued.

(3) The enterprises with energy consumption above 1,000 TEP according to the calculations made within the framework of the principles and procedures defined in paragraph 8 of Article 9 of this Regulation shall act according to the provisions of first paragraph.

#### **Administrative sanctions**

**ARTICLE 32-** (1) As a result of the examinations and/or inspections carried by the Directorate General, the administrative sanctions provided in the Law shall be imposed on real persons and legal entities.

#### **Other provisions**

**ARTICLE 33-** (1) The values re-determined by the Ministry under Article 11 of the Law shall be published in the official Gazette.

(2) The principles required to be published in the official Gazette by the Directorate General under this Regulation shall be published within sixty calendar days following the effectiveness date of this Regulation. Directorate General may publish in the official Gazette other regulations which it may deem necessary in respect of implementation.

#### **Exemptions**

**ARTICLE 34-** (1) The schools attached to the Ministry of National Education shall be exempt from the practices under Article 9 of this Law.

#### **Authorization duty of Directorate General**

**PROVISIONAL ARTICLE 1-** (1) The activity of Directorate General to authorize firms under Article 6 of this Regulation shall expire if the number of authorized agencies exceeds ten as 2 May 2008. Otherwise, the activity of Directorate General to authorize firms shall continue until the number of authorized agencies reaches ten.

#### **Authorization certificates, energy manager certificates and other provisions**

**PROVISIONAL ARTICLE 2-** (1) The authorization certificates already issued by the Directorate General for consultancy and training shall be valid until their durations expire.

(2) The following practices shall be enforced with regard to energy manager and consultancy certificates:

a) Energy manager certificate shall be issued, for free of charge, to those persons who apply to the Directorate General before 2 May 2008 to renew their energy manager certificates issued prior to the effectiveness date of the Law.

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b) Energy manager and/or consultancy certificate may be issued by the Directorate General within one year following the effectiveness date of this Regulation, to the persons who bear the following qualifications:

1) Energy manager and/or consultancy certificate shall be issued to the technical staff who has taken part in the energy efficiency training and/or study activities executed by the Directorate General or agencies and institutions which have been granted authorization certificate to execute energy manager training and/or study activities prior to the effectiveness date of this Regulation, and who have completed a degree program at minimum.

2) Energy manager certificate shall be issued to the persons who have participated and succeeded in energy manager trainings organized towards industrial and building sectors prior to the effectiveness date of this Regulation, and who have completed a degree program at minimum.

3) The energy manager certificate of those persons who have been granted energy manager certificate or participated and succeeded in energy manager trainings prior to the effectiveness date of this Regulation and who have minimum five-year experience in the sector, shall have the status of consultancy certificate in the authorization of firms for a period of one year from the effectiveness date of this Regulation. However, for the renewal of authorization certificate of firm at the end of third year, the documents defined in the fourth paragraph of Article 6 shall be required.

**PROVISIONAL ARTICLE 3-** (1) For the term “Turkish Lira” used in this Regulation, the term “New Turkish Lira” shall be used as long as the letter is defined as the currency in circulation in the country pursuant to the provisions of Law No. 5083 dated 28 January 2004 on the Currency of the Republic of Turkey.

#### **Annulled legislation**

**ARTICLE 35-** (1) Through the effectiveness of this Regulation, the “Regulation on Measures to be Taken by Industrial Facilities for Increasing Efficiency in Energy Consumption”, which was published in the Official Gazette No. 22460 dated 11 November 1995; Announcement on Issuance of Authorization Certificate for Energy Saving Studies”, which was published in the Official Gazette No. 23396 dated 8 July 1998; and the “Announcement on Energy Management Course to be Launched to Train Energy Managers”, which was published in the Official Gazette No. 22743 dated 31 August 1996 have been annulled.

#### **Effectiveness**

**ARTICLE 36-** (1) This Regulation prepared in consultation with the Ministry of Finance and Supreme Court of Public Accounts shall take effect as of its publication date.

#### **Enforcement**

**ARTICLE 37-** (1) This Regulation shall be enforced by the Minister of Energy and Natural Resources.

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**Annex-1**  
**ENERGY MANAGER AND CONSULTANCY TRAININGS**

**1. Competences expected from the persons receiving energy manager certificate**

The trainings shall be intended to equip the persons to receive energy manager certificate with the following competences:

- a) ability to think analytically and to produce solutions rapidly,
- b) be open to innovations and acquire the habit of following up the developments,
- c) be self-confident and determined; ability to express oneself and convince counterparts,
- ç) have knowledge of primary energy resources in the world and in Turkey, secondary energy types and supply-demand relations,
- d) ability to distinguish between energy saving and energy efficiency,
- e) know about the energy saving potential and how it can be forecast,
- f) know about the energy density and specific energy consumption concepts across the country, in industrial sectors and at industrial enterprises, the calculation methodologies and trends,
- g) know the way how energy management activities will be performed and reported,
- ğ) have knowledge about the technical specifications and maintenance and operation procedures of the energy-consuming equipment and tools in the enterprise; know how energy losses and inefficiencies may occur with such equipment, how these losses and inefficiencies can be prevented and measured, and how measurement results will be interpreted,
- h) know about the losses that may occur in buildings and heat-generating, storing and transporting systems, their measurement methods and isolation methods,
- ı) know about the good habits that can ensure energy saving at buildings and enterprises, through simple measures,
- i) know about the efficient production processes relating to his enterprise, the efficient energy-consuming products in the market, and their technical and economic characteristics,
- j) ability to conduct feasibility studies for measures that require significant expenditure, which can ensure energy saving in buildings and increase efficiency in enterprises,
- k) have extensive knowledge on energy study and efficiency-increasing project preparation methodologies.

**2. Competences expected from persons receiving consultancy certificate**

The trainings shall be intended to equip the persons to receive consultancy certificate with knowledge on energy study and EIP preparation methodologies, in addition to the competences of energy managers.

**3. Curriculum and duration**

The minimum curriculum and durations provided in Table-1 in Annex-1 shall be applied for the energy manager and consultancy trainings towards industrial enterprises and buildings.

**4. Training methodology**

**4.1. Energy manager training**

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In training programs, minimum two different course programs shall be prepared, whereby heat-mechanics or electricity subjects will be focused, from the curriculum provided in Table-1 in Annex-1. Trainees shall attend the program they prefer.

The curriculum included in the coverage of training programs shall be applied as theoretical teaching followed by practical training. Classroom lectures or remote-training courses may be applied for theoretical teaching. Practical training shall be applied in laboratory.

#### **4.2 Consultancy training**

Persons holding energy manager certificate may attend consultancy training. For implementing the training curriculum, classroom lectures or web-based remote training courses may be applied.

The trainees who succeed in the examination shall conduct energy study or EIP study at an enterprise or building within maximum three months following the completion of training. The report prepared regarding this work shall be submitted to the Directorate General or authorized agency which has executed the training, for evaluation.

#### **4.3 Examinations**

Examinations shall be held in classrooms and shall include questions which can measure the targeted competences as listed in Article 1 and 2 of this Annex-1. For the purposes of examination, an examination commission consisting of three persons from the trainers working in the training programs shall be established to prepare questions, hold exams, evaluate answer sheets, and notifying the results to the trainees. The exam results shall be recorded on a minute by the exam commission, and shall be notified to the trainees within seven calendar days following the date of exam.

The trainees who receive minimum 70 percentile points shall be entitled for energy manager certificate.

Persons entitled for energy manager certificate may attend the consultancy training. The trainees who receive 70 percentile point in the exam to be held at the end of consultancy training shall be deemed successful, and such persons shall conduct energy study and EIP study. Energy managers may perform energy study and EIP study if they succeed in the consultancy exams, without attending consultancy training. The trainees who get minimum 70 percentile points in the energy manager and consultancy exams, and energy study and EIP exercises, shall be entitled for consultancy certificate.

Written objections to exam result and evaluation of energy study and EIP report, shall be reviewed by the same commission and the result of such review shall be notified to the related trainee within five days.

### **5. Classroom lectures**

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Classroom lectures shall be performed in classroom with maximum capacity of 30 people, and equipped with computer supported projection system, board, trainer desk, document cabinets, with standard comfort temperature and enlightening.

The building in which the training is executed shall also include management rooms, trainer rooms, library, computer room for internet researches, resting spaces and minimum social facilities.

## **6. Laboratory**

The laboratories in which applied training is performed shall at minimum include the equipment, tools and instruments which can perform operation/application, maintenance, measurement and analysis relating to burners and boilers of combustion systems, steam systems/traps, pump and compressor systems, industrial furnaces, compressed air systems, waste heat recovery systems, electric motors and variable speed driver applications, compensation applications, enlightenment systems, heating-cooling and air-conditioning systems, drying systems, building and industrial isolation applications, as well as at least one technician who can use such equipment and tools.

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**Annex-1**

**Table-1 : Curriculum and duration of energy manager and consultancy trainings**

SUBJECT / CONTENTS	ENERGY MANAGER TRAINING MINIMUM DURATIONS (HOUR)		CONSULTANCY TRAINING MINIMUM DURATIONS (HOUR)	
	INDUSTRY	BUILDING	INDUSTRY	BUILDING
<b>PERSONAL SKILLS DEVELOPMENT TRAINING</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
- Analytical thinking and fast problem-solving skills				
- Being open to innovations and habit of following up developments				
- Being self-confident and determined; being able to express oneself and convince others				
- Team work				
<b>GENERAL TRAINING</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
- Primary energy resources in the world and in Turkey, secondary energy types, and supply-demand developments				
- Sectoral energy consumption and tariffs in the world and in Turkey				
- Energy Efficiency Law and secondary legislation				
- Related agencies and institutions				
<b>ENERGY EFFICIENCY TRAINING</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
- Energy saving and energy efficiency				
- Energy saving potential, energy density and specific energy consumption – concept, calculation, trends				
- Energy efficiency increasing measures in the industry –technical and economic characteristics				
- Energy saving measures in buildings –technical and economic characteristics				
- Energy and environment /environmental legislation, energy – environment relations, effects of fuel characteristics on air quality, measures and techniques for preventing air pollution, emission calculation methodologies.				

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**Annex-1**

<b>SUBJECT / CONTENTS</b>	<b>ENERGY MANAGER TRAINING MINIMUM DURATIONS (HOUR)</b>		<b>CONSULTANCY TRAINING MINIMUM DURATIONS (HOUR)</b>	
	<b>INDUSTRY</b>	<b>BUILDING</b>	<b>INDUSTRY</b>	<b>BUILDING</b>
<b>ENERGY MANAGEMENT / GENERAL</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>
- Duties of energy manager (target setting, awareness raising, planning, monitoring, data collection and reporting)				
- Economic analysis methodologies				
- Measurement techniques and equipment				
- Standards				
- Feasibility studies				
- Energy study and efficiency increasing project preparation – I (extensive information)				
<b>ENERGY MANAGEMENT / HEAT – MECHANICS</b>	<b>50</b>	<b>40</b>	<b>50</b>	<b>40</b>
- Energy and mass equivalences (Basic concepts, Sankey diagram formulae, psychometric diagram, applied example)				
- Combustion facilities, fuels and combustion (burners, flues, boilers, efficiency calculations, fuels, improvement of calorific values of fuels, conversion of fuels to TEP value, flue gas analyses, combustion formulae, combustion control and improvement)				
- Steam systems (concepts, steam systems, condense recovery, flash steam, steam traps, losses and leakages)				
- Heat isolation (isolation materials, selection of appropriate material, isolation at industrial facilities, isolation at buildings, pipe-valve and flange isolation, formulae)				
- Industrial furnaces (furnace types, energy and/or mass balance in furnaces, operation and modernization, energy efficiency measures.)				

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**Annex-1**

<b>SUBJECT / CONTENTS</b>	<b>ENERGY MANAGER TRAINING MINIMUM DURATIONS (HOUR)</b>		<b>CONSULTANCY TRAINING MINIMUM DURATIONS (HOUR)</b>	
	<b>INDUSTRY</b>	<b>BUILDING</b>	<b>INDUSTRY</b>	<b>BUILDING</b>
-Heating, ventilation and air-conditioning (concepts, calculation and design of heating and cooling load in buildings, control systems)				
- Compressed air systems (compressors, control systems, distribution lines, compressed air quality, losses and leakages, waste heat usage)	Applied		Applied	
- Drying systems (drying concept / drying processes and application areas, psychometric calculations)				
- Use of waste heat (waste heat concept, waste heat sources, application areas of waste heat recovery equipment and systems, formulae-calculations, examples)	Applied	Applied	Applied	Applied
- Cooling	Applied	Applied	Applied	Applied
<b>ENERGY MANAGEMENT / ELECTRICITY</b>	<b>20</b>	<b>15</b>	<b>20</b>	<b>15</b>
- Electric energy – concepts and sizes (ampere, voltage, power and power factor, etc.				
- Efficiency in electric energy (generation, transmission, distribution, end user) and demand side management				
- Metering and monitoring of electric energy (electricity, scada systems, etc.)				
- Types, losses and efficiencies of power transformers				
- Reactive power, power factor and compensation practices, harmonics and filters	Applied	Applied	Applied	Applied
- Types, losses, efficiencies and common usage areas of electric motors (fan, pump, comp.)				
- Variable speed drivers, soft starters, and application areas	Applied		Applied	
- Efficient use of electric energy in enlightening (efficient fittings, control systems, etc.)	Applied	Applied	Applied	Applied

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- Combined heat-power systems (cogeneration, trigeneration), types and efficiencies				
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### Annex-1

SUBJECT / CONTENTS	ENERGY MANAGER TRAINING MINIMUM DURATIONS (HOUR)		CONSULTANCY TRAINING MINIMUM DURATIONS (HOUR)	
	INDUSTRY	BUILDING	INDUSTRY	BUILDING
- Efficient electrical home appliances and office equipment				
- Automation systems (industry and buildings)				
<b>ENERGY STUDY AND EIP PREPARATION TRAINING</b>	-	-	<b>30</b>	<b>25</b>
- Energy study (building, energy-intensive industrial sectors, heat-mechanics and electricity categories)				
- EIP preparation (building, energy-intensive industrial sectors, heat-mechanics and electricity categories)				
<b>ADDITIONAL INFORMATION ON ENERGY EFFICIENCY TRAINING</b>	-	-	<b>50</b>	<b>40</b>
- Energy efficiency				
- Energy management (general)				
- Energy management (heat-mechanics)				
- Energy management (electricity)				
<b>TOTAL (*)</b>	<b>80</b>	<b>75</b>	<b>160</b>	<b>140</b>

(\*) Total duration of training is not the sum of durations given for each subject and content given in the table, but represents the minimum total duration of training since the training programs will be prepared such that heat-mechanics and electricity subjects will be addressed with greater focus within the framework of the first paragraph of Article 4.1 of Annex-1; and since only one of the minimum durations provided in the table will be observed for one of the heat-mechanics or electricity subjects in a training program while the other subject may be addressed superficially.

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**Annex-2**

**Minimum Calorific Values of Energy Resources and Coefficients for Conversion to TEP**

<b>Quantity</b>	<b>Energy Resource</b>	<b>Density</b>	<b>Minimum Calorific Value</b>	<b>Unit</b>	<b>TEP Conversion Coefficient</b>
1 ton	Hard Coal		6,100,000	kCal	0,610
1 ton	Coke		7,200,000	kCal	0,720
1 ton	Patent Fuel		5,000,000	kCal	0,500
1 ton	Lignite Heating and Industry		3,000,000	kCal	0,300
1 ton	Lignite-Fired Power Plant		2,000,000	kCal	0,200
1 ton	Elbistan Lignite		1,100,000	kCal	0,110
1 ton	Petro-coke		7,600,000	kCal	0,760
1 ton	Olive Pomace		4,300,000	kCal	0,430
1 ton	Wood Shavings		3,000,000	kCal	0,300
1 ton	Shell		2,250,000	kCal	0,225
1 ton	Graphite		8,000,000	kCal	0,800
1 ton	Coke Powder		6,000,000	kCal	0,600
1 ton	Mine		5,500,000	kCal	0,550
1 ton	Elbistan Lignite		1,100,000	kCal	0,110
1 ton	Asphaltite		4,300,000	kCal	0,430
1 ton	Wood		3,000,000	kCal	0,300
1 ton	Animal and Plant Waste		2,300,000	kCal	0,230
1 ton	Crude Oil		10,500,000	kCal	1,050
1 ton	Fuel Oil No. 4		9,600,000	kCal	0,960
1 ton	Fuel Oil No. 5	0,920 kg/l	10,025,000	kCal	1,003
1 ton	Fuel Oil No. 6	0,940 kg/l	9,860,000	kCal	0,986
1 ton	Gas Oil	0,830 kg/l	10,200,000	kCal	1,020
1 ton	Gasoline	0,735 kg/l	10,400,000	kCal	1,040
1 ton	Paraffin Oil	0,780 kg/l	8,290,000	kCal	0,829
1 ton	Black Liqueur		3,000,000	kCal	0,300
1 ton	Naphtha		10,400,000	kCal	1,040
1000 m <sup>3</sup>	Natural Gas	0,670kg/m3	8,250,000	kCal	0,825
1 ton	Coke Gas		8,220,000	kCal	0,820
1000 m <sup>3</sup>	Coke Gas	0,490 kg/m3	4,028,000	kCal	0,403
1 ton	Blast Furnace Gas		791,000	kCal	0,080
1000 m <sup>3</sup>	Blast Furnace Gas	1,290 kg/m3	1,019,000	kCal	0,102
1000 m <sup>3</sup>	Refinery Gas		8,783,000	kCal	0,878
1000 m <sup>3</sup>	Acetylene		14,230,000	kCal	1,423
1000 m <sup>3</sup>	Propane		10,200,000	kCal	1,020
1 ton	LPG		10,900,000	kCal	1,090
1000 m <sup>3</sup>	LPG	2,477 kg/m3	27,000,000	kCal	2,700
1000 kWh	Electricity		860,000	kCal	0,086
1000 kWh	Hydraulic		860,000	kCal	0,086
1000 kWh	Geothermal		860,000	kCal	0,086

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## ENERGY STUDY AND ENERGY INCREASING PROJECT (EIP) PREPARATION PRINCIPLES

### 1. Purpose of Energy Study

Energy study is conducted in order to determine energy saving potentials, energy wastes and greenhouse gas emissions at buildings and industrial enterprises, and to set out the related recovery or preventive measures with their technical and economic dimensions.

### 2. Scope of Energy Study

The following study profiles are addressed on an annual basis under energy study:

- Input Profile: Types of energy entering the enterprise or building (natural gas, fuel oil, coal, electricity, steam/hot water, etc.), unit energy sizes (energy quantities borne by the unit weight of inputs in kWh terms or their volume), consumption quantity – time graphics.
- Waste Profile: Types (flue gas, hot gas/water, steam, etc.), formation reasons, quantity-time graphics of the recyclable energy wastes revealed by heating/cooling systems, energy cycle systems or production process.
- Loss-Leakage Profile: Energy quantities lost due to heat isolation inadequacies in buildings and equipment, steam/gas/water/fuel leakages in equipment, and non-conformities in electricity systems, and whose loss can be prevented.
- Inefficiency Profile: Energy quantities wasted due to application of energy-inefficient equipment or process and whose loss can be prevented.
- Extravagancy Profile: Energy quantities consumed in excess of needs in the areas of heating, cooling, enlightenment, office needs, etc. due to equipment in stand-by mode or running in vein.
- Emission Profile: Greenhouse gas quantities on the basis of energy types in the input profile.
- Energy Management Profile: The adequacy of energy manager/management unit in the enterprise, applied procedures, awareness level of employees, and energy management perspective of senior managers.

### 3. Energy Study Methodology

The following studies shall be conducted in the process of Energy Study:

- Preliminary Study: The study profiles in the enterprise or building will be analyzed using documents, interviews, observations and point-measurements as necessary. Prevention and/or recovery potentials will be determined, and the measures which can be taken for these potentials, the approximate costs and recovery periods will be determined. Recommendations will be developed for the elimination of inadequacies observed in the energy management profile. The activities deemed necessary to be included in the detailed study, and the activity

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program will be determined. Preliminary study will be completed in maximum fifteen days together with the preliminary study report.

- **Study Briefing:** A one-day study briefing will be given to the top management of the enterprise and the employees to be determined by the top managers. This briefing will cover the benefits, costs and general introduction of energy efficiency; model practices in the world and in Turkey; results of preliminary study; and measures that may be taken. The useful documentation will be distributed. The questions of participants will be answered. It will be stated that detailed study is needed and EIP may be prepared according to the results of detailed study, asking for the decision of top management.
- **Detailed Study:** Depending on the results of preliminary study, measurements and calculations will be made under the enterprise conditions regarding the subjects deemed appropriate for inclusion in the scope of detailed study. Prevention and/or recovery potentials will be estimated with an error probability of maximum +/- 10%. Using the results of preliminary study and detailed study, the applicable options of measures and economic characteristics will be analyzed. In this context, the most appropriate measures will be selected and the information providing guidance for further efficiency increasing projects will be set forth.
- **Reporting:** The formats of preliminary study and detailed study reports will be specified in a communiqué to be published by the Ministry in the Official Gazette.

#### **4. Efficiency Increasing Project (EIP)**

- EIP will be prepared to provide guidance for the implementation of measures for eliminating energy wastes, losses and inefficiencies at industrial enterprises and buildings, which can recover their cost in one year, at minimum.
- The EIP will cover the technical information and drawings which are capable of providing guidance for the realization of project; technical specifications and manuals of goods to be purchased under the project; information regarding supply sources; training program and operational procedures that may facilitate the enterprise's ability to make utmost use of the project outputs; maintenance/repair and spare part information; equipment warranty information; project timetable; and project cost items.
- The format of efficiency increasing project will be specified in a communiqué to be published by the Ministry in the Official Gazette.

**Table 1. The list and specifications of equipment which firms must own or have usage rights in order to be authorized**

<b>Name of Equipment</b>	<b>Purpose of Use and Specifications</b>
Flue Gas Analysis Device	For use in the measurement of flue gas components and temperature; <ul style="list-style-type: none"> <li>• portable, electronic, with automatic calibration feature,</li> <li>• have rechargeable dry type battery not requiring maintenance, or be suitable for supply from battery or city power network,</li> </ul>

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	<ul style="list-style-type: none"> <li>• with a probe of minimum 75 cm length,</li> <li>• have the specifications of minimum 5 commonly used fuels in its memory</li> <li>• print-out feature,</li> <li>• ability to measure ambient temperature</li> <li>• Ability to measure the following parameters in flue gas: <ul style="list-style-type: none"> <li>- Oxygen</li> <li>- Carbonmonoxide</li> <li>- Flue gas temperature</li> <li>- Sulphur dioxides, if requested</li> <li>- Flue aspiration</li> </ul> </li> </ul>
Flue gas Analysis Device Probe (Long Probe)	For use in places which require a probe longer than 75 cm.
Infrared Thermometer	<p>For measuring the temperatures of hard-to-access areas such as revolving furnace, etc.</p> <ul style="list-style-type: none"> <li>• Portable, electronic, battery supply feature</li> <li>• Different types for low and high temperatures</li> </ul>
Luxmeter	<p>For measuring light levels in carious areas;</p> <ul style="list-style-type: none"> <li>• Portable, electronic, battery supply feature</li> <li>• With automatic or manual scale selection feature</li> </ul>
Ultrasonic Flow Meter	<p>For externally measuring the quantity of clean fluids passing from pipelines;</p> <ul style="list-style-type: none"> <li>• portable and electronic</li> <li>• automatic start and stop at adjusted hours</li> <li>• have rechargeable dry type battery not requiring maintenance, or be suitable for supply from battery or city power network,</li> <li>• with printer</li> </ul>
Ultrasonic Flow Meter Probe	For measurements in pipelines with greater diameter
Doppler Type Flow Meter	<p>For externally measuring the quantity of dirty fluids passing from pipelines;</p> <ul style="list-style-type: none"> <li>• portable and electronic</li> </ul>
Electronic Thermometer	<p>For use in measuring temperatures by connecting thermocouples of various types;</p> <ul style="list-style-type: none"> <li>• portable, electronic, and battery supply feature,</li> <li>• with “hold” feature keeping the measured value on the display, in case of measurements in hard-to-access areas</li> </ul>
Electronic Thermometer Probe (surface thermocouple)	For use in measuring surface temperatures
Electronic Thermometer Probe-2 (ambient thermocouple)	For use in measuring ambient temperatures
Electronic Thermometer Probe-3 (long thermocouple)	For use in measuring temperatures in hard-to-access places such as boilers, large tanks, etc.
Electronic Thermometer Probe-4 (skewer type thermocouple)	For use in measuring the temperatures of particulate materials through immersion.
Electronic Relative Humidity Meter	For use in measuring ambient temperature and relative humidity in various areas;

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	<ul style="list-style-type: none"> <li>• portable, electronic, and battery supply feature</li> <li>• with feature of simultaneously displaying ambient dry thermometer temperature and relative humidity values as well as wet thermometer temperature if desired</li> </ul>
Pitote Tube Original (classical) type	<p>For use in measuring the quantities of flow in canals in which air and low-pressure gases pass;</p> <ul style="list-style-type: none"> <li>• classical type</li> <li>• with minimum length of 1.5 m.</li> </ul>
Manometer (to be used with pitote tube)	<p>For use in measuring flow quantities in canals, together with pitote tube</p> <ul style="list-style-type: none"> <li>• portable and battery supply feature</li> <li>• with analog display to ensure easy reading</li> <li>• the range of pressure values adjustable, to ensure sensitive reading.</li> </ul>
Curved manometer	<p>For use in measuring very small pressure values such as furnace inner pressure.</p>
Hot-Wire Air Speedometer	<p>For use in measuring the quantity of flow in canals from which air and low-pressure gases pass;</p> <ul style="list-style-type: none"> <li>• Portable, electronic and battery supply feature</li> <li>• With minimum 1.5 long probe</li> </ul>
Fan Type Air Speedometer	<p>For use in measuring air or gas speed or flow quantity in the suction gates of air fans and exit gates of exhaust canals</p> <ul style="list-style-type: none"> <li>• Portable, electronic, and battery supply feature</li> <li>• With probes in(measurement caps) in various diameters</li> <li>• With feature of measurement in multiple areas, and averaging</li> </ul>
Textometer Device and Probe	<p>For use in measuring fabric humidity in the textile sector</p> <ul style="list-style-type: none"> <li>• Portable, electronic, and battery supply feature</li> <li>• With probes (measurement caps) in various diameters enabling measurement in various areas (roll, plain fabric, etc.)</li> </ul>
Tachometer	<p>For use in measuring the revolution numbers of revolving equipment and progress speeds of travelator, fabric, etc.</p> <ul style="list-style-type: none"> <li>• Portable, electronic, and battery supply feature</li> <li>• Separate or combined types of contact and no-contact (optical)</li> <li>• With equipment capable of measuring revolution number, revolution speed, progress rate, and similar parameters</li> </ul>
Conductivity meter	<p>For use in measuring the conductivity and temperature of various waters;</p> <ul style="list-style-type: none"> <li>• Portable, electronic, and battery supply feature</li> <li>• Feature of measuring water temperature and ensuring temperature compensation during measurement,</li> <li>• Automatic scale selection feature</li> <li>• With conductivity and temperature measurement probe</li> </ul>

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	<ul style="list-style-type: none"> <li>• Feature of entering conductivity measurement probe adjustment coefficient</li> <li>• Feature of displaying conductivity in (<math>\mu\text{S}/\text{cm}</math>), (TDS ppm) (resistance <math>\Omega</math>) units.</li> </ul>
Thermal Camera	For determining heat losses
Sound Level Meter	<p>For use in measuring sound and noise levels in various areas;</p> <ul style="list-style-type: none"> <li>• portable, electronic and battery supply feature,</li> <li>• automatic or manually adjustable scale selection feature</li> <li>• with printer connection port to ensure continuous control</li> </ul>
Electrical Clamp Ampermeter	<p>For use in measuring electrical parameters in various areas;</p> <ul style="list-style-type: none"> <li>• portable, electronic and battery supply feature</li> <li>• with a clamp that can contain large busbars and thick cables</li> <li>• Parameters to be metered: <ul style="list-style-type: none"> <li>- Voltage (V)</li> <li>- Ampere (A)</li> <li>- Power (kW)</li> </ul> </li> </ul>
Electric Analyzer	<p>For use in measuring electrical parameters in various areas;</p> <ul style="list-style-type: none"> <li>• portable, electronic and battery supply feature</li> <li>• with feature to control connections when turned on (measurement ranges of ampere clamps, reverse connection, etc.)</li> <li>• Feature of automatic start and stop at adjusted hours</li> <li>• have rechargeable dry type battery not requiring maintenance, or be suitable for supply from battery or city power network</li> <li>• with printer and memory card saving feature to record requested parameters at specified intervals.</li> <li>• With ampere and voltage transformers for medium voltage measurements,</li> <li>• with clamps that can contain large busbars and thick cables</li> <li>• Parameters to be measured in mono and tri-phase systems: <ul style="list-style-type: none"> <li>• Voltage (V)</li> <li>• Ampere (A)</li> <li>• Power Factor (<math>\text{Cos}\phi</math>)</li> <li>• Power (kW), (kVA), (kVAr)</li> <li>• Energy consumption (kWh), (kVAh), (kVARh)</li> <li>• Frequency (Hz)</li> <li>• Harmonics</li> </ul> </li> </ul>
Steam Trap Tester	<p>For use in controlling steam traps of various sizes;</p> <ul style="list-style-type: none"> <li>• portable, electronic and battery supply feature</li> <li>• feature of measurement through contract outside steam trap</li> </ul>

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	<ul style="list-style-type: none"><li>• feature of selecting steam traps of various types</li><li>• feature of displaying measured steam trap and simple results (blocked, leaking, fit, etc.)</li><li>• featuring of storing the results of many measurements in memory</li><li>• evaluation program enabling the computerized evaluation of measurement results</li></ul>
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