

**GREEK ASSOCIATION OF RENEWABLE  
ELECTRICITY PRODUCERS**

**TASK 3 : INTEGRATION OF ALTERNATIVE  
RES SUPPORT MECHANISMS IN THE GREEK  
ELECTRICITY SECTOR**

**PROJECT ETRES (LIFE 03 ENV/GR/000219)**

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## TASK 3: INTEGRATION OF ALTERNATIVE RES SUPPORT MECHANISMS IN THE GREEK ELECTRICITY SECTOR

### 1. National RES policy, current legislative & regulatory framework of the Greek RES sector

#### 1.1 National targets and international obligations

EU Directive 2001/77/EC on electricity from renewable energy sources (RES) sets an indicative target for Greece, to cover 20.1% of its total electricity demand from renewables (including large hydro), by the year 2010. This target corresponds to about 2800-3000 MW of RES installations (over and above those of large hydro plants), that should be constructed and operated by 2010, i.e. a 6-fold increase over the country's currently installed RES capacity of about 500 MW (April 2004).

The above national target of 3000 MW of RES installations operating by 2010 is certainly ambitious but based on a realistic platform, taking into account the high RES potential of the country, especially its wind energy potential, and the high level of already expressed interest of Greek and international companies, to invest in renewables in Greece. Characteristic of this interest is the fact that in the last 3 years alone, a total of 13.000 MW of applications for RES projects have been made to the Greek Regulatory Authority for Energy, to obtain the required electricity generation license. After exhaustive technical / economic evaluation of these applications, the Regulatory Authority has already awarded electricity generation licenses to RES projects totaling about 4200 MW, 3700 MW (i.e. 87%) of which are wind parks. It is obvious from these last figures, that further RES development in Greece will be based chiefly on wind energy, which is by far the richest electricity – generating RES resource of the country.

Rapid RES development will also be the country's primary means of meeting its obligations under the Kyoto Protocol, on greenhouse gas emissions. Greece is obligated to curb the increase of its total greenhouse-gas emission levels to +25%, by 2008-2012, compared to the corresponding levels of 1990. According to Greece's

National Plan to Limit Greenhouse Gas Emissions, which was approved by the Council of Ministers in February 2002 (Act of the Council of Ministers 5/27.02.2003), RES development (mostly wind) will contribute 32% of the total national effort required to meet the Kyoto Protocol's obligation. This 32% contribution of RES amounts to a decrease of approximately 4.4 million tonnes of CO<sub>2</sub> equivalent per year, in the national greenhouse gas emissions, and requires the installation of about 2500 MW of RES, i.e. a figure very close to Greece's RES electricity target for 2010, under Directive 2001/77/EC.

## 1.2 Instruments for promoting renewable energies in Greece

### 1.2.1 Laws, Ministerial Decrees and Energy Programmes

#### 1.2.1.1. Laws

The basic law governing RES electricity is Law 2773 of 1999, on the liberalisation of the domestic electricity market, and, specifically, its Chapter 10, Articles 35-41. This law has incorporated the majority of provisions of the earlier Law 2244 of 1994, which, unlike Law 2773, was devoted entirely to RES electricity matters. At present, there is no Greek law dealing specifically with heat production from RES.

The key provisions of Law 2773/99 concerning renewables are as follows:

- i) The Transmission System Operator (TSO) is obligated to grant priority access (priority in load dispatching) to RES electricity-producing installations up to 50 MW<sub>e</sub> in power capacity (up to 10 MW<sub>e</sub> in the case of small hydroelectric units).
- ii) The TSO is obligated to enter into a 10-year contract (PPA) with the RES-electricity producer, for the purchase of his electricity. The contract always includes a renewal option.
- iii) The RES-electricity production of an independent power producer, or the surplus electricity production of a RES autoproducer, is sold to the TSO at a predetermined buy-back rate, which is fixed percentage of the corresponding consumer electricity rate.
- iv) The electricity tariffication system, applicable to the sales of RES-produced electricity to the grid, is as follows :

a. Autonomous (non-interconnected) islands

The applicable rates (below) are all independent of the actual voltage level of the grid, to which the RES power station is connected.

a.1 Autoproducer

- Energy (all kWh) : 70% of the kWh selling price of the Γ22 consumer tariff of the Public Power Corporation (this is a low-voltage, general-use tariff, billed monthly)
- Capacity credit : None

a.2 Independent power producer

- Energy (all kWh) : 90% of the kWh selling price of the Γ22 consumer tariff
- Capacity credit : None

b. Interconnected system (mainland)

b.1 Autoproducer

- Energy (all kWh) : 70% of the kWh selling price of the Γ22 low-voltage consumer tariff (for connection of the RES producer at low voltage), or the B2 mid-voltage consumer tariff (for connection at mid voltage), or the A high-voltage consumer tariff (for connection at high voltage). The 70% rate is applicable to all three (3) time zones of the A high-voltage tariff (peak-load hours, mid-load hours, low-load hours)
- Capacity credit : None

b.2 Independent power producer

- Energy (all kWh) : 90% of the kWh selling price of the B2 mid-voltage consumer tariff (for connection at mid or high voltage).
- Capacity credit : 50% of the capacity charge (Euro/kWp/month) of the B2 mid-voltage consumer tariff (for connection at mid or high voltage).

The capacity credit is calculated on the basis of the peak measured output of the RES station,  $P_m$  (kW), between two successive measurements, as follows :

RES power capacity used as basis for capacity-credit calculation (kW) =  $\sigma \times P_m$  (kW)

where :  $\sigma =$  0.50 for wind and solar stations  
 0.70 for small hydroelectric stations  
 0.90 for geothermal and biomass stations

At today's (April 2004) electricity consumer prices in Greece, an independent RES producer is paid as follows :

<ul style="list-style-type: none"> <li>• Interconnected system :</li> </ul>	Energy – 0.0645 Euro / kWh Capacity – 0.828 Euro/kWp/month ( <i>for wind and solar</i> ) – 1.159 Euro/kWp/month ( <i>for small hydro</i> ) – 1.490 Euro/kWp/month ( <i>for biomass and geothermal</i> )
<ul style="list-style-type: none"> <li>• Non-interconnected islands :</li> </ul>	Energy – 0.0797 Euro / kWh

- v) Every RES-electricity producer is subject to a special reciprocity charge (annual fee), specified by a joint decision of the Ministers of Finance and Development, and equal to two-percent (2%) of the producer's electricity sales to the grid. This charge is collected by the TSO and is given to the Local Authority, within the area of which the RES generation unit operate, for the purpose of realising local development projects.

Law 2773/99 instituted a new license, the so-called electricity generation license, which is now the first license required to be obtained by any electricity-producing station, conventional or RES-based, in a long planning / licensing procedure that also includes presiting permit, land-use permit, approval of environmental terms and conditions, installation license, operation license, etc. (see below).

Law 2941 of 2001 supplemented Law 2773/99 with certain important provisions about renewables, including : a) the definition of the general terms and conditions, under which it is allowed to install RES stations in forests and forestry lands, and b) the characterisation of all RES projects as projects of public utility status, which gives them the same rights and privileges in land expropriation procedures as those given to public works, independently of the legal status of the RES project owner (being private or public).

Finally, Law 3010 of 2002 specified the general terms, procedures and requirements for obtaining the necessary environmental licenses for any given investment project (including, as such, a RES project).

#### 1.2.1.2 Ministerial Decrees

Laws 2244/94, 2773/99 and 2941/01 on renewables, as well as Law 3010/02 on environmental licensing, are supplemented by a number of Ministerial Decrees, which specify:

- a) The procedures, required documents, fees, etc. for issuing the generation, installation and operation licenses, necessary to all RES-to-power projects;
- b) The general technical and financial terms of the contract to be concluded between the Transmission System Operator (TSO) and each RES power

producer, the details of the electricity tariffication system to be applied, the terms and conditions for connecting the RES station to the grid, etc.

The most important of the above Ministerial Decrees (MD) and Joint Ministerial Decrees (JMD) are summarised below:

**1. MD 17951/2000** : Terms and procedures for obtaining the electricity generation license

**2. JMD 15393/2002** : Categorisation of activities / projects according to their potential environmental impact. RES projects are categorised according to RES type (technology) and installed capacity. For example, wind parks between 5 and 40 MW<sub>e</sub> fall into the 1<sup>st</sup> environmental category (high potential impact), subcategory # 2.

**3. JMD 11014/2003** : Specific terms, procedures and requirements for obtaining the necessary environmental licenses (preliminary environmental impact assessment, approval of environmental terms and conditions), for all types of projects and activities categorised under JMD 15393/2002 above.

**4. MD 2000/2002** : Specific terms, procedures and requirements for obtaining the RES installation and operation licenses, as well as a model contract (PPA) between the TSO and the RES power producer. The multi-step RES licensing procedure and the corresponding jurisdictions are depicted schematically in Diagramme 1.

**5. MD 31928/1993** : (*in conjunction with Law 3175/2003*) : Terms, procedures and fees for obtaining the necessary concession license, for the right to exploit a geothermal field.

**6. MD 5813/1989** : (*in conjunction with Law 1739/1987*) : Terms and procedures for obtaining the necessary «unified water license», which is a license for water use and for carrying out any project of exploitation of water resources (including energy valorisation).

**7. JMD 1726/2003** : This Joint Ministerial Decision marks a breakthrough in the State's intensifying efforts to rationalise and simplify the complex and very lengthy licensing procedures for RES-to-power projects. These procedures constitute today

the single, most difficult obstacle in the effective materialisation of commercial-scale RES investments in Greece.

JMD 1726/2003 is signed by the ministers of all six (6) Ministries that are co-responsible for the RES licensing procedure (Figure 1), namely the Ministries of : a) Development, b) Environment, Land Planning & Public Works, c) Agriculture, d) Culture, e) Transportation & Communications and f) National Defense.

The said JMD covers all three basic (and time consuming) stages of the RES licensing procedure, and more specifically those of :

- i) Preliminary environmental impact assessment
- ii) Approval of environmental terms and conditions
- iii) Approval of intervention on public land

First, the JMD defines clearly and unambiguously the specific public authorities, agencies and directorates that are required to give an opinion (or to make a decision) regarding the licensing of a RES project (see Diagramme 1).

Second, the JMD describes in detail the contents of the opinion, to be given by each one of the above authorities or agencies.

Third, the JMD sets strict deadlines for the licensing authorities or agencies, within which they are required to give their opinions about the RES project under consideration. These deadlines have an irrevocable character, i.e. beyond them, the respective authorities, agencies, committees, etc., that have not responded, are counted as having positive opinions (answers) towards the given RES project, and the licensing procedure moves on to the next stage.

The licensing deadlines, set by JMD 1726/2003 , are as follows :

1. Preliminary environmental impact assessment	: 30	working	days	(total)
2. Approval of environmental terms and conditions	: 60	''	''	''
3. Approval of intervention on public land	: 40	''	''	''

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**Total licensing time for RES projects : 90 working days (total)**



**Figure 1.** RES licensing procedures and jurisdictions in Greece



**Diagramme 1. List of the public authorities, agencies and directorates required to give an opinion or to make a decision regarding the licencing of a RES project**

**ELECTRICITY GENERATION LICENSE**

1. REGULATORY AUTHORITY FOR ENERGY (EVALUATION / OPINION)
  2. MINISTRY OF DEVELOPMENT (ISSUING OF THE ELECTRICITY GENERATION LICENSE)
    - A) DIRECTORATE FOR RENEWABLE ENERGY SOURCES AND ENERGY SAVINGS
    - B) MINISTER OF DEVELOPMENT
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**INTERCONNECTION TO THE GRID**

1. TRANSMISSION SYSTEM OPERATOR (or DISTRIBUTION GRID OPERATOR, i.e. PPC)
    - A) SPECIFICATION OF THE TERMS AND CONDITIONS FOR INTERCONNECTION TO THE GRID (OPINIONS FROM VARIOUS PPC DIRECTORATES)
    - B) (i) TECHNICAL INTERCONNECTION CONTRACT, (ii) COMMERCIAL ELECTRICITY SALES CONTRACT
    - C) CERTIFICATE CONFIRMING COMPLETION OF THE INTERCONNECTION WORKS (AUTOPSY)
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**INSTALLATION LICENSE**

1. DIRECTORATE FOR PLANNING AND DEVELOPMENT OF THE REGIONAL GOVERNMENT
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**PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT**

1. DIRECTORATE FOR ENVIRONMENT AND LAND PLANNING OF THE REGIONAL GOVERNMENT (DEPARTMENT FOR LAND AND URBAN PLANNING)
2. LOCAL FORESTRY INSPECTION OFFICE (OR PREFECTURAL DIRECTORATE FOR FORESTS)

3. LOCAL URBAN PLANNING OFFICE
    - A) OPINION ABOUT THE RES PROJECT'S DISTANCE FROM URBAN SETTLEMENTS, ZONES OF URBAN CONTROL, etc.
    - B) BUILDING PERMIT (FOR ISSUING THE OPERATION LICENSE)
  4. A) STATE COMMITTEE FOR PREHISTORIC AND CLASSICAL ANTIQUITIES (+ REGIONAL AND/OR CENTRAL ARCHEOLOGICAL COUNCILS)
    - B) STATE COMMITTEE FOR BYZANTINE AND POST-BYZANTINE MONUMENTS (+ REGIONAL AND/OR CENTRAL ARCHEOLOGICAL COUNCILS)
  5. CIVIL AVIATION AUTHORITY
  6. MINISTRY OF NATIONAL DEFENSE / CENTRAL MILITARY COMMAND
    - A) ARMY COMMAND
    - B) NAVY COMMAND
    - C) AIR FORCE COMMAND
  7. PUBLIC TELECOMMUNICATIONS CORPORATION
  8. NATIONAL TOURISM ORGANISATION
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#### **TECHNICAL CERTIFICATION**

1. CENTER FOR RENEWABLE ENERGY SOURCES (CERTIFICATE OF APPROVAL OF THE WIND TURBINES & CERTIFICATE OF MEASUREMENTS OF THEIR POWER QUALITY CHARACTERISTICS)
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#### **APPROVAL OF ENVIRONMENTAL TERMS AND CONDITIONS**

1. LOCAL MUNICIPALITY (MUNICIPAL COUNCIL)
  2. LOCAL PREFECTURE
    - A) DIRECTORATE FOR LAND AND URBAN PLANNING & ENVIRONMENT (ENVIRONMENTAL DEPARTMENT)
    - B) PREFECTURAL COUNCIL
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**CONCESSION OR APPROVAL OF INTERVENTION ON PUBLIC LAND**

1. **LOCAL FORESTRY INSPECTION OFFICE (OR PEFECTURAL DIRECTORATE FOR FORESTS)**

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**OPERATION LICENSE**

1. **FIRE-FIGHTING SERVICE**
  2. **DIRECTORATE FOR INDUSTRY AND TRANSPORTATION OF THE LOCAL PEFECTURE (AUTOPSY OF THE COMPLETED PROJECT)**
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In 1995, the Greek Ministry of Environment, Urban Planning and Public Works prepared an Action Plan, entitled "**Energy 2001**", aiming at promoting the use of RES, as well as the application of energy-efficiency technologies, in the building sector. The Action Plan was prepared in order to define specific measures for the reduction of greenhouse gas emissions in buildings, in accordance with the "National Action Plan for the Abatement of CO<sub>2</sub> and Other Greenhouse Gases". Following official adoption of the Action Plan by the Greek Government, "**Energy 2001**" was further reinforced by the enactment of MD **21475/98**, which incorporated the provisions of Council Directive 93/76/EC (SAVE Directive) for the stabilisation of CO<sub>2</sub> emissions and the efficient use of energy in buildings.

Concerning the incorporation of RES systems in buildings, the **MD 21475/98** specifically refers to, in Art. 2:

- active solar systems, such as hot-water solar heaters and photovoltaic modules
- other (non-specified) RES systems, which convert renewables to electricity or thermal energy.

In addition, Art. 4 of the Ministerial Decree provides for the future issuing of a Regulation for the rational and efficient use of energy, which will be in compliance with the Greek General Building Code. The drafting of the Regulation has been assigned by the Ministry of Environment, Urban Planning and Public Works to the Centre for Renewable Energy Sources (CRES), and it is to be carried out in accordance with the provisions and specifications set out by MD 21475/98. As far as the incorporation of RES in buildings is concerned, the Ministry's specifications for the drafting of the Regulation encompass the following:

- determination of the building's energy requirements and their potential degree of coverage through RES
- specifications of active solar systems (ASS)
- determination of the ASS contribution to space and water heating (compulsory)

- determination of the contribution of photovoltaic systems (PVs) to the coverage of the building's electrical loads (optional)
- study for the incorporation of ASS (compulsory) and PVs (optional) in buildings
- determination of the requirements for the installation of building energy systems for the exploitation of RES.

## 1.2.2 Financial support instruments

There are two main financial-support instruments that provide substantial public subsidies to RES investment projects (among others) : a) The so-called "National Development Law" (Law 2601 of 1998, revised in January 2004, currently under new revision), and b) the Greek Operational Programme for Competitiveness, one of the eleven (11) National and the thirteen (13) Regional Operational Programmes, in which the Third Community Support Framework (CSF III ; 2000-2006) for Greece is divided.

These two instruments are detailed below.

### 1.2.2.1 National Development Law (2601/98 & modifications thereafter)

This is a financial instrument-umbrella, covering all private investments in Greece, in all sectors of economic activity. It has a strong regional character, in that the level of public support depends strongly on the particular geographic region, in which the given private investment is planned to materialise. Regions with high unemployment rates and low incomes per capita receive the highest investment subsidies from the State.

Investments in RES installations (both electricity- and heat - producing ones) have a special status under Law 2601/98, similar to the one bestowed to other selected categories of investments, such as investments in high technology, environmental protection, etc. More specifically, the main provisions of Law 2601/98 concerning public support of RES investments are as follows:

- 40% public subsidy (grant) on the total eligible RES investment cost + 40% subsidy on the interest of loans obtained for the purpose of financing the RES investment
- Alternatively, 40% subsidy on the loan interest + 100% tax deduction on the RES investment cost
- Level of subsidy (40%) is independent of the RES technology and the geographical region of the country
- Required own capital : 40% (min) of the total investment cost
- Minimum investment cost required : 176,000 Euro
- Maximum subsidy granted : 14.7 million Euro
- Maximum investment cost subsidised : 36.7 million Euro

Proposals for private investments can be submitted to the National Development Law 2601/98 at any time and they are evaluated on their own merit, i.e. independently of other submitted proposals. Law 2601/98 does not have any total budget cap, thus there is (theoretically) no limit in the number and budget of proposals that can be funded.

In January 2004, Law 2601/98 was modified, with the aim to reduce bureaucracy and promote large-scale investments. The basic modifications of Law 2601/98 affecting RES projects were as follows :

- a) The public subsidy (capital grant) is now paid to the investor in one single installment, following certification of the completion of his investment project and start up of its productive operation.
- b) Up to thirty per cent (30%) of the total public subsidy granted to an investment project can be paid to the investor as down (early) payment, provided that he furnishes an equivalent letter of guarantee and that he submits a formal declaration stating that at least 30% of the project's capital cost has already been paid.
- c) Specifically for wind park investments, the level of public subsidy is now set at 30% of total investment cost (down from 40% in Law 2601/98), or, alternatively, the level of tax deduction is set at 70% of total investment cost

(down from 100% in Law 2601/98). For all other RES projects (except wind), the original provisions of Law 2601/98 are still in effect.

Currently, Law 2601/98 is, again, under new revision.

#### 1.2.2.2 National Operational Programme for Competitiveness / CSF III (2000-2006) (Actions 2.1.3, 6.4.3 & 6.4.4)

The Measure 2.1 of Subprogramme 2 of the National Operational Programme for Competitiveness (NOPC) / CSF III (2000-2006) is devoted entirely to providing State support (grants) to private investments in: a) renewables, b) rational use of energy and c) small-scale (<50 MWe) cogeneration. The total budget of Measure 2.1, for the 2000-2006 period of CSF III, is 1.07 billion Euros, of which 35.6% or 382 million Euro is the public subsidy available to RES/RUE/CHP investments. About two-thirds of the total available subsidies (~ 260 million Euros) are foreseen to be awarded specifically to RES investment projects (mainly wind parks).

The main provisions of Measure 2.1 of NOPC, concerning public support of RES investments, are as follows:

- Public subsidy (grant) on the total eligible RES investment cost :
  - Wind parks, conventional solar thermal units : 30%
  - Small hydro, biomass, geothermal, high-tech solar thermal units, passive solar : 40%
  - Photovoltaics : 40-50%
- Level of subsidy (%) is independent of the geographical region of the country (except for photovoltaics)
- Required own capital : 30% (min) of the total investment cost
- Minimum investment cost required : 44,000 Euro
- Maximum investment cost subsidised : 44 million Euro

Grants are awarded to RES projects by Measure 2.1 of NOPC (Action 2.1.3) following rounds of public calls for RES / RUE / CHP investment proposals and subsequent



competitive evaluation of the submitted proposals (per round). So far (April 2004), 650 investment proposals have been submitted, overall, to the past calls and rounds of Action 2.1.3, having a total budget of about 2.3 billion Euro. Three hundred and twenty seven (327) of these proposals have been approved for public subsidy, having a total budget of about 1.2 billion Euro. By the end of March 2004, 126 investment projects had signed the relevant public support / materialisation contract. These projects have a total budget of 373 million Euro.

It should be mentioned that a RES investment-subsidy programme, very similar to that of Measure 2.1 of NOPC/CSF III, existed also in the Second Community Support Framework (CSF II ; 1994-1999) for Greece. This CSF II programme granted cumulatively about 92 million Euro of public subsidies to 77 RES investment projects, having a total budget of about 213 million Euro (i.e. mean subsidy rate  $\sim 43\%$ ) and a total installed capacity of 160 MW<sub>e</sub> + 94 MW<sub>th</sub>. This programme was very instrumental in stirring up substantial RES activity and in materialising a large number of commercial-scale RES projects in Greece, particularly in the period 1997-2000.

### 1.2.2.3 Tax and other fiscal incentives

The one legislative provision, which has been instituted so far in the area of tax incentives for (domestic) RES installations, was incorporated in Law 2364 of 1995. This law, although dealing primarily with the importation, transmission, distribution and sales of natural gas in Greece, contained an important provision regarding the purchase and installation of domestic RES appliances. According to Article 7 of the law, up to 75% of the total cost for the purchase and installation of domestic RES appliances and systems (as well as of gas appliances) could be deducted from the taxable income of natural persons. Such appliances and systems were deemed to include installations for the common use of the occupants of apartment buildings, in which case the deduction was calculated on the basis of the co-ownership percentage of each owner. It was estimated that the tax deduction of Law 2364/95 could reduce the cost of domestic RES systems (e.g. of solar heaters) by up to 30%.

For legal persons and companies taxed on the basis of coefficient of profits, or on the basis of objective criteria, 75% of the total expenditure for the purchase and

installation of the aforementioned appliances or systems was deductible from the total profit established by the application of the tax coefficient or the objective criteria.

Legal persons and companies in the commercial or service sectors, which kept simple revenue and expenditure books, were entitled to amortise such costs at an annual rate. The annual amortisation rate, the documentation required and the details of the implementation of this provision were to be established by a separate Decision of the Minister of Finance.

Unfortunately, in 2002 the above favourable tax provision of Law 2364/95 was abolished by Law 3091/02, despite strong protests from the RES sector, in order to save the Greek State about 2.3 million Euro annually (!) in related RES subsidies.

Following the enactment of the Ministerial Decree 21475/98 (see Ch. 1.2.1.2), a separate Presidential Decree had been planned, entitled "Incentives for energy savings". According to the draft of this Decree, an integrated set of financial, administrative and other incentives was to be instituted for domestic applications of techniques and systems, including RES, that demonstrably contribute to energy savings in buildings. These planned incentives are outlined below :

- i) All expenses related to the purchase and installation of RES systems and materials in existing buildings can be deducted from the taxable income of owners / possessors / usufructuaries, up to a certain percent which will be defined, according to a specific set of criteria, in a later Ministerial Decree.
- ii) Owners of existing or new buildings (domestic / commercial / tertiary) who, within a period of six (6) years from the date of enactment of the above Presidential Decree, will install RES exploitation systems in their buildings, for space heating and/or cooling, hot water production or lighting, demonstrably meeting at least 30% of their energy needs with RES, will be entitled to receiving certain subsidies or attractive, low-interest loans from State or private banks, in order to cover their RES-related costs. The maximum amount of the loan, the interest rate, the time and terms of loan repayment and all other relevant details will be set out in a separate Ministerial Decree.
- iii) In case the building owner opts for the low-interest loan, he will not be eligible for the income tax deduction of point (a) above.

iv) In regions with autonomous electricity networks (for example, in islands), or in regions of the interconnected system where the Public Power Corporation (PPC) of Greece is unable to cover the peak load, PPC can provide relevant subsidies or financial incentives, through mass purchases of domestic RES systems (solar heaters, photovoltaics, etc.) for interested customers. The RES systems will be selected by PPC to suit the specific load characteristics of the given residential area and will be offered to its customers at attractive low prices (due to mass-purchase discounts). The system cost will be repaid to PPC by customers joining the programme through their electricity bills, in a number of equal instalments.

It is interesting to note that the issuing of the above Presidential Decree has stalled for years, due to reaction from the Ministry of Finance, which considers the State's financial burden, from the application of the above measures, to be excessive.

As far as tax incentives for corporation investments in renewables are concerned, we note that such incentives are actually provided as alternative choices to capital subsidies in the National Development Law 2601/98 (see Ch. 1.2.2.1). According to the law, investments and equipment - leasing programmes by corporations in : a) electricity production from renewables (wind, solar, hydroelectric and geothermal energy), and b) cogeneration of heat and electricity (e.g. from biomass), can receive one (but not both) of the following subsidy packages :

- i)**
  - Capital subsidy : 40% of the total investment cost (wind parks: 30%)
  - Interest-rate subsidy : 40% of the interest paid on loans related to the RES investment (wind parks: 30%)
  - Leasing subsidy : 40% (wind parks : 30%)
  
- ii)**
  - Tax deduction : 100% of the total investment cost (wind parks: 70%)
  - Interest-rate subsidy : 40% of the interest paid on loans related to the RES investment (wind parks: 30%)

The first subsidy package has been discussed in Ch. 1.2.2.1. The second subsidy package, for which a corporation may opt instead of the first one, contains two

components of State financial support to RES investments: a 40% interest-rate subsidy (wind parks: 30%) and a tax deduction equalling 100% (wind parks: 70%) of the total investment cost (or equipment - leasing cost). This last form of financial support regards the exemption of the corporation from payment of income tax on the non-distributed net profits of the first decade following the materialisation of the RES investment, by creating an untaxed (tax-exempt) reserve, equal in amount to the total RES investment cost. The 100% (wind parks: 70%) tax deduction is normally made from the profits of the particular tax year in which the RES investment is made. If there are insufficient or no profits in that year to cover the tax deduction, this deduction is made from the profits of subsequent tax years (and up to the tenth year), until the total RES investment cost is fully covered.

## 2. Status of the Greek RES electricity industry

### 2.1 Current level of RES development in Greece and prospects for 2010

Against the ambitious RES-related national targets and obligations discussed in Chapter 1.1, Greece is failing at present to achieve any kind of sustained drive in RES development. The currently installed total RES electrical capacity in the country is about 500MW, 400MW of which are wind parks. After a modest rise in the three-year period 1999-2001, the rate of installation of new RES projects has fallen sharply in 2002: while 46MW of RES plants were installed in the country in 1999, 85 MW in 2000 and 103 MW in 2001, only 18MW were installed, in total, in 2002. At present, after completion (in the first semester of 2003), of a few remaining wind parks, licensed back in 2000-2001, very few new RES installations are planned for construction in the near future and, in particular, the construction of new wind parks has come to an almost complete stop. This investment "drought" in the Greek renewables sector has already produced serious side effects in the country's economy:

- a) Large public funds of the CSFIII (2000-2006), earmarked for the financial support (subsidies) of commercial RES investments under the Operational Programme for Competitiveness (Action 2.1.3), cannot be absorbed by new RES projects and are, thus, in immediate danger of being lost. These funds,

amounting to approximately 350 million Euro, were planned to be the primary force that would “fuel” RES development in Greece, towards its 2010 targets.

- b) Large international energy companies, that have been trying for the last few years to invest in RES projects in Greece, especially in wind parks, have recently decided to discontinue their RES activities in the country, due to the big administrative (and other) obstacles they have been facing (see next section). This alarming exodus is more pronounced with German companies specialising in wind energy investments.

Against this background of failing RES development efforts, and mostly because of this, Greece is also failing seriously in meeting its Kyoto commitments. Instead of achieving the +25% increase in greenhouse gas emissions by 2008-2012, Greece has already reached this ceiling in 2001 (!) and is currently running at an estimated rate of +45-48% increase in its national emissions by 2008-2012. Even with conservative estimates, this failure to meet its Kyoto obligations, will cost Greece about 70 million Euro per year, from 2008-2012 onwards, in penalties or in funds to buy emission permits from the international market.

To make matters worse, Greece has not yet incorporated into national law the EU Directive 2001/77/EC on RES electricity (deadline to do so: 27.10.2003), nor has it even started to develop a National Allocation Plan for emission permits, as required by the upcoming Emissions Trading Directive (deadline to do so: 31.03.2004).

This, rather bleak, situation for renewables in Greece is fully reflected in the latest report on RES development prospects in the EU, published by the European Renewable Energies Federation (EREF) in March 2004 (Annex I).

## 2.2 Key non-financial barriers to RES development in Greece

The four (4) most important obstacles, still persisting today in the RES sector in Greece and delaying further RES investment, are:

- licensing procedures
- grid connection issues
- public attitudes (reactions)

- legal issues

These obstacles are outlined below.

### 2.2.1 RES licensing procedures

The complex licensing procedures for RES-to-power projects, set in the past by various Ministerial Decrees (MD), have constituted the single, most difficult obstacle in the effective materialisation of commercial-scale RES investments in Greece. These procedures involve a multitude of central, regional, prefectural and local authorities (departments, committees, councils, agencies, etc.), interwoven in a lengthy, bureaucratic and, at times, confusing licensing process, that invariably take 2-3 years to complete (see Figure 1, Ch. 1.2.1.2.). Any single RES installation license requires the official expression of (positive) opinion of more than 25 public-sector entities, at the central, regional, prefectural and local level (see Diagramme 1, Ch. 1.2.1.2.), and needs to be checked, in terms of conformity, with 4 National Laws and 7 Ministerial Decrees.

The transfer, in late 1998 (Law 2647/1998), of most RES licensing jurisdictions and competences, from the central to the regional and prefectural authorities, had compounded the already difficult situation, creating more problems than those it was supposed to solve. This was due to the structural and organisational weaknesses that plagued, and still plague, regional and local administrations in Greece, such as severe budgetary constraints, lack of specialised knowledge, RES-related experience and trained personnel, parochial ideas and conflicts, etc.

The Joint Ministerial Decree (JMD) 1726/2003 (issued in May 2003) took significant steps, towards correcting the difficult situation and towards improving and speeding up the licensing procedures, specifically for wind parks, by: a) defining, clearly and unambiguously, the specific public authorities, agencies and directorates that are required to give an opinion (or to make a decision) regarding the licensing of a wind park project (see Diagramme 1), b) describing in detail the contents of the opinion, to be given by each one of the above authorities or agencies, and c) setting strict deadlines, of an irrevocable character, for the licensing authorities or agencies, within which they are required to give their opinions about the wind park project

under consideration. The total licensing time for wind projects (excluding the electricity generation licensing step) has been set at 90 working days (maximum).

Unfortunately, in the one year that has elapsed since its passing, JMD 1726 has not been fully activated and enforced yet, due to minor legalities, which the Ministries involved (Ministry of Development / Energy, Ministry of Environment, Ministry of Agriculture) appear reluctant, so far, to iron out.

### 2.2.2 Limited capacity of the power transmission grid

As of 2003, new RES capacity can no longer be connected to the existing grid (due to its capacity saturation), in the Greek regions of high wind potential, namely Thrace, Euboea / Cyclades Islands and southeastern Peloponese (Lakonia). According to modest estimates, these regions can yield at least 1000-1500 MW of commercial wind power, with very attractive aeolic / economic characteristics.

Plans for upgrading the transmission grid in those regions (by re-enforcing and extending the existing power lines), so that they can uptake the above wind power capacity, have been drawn up by the PPC (Public Power Corporation) in the last 2-3 years, but have been mostly shelved. A crucial problem with these plans, even if-at some distant point-they are given the green light to go ahead, is their long period of materialisation, which exceeds 5-6 years, due to difficulties (public reactions, etc.) in land expropriation and construction of high-voltage power lines through environmentally sensitive areas. Such long time delays in upgrading the transmission grid in the above windy regions of Greece will result in the loss of about 180 million Euro of public subsidies from the CSF III (2000-2006), earmarked for wind park development in those regions.

### 2.2.3 Public attitudes (reactions)

Although opinion polls in Greece invariably show a positive attitude and support of the general public towards renewables, this attitude seems to have a strong NIMBY ("Not In My Back Yard") component. This has been evident in the commercial development of wind energy in Euboea, which has taken place between 1998 and 2001, and has resulted in the installation of about 200MW of wind parks. This

important RES development, the first of its kind in Greece, in terms of scale, has been met with increasing local opposition (from environmentalists, cultural clubs, some municipal authorities, part of the local population, etc.), which led in 2001 to a virtual stop of any further wind-park development, in many areas of southern Euboea. A similar situation has, more recently, unfolded in the prefecture of Lakonia, in southeastern Peloponnese, another Greek region with high wind potential, but with very few wind parks installed so far.

Reasons offered by local entities resisting wind park development in their areas include visual intrusion, noise, land devaluation, etc., but also perceived health problems to people and animals (due to radiation presumably emitted from the wind turbines!), negative impact on local tourism, deforestation, little or no benefit to the local economy (employment / added value), etc. Similar, more or less, arguments are employed also by local entities opposing the development of small hydro in other regions of Greece, such as Epirus, central Peloponnese, etc.

Unfortunately, the Greek State and its relevant public bodies (Ministry of Development, Centre for Renewable Energy Sources – CRES, Public Power Corporation – PPC, Universities, etc.) have been practically absent from any effort undertaken so far, to counteract this negative tendency and to inform, in a responsible and integrated manner, the general public (through country-wide publicity and information campaigns, etc.). Significant CSF III funds, earmarked specifically for this kind of RES information / dissemination actions, have not been activated so far, and are at danger to be lost.

#### 2.2.4 Legal issues (Council of State)

Starting in 2000-2001, local opposition to the installation of wind parks, mostly by individuals (farmers, hotel owners, etc.) and members of local cultural clubs (who, nevertheless, have been very vocal in their reactions), led to a barrage of legal appeals to the Supreme Council of State (SCS), against wind parks that had already obtained, through the complex and time-consuming procedures outlined before, their installation licenses.



This barrage of SCS appeals has intensified in the last two years and has now become the single, most serious threat, that can halt completely any further wind energy development in Greece. This is so, primarily for the following two reasons:

- i) Appealing to the SCS is a simple and relatively inexpensive procedure (required initial fee: 1500 Euro) and can immediately halt the materialisation of a fully (and legally) licensed wind park. In most of the wind park cases that have been brought so far to the SCS, the Council immediately ordered stoppage of the construction works until reaching its final decision, which, in the case of wind parks, has taken, on the average, three (3) years. Such a long time in reaching the Council's decision, usually leads to the abandonment of the wind park project and to the loss of millions of Euros in (already secured) public subsidies for the project.
- ii) All the decisions issued so far by the Supreme Court of State in wind park cases reflect the strong negative attitude of its majority towards wind energy development in Greece. The Court's arguments are based mostly on environmental /aesthetic concerns (perceived visual intrusion of wind turbines into the mountainous, forest-rich and ecologically sensitive Greek landscape), but, recently, they tend to focus more on the lack of official land planning in Greece (definition, country-wide, of land uses, activity zones, etc.).

Although both issues above (i.e. environmental concerns and land planning) are certainly valid and important, and need to be carefully addressed by the State, one cannot help but notice that the SCS has, so far, selectively applied them to environment-friendly wind parks and not to pollution-ridden activities in the very same areas of (planned) installation of wind parks, e.g. to fossil fuel – based power plants (oil, lignite, natural gas), illegal landfills, quarries, poultry farms, etc. A very characteristic example of this selective application and interpretation of existing laws and regulations by the Supreme Court of State is the case of wind parks in Southern Euboea (see, also, section 2.3 below).

## 2.3 Priority considerations (steps) to overcome the above barriers

Based on the detailed discussion, presented in Chapter 2.2, of the major problems and barriers impeding further RES development in Greece, we outline below some priority considerations and basic steps that can be taken to overcome the said barriers and to accommodate commercial RES investment in the country.

### a) RES licensing procedures

The following corrective actions may be undertaken to further improve and speed up the current RES licensing process :

- i) Strict adherence to the deadlines set for the various RES application – reviewing steps by the Ministerial Decrees 1726/03, 11014/03 and 2000/02. These deadlines are, still, rarely respected by the public electricity company, by the relevant departments of the Ministry of Development and the Ministry of Environment, Civil Planning and Public Works, by the regional and prefectural authorities, etc. For this reason, the irrevocable character of the above license-related deadlines, set by JMD 1726/03, must be strictly enforced in practice, i.e. beyond these deadlines, the respective departments, committees, etc. that have not yet responded, must be counted as having positive opinions (answers) towards the RES-to-power project under examination.
- ii) Further reduction in the number of public-sector entities (departments, committees, agencies, etc.) that are required to give their opinion in the process of environmental licensing of RES installations. Given the inherent environment-friendly nature of renewables, it is fully justified to define simplified and time-condensed procedures, terms and conditions for granting environmental authorisation, specifically to RES projects.
- iii) Detailed examination of the possibility to incorporate all RES-licensing procedures into a “one-stop shop” mechanism, under the supervision of the Ministry of Development. Despite the obvious difficulties that such an undertaking, of an inter-ministerial character, poses, it may constitute the only viable -in the long run- solution, for the rationalisation and speeding up of the complex and inefficient RES-licensing procedures, currently in effect.

#### b) Limited capacity of the power transmission grid

It is imperative that the Transmission System Operator (TSO) promptly re-evaluates the existing technical plans for upgrading the power grid in Greece's windy regions and that he opts for technical solutions, that may not be the most economic, in terms of cost per km of power line, but allow the grid-upgrading project to be completed with the minimum of environmental/social problems and, thus, with minimum time delays. Such technical solutions do exist, and will allow rapid wind-park development in the said regions, utilising, in the process, the available CSF III public funds (2000-2006).

Once the above technical solutions are finalised by the TSO, the corresponding topographical and detailed engineering studies must be promptly carried out, while, in parallel, the required licensing and other legal procedures (e.g. expropriations) must proceed at a rapid pace, so that grid construction can actually commence in the first semester of 2005. A crucial prerequisite is to define the specific terms, conditions and procedures for the RES investors that will co-finance (50%) the grid extension / upgrading, in order for them to provide the TSO with the necessary financial guarantees (letters of credit, etc.), as well as for the TSO to commit itself (with relevant binding clauses) on the timetable for the construction / operation of the grid extension in the country's windy areas (Thrace, Southern Euboea / Cyclades Islands, Lakonia).

The key goal, timewise, is to begin gradually connecting new RES installations (mostly wind parks) to the new grid in the first semester of 2006, i.e. at a time that will allow a number of these RES installations to apply to Action 2.1.3/EPAN/CSF III (2000-2006) and receive much-needed public support (capital investment subsidies).

#### c) Public attitudes (reactions) / legal issues

To counteract the growing negative tendency, both social and legal, towards local installation of wind parks and other RES projects, as well as to inform, in a responsible and integrated manner, the general public, a full-scale RES publicity and information campaign should be launched nationwide, similar to the one that the Greek Association of RES Electricity Producers (GAREP) carried out in 2001-2002, in Southern Euboea, specifically for wind energy. That particular multimedia campaign

led to a significant shift in local public opinion (as shown in subsequent polls), towards a more positive attitude for commercial-scale wind park development.

The 2001-2002 GAREP initiative needs to be widened in scope, to include all renewables and to cover all geographical areas of Greece, and, also, to involve the active participation of all relevant public bodies (Centre for Renewable Energy Sources, Public Power Corporation, Universities, etc.), under the auspices and co-ordination of the Ministry of Development. Regional and local authorities, as well as professional associations, environmental societies, etc. need to be well integrated into this country-wide RES information campaign. The campaign should draw considerable experience, know-how and direction from the excellent example of Crete Island, where in the last few years there has been a rapid growth in RES development, wind energy in particular, with the full support and involvement of local authorities, local organisations and the local people.

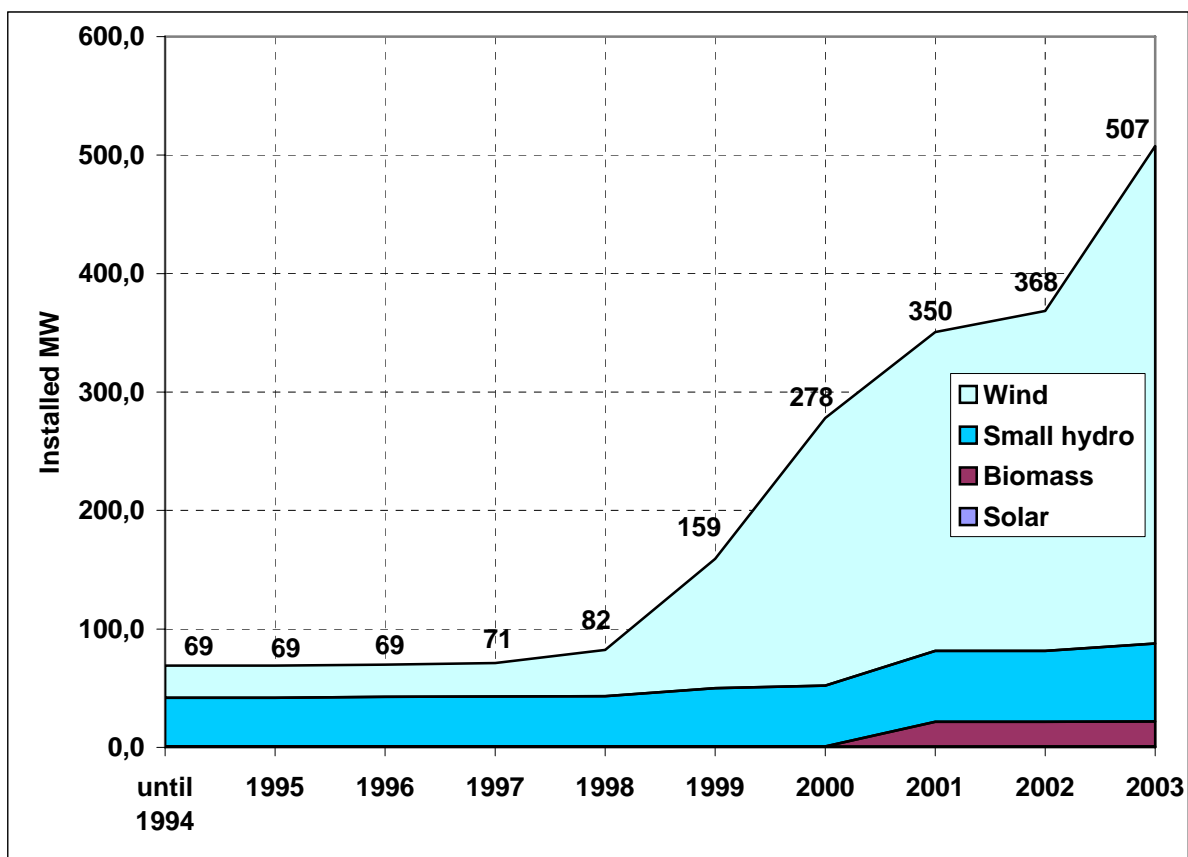
## 2.4 Current RES financial support scheme

### 2.4.1 Assessment of effectiveness so far

As presented in detail in Chapter 1.2, the RES financial support scheme, currently in effect in Greece, is based on a mix of a) feed-in tariffs for RES electricity and b) capital subsidies or equivalent tax incentives (deductions) on RES investments. This mix (support scheme) has been in place since 1994 (Law 2244/94), but it was practically activated in 1998, when the National Development Law 2601/98 was passed and the CSF II public funds for RES/RUE/CHP investments were made available for the first time. Therefore, the current RES support framework has, in essence, a 6-year history (mid 1998-mid 2004), and it is within this limited period of time that its effectiveness and success should be judged.

Macroscopically, the current scheme appears to have produced, in its 6-year course, substantial positive and measurable results, as far as development, construction and operation of commercial-scale RES power capacity in Greece is concerned : from only 71 MW<sub>e</sub> in 1997 (the same as in 1994), the RES installed capacity in the country reached 500 MW<sub>e</sub> in the beginning of 2004 ([Figure 2](#)). The largest part of this RES capacity, in excess of 400 MW<sub>e</sub> (or, 83% of the total), concerns wind parks ([Table 1](#)), bringing Greece into the eighth place, overall, in Europe in installed wind power

**Figure 2.** Time evolution of the RES installed power capacity in Greece (MW<sub>e</sub>)



**Table 1. Current RES installed power capacity in Greece (MW<sub>e</sub>, May 2004)**

	<b>IN OPERATION</b>	<b>WITH INSTALLATION LICENSE</b>	<b>WITH ELECTRICITY PRODUCTION LICENSE</b>	<b>TOTAL</b>
<b>WIND PARKS</b>	<b>417</b>	<b>139</b>	<b>3120</b>	<b>3676</b>
<b>SMALL HYDROPOWER STATIONS (&lt;10 MW)</b>	<b>61</b>	<b>53</b>	<b>293</b>	<b>407</b>
<b>BIOMASS UNITS</b>	<b>21</b>	<b>5</b>	<b>80</b>	<b>106</b>
<b>PHOTOVOLTAICS</b>	<b>~3</b>	<b>-</b>	<b>-</b>	<b>~3</b>
<b>TOTAL</b>	<b>502</b>	<b>197</b>	<b>3493</b>	<b>4192</b>

**Table 2. Wind park power capacity in operation, in EU Member States (MW<sub>e</sub>)**

<b>COUNTRY</b>	<b>END 2001</b>	<b>END 2002</b>	<b>JANUARY 2004</b>
<b>Germany</b>	<b>8753</b>	<b>12001</b>	<b>14000</b>
<b>Spain</b>	<b>3335</b>	<b>4830</b>	<b>5780</b>
<b>Denmark</b>	<b>2556</b>	<b>2889</b>	<b>3094</b>
<b>Netherlands</b>	<b>483</b>	<b>686</b>	<b>900</b>
<b>Italy</b>	<b>697</b>	<b>785</b>	<b>820</b>
<b>United Kingdom</b>	<b>485</b>	<b>552</b>	<b>648</b>
<b>Sweden</b>	<b>280</b>	<b>328</b>	<b>390</b>
<b>Greece</b>	<b>272</b>	<b>302</b>	<b>354</b>
<b>Austria</b>	<b>95</b>	<b>139</b>	<b>267</b>
<b>France</b>	<b>85</b>	<b>147</b>	<b>231</b>
<b>Portugal</b>	<b>127</b>	<b>194</b>	<b>217</b>
<b>Ireland</b>	<b>125</b>	<b>137</b>	<b>150</b>

(Source: WINDPOWER MONTHLY, JANUARY 2004)

capacity (Table 2). This is no small achievement, considering that it was based entirely on private sector investment, while the participation of the Public Power Corporation and other public sector companies was negligible.

Table 1 also reveals the potential future dynamism of the Greek RES sector, with about 4200 MW<sub>e</sub> of RES power capacity having already been granted electricity generation licenses by the National Regulatory Authority for Energy (RAE). This is important, because the electricity generation license is awarded to a project (a RES project, in this case) after a thorough (and positive) evaluation of its technical, economic, financial and environmental feasibility / viability. Therefore, a large percent of RES projects, that have already been granted their electricity generation licenses, are expected to pass through the subsequent environmental licensing “pipeline”, then to be awarded their respective installation licenses and, eventually, to be materialised.

#### 2.4.2 Weaknesses and problems

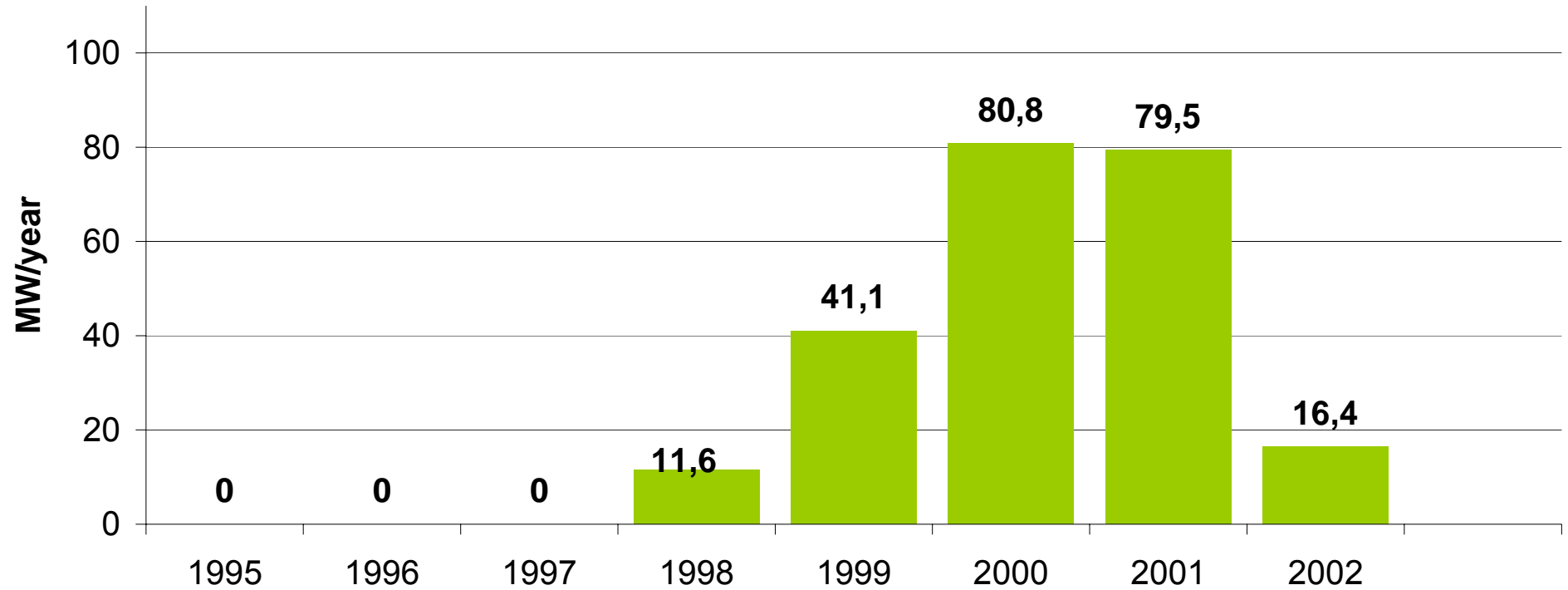
By the same token, Table 1 reveals two major points of concern (weaknesses), as well, regarding the future evolution of the RES sector in Greece :

- i) The materialisation rate of RES projects licensed by RAE is still low : only 12% of the RES projects, that have already been granted an electricity generation license, have materialised so far, with a further 5 % at various stages of construction (installation license granted). Figures 3 & 4 show, in the last two years, a considerable slow down in the installation and operation of new wind parks, licensed by RAE after 2000-2001.
- ii) Most of the RES development so far concerns wind parks, with minimal development of other RES power technologies (mainly some small hydro and biogas projects), while almost complete is the absence of commercial-scale solar, geothermal and biomass-electricity applications.

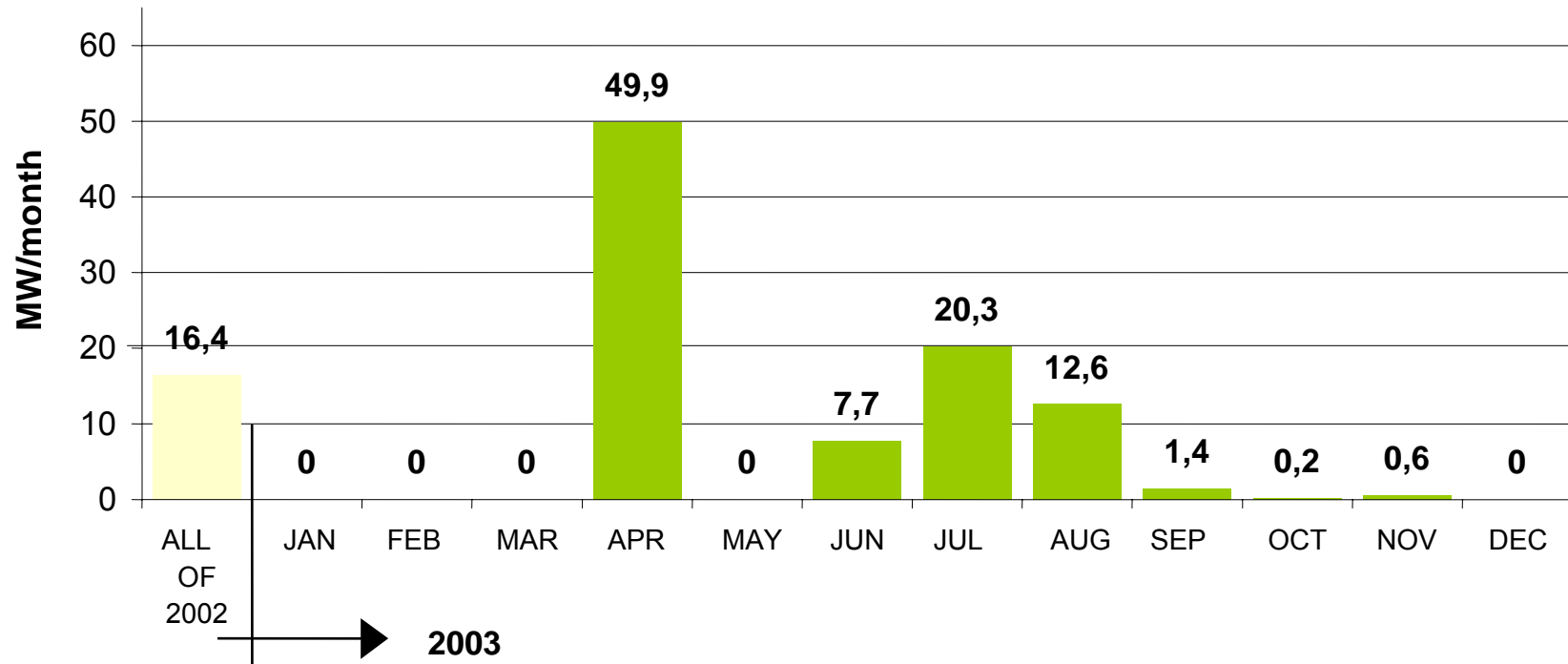
The first point of concern, i.e. the slow materialisation rate of RES projects, is almost entirely due to the administrative and technical problems and barriers presented in detail in Chapter 2.2, namely complex RES licensing procedures, grid saturation in areas of high RES potential and negative public attitudes (reactions) / legal issues. These problems should be firmly addressed and promptly resolved (see Chapter 2.3),



**Figure 3. Development of wind power capacity in Greece, 1995 – 2002**



**Figure 4. Wind parks in Greece coming on stream in 2003**



in order for the current favourable RES support framework to take full effect and produce even more positive results.

On the other hand, the low, so far, commercial development of all other RES technologies, except wind, despite the generous capital subsidies of Law 2601/98 and CSF III/EPAN (Action 2.1.3), is largely due to the uniform, relatively low (6.5 Eurocents/KWh), buy-back tariff for RES electricity, currently in effect. This tariff does not differentiate between RES technologies, thus favours (in relative terms) the more mature, technically and economically, wind energy.

### 2.4.3 Possible improvements and/or modifications

Two important factors should be taken into account when proposing potential improvements and/or modifications to the RES support framework, currently in effect in Greece : a) the crucial need for graduality in any change and b) the technical / economic constraints arising from the specific patterns of further RES development in the country, which are expected to prevail, at least until 2010. These two important factors are discussed below.

#### 2.4.3.1 The crucial need for graduality

It should be realised that the current RES support framework has been in effect practically for only 6 years (1998-2004). During this time, it has produced substantial positive results, in terms of installed RES capacity (>500 MW<sub>e</sub>), although the rate of materialisation of new RES installations has been lower than expected. This largely reflects the administrative and technical problems and barriers encountered in commercial-scale RES development in Greece (licensing procedures, grid saturation, public reactions), rather than any major weakness of the RES support framework itself.

The currently intensifying efforts of the Greek State to resolve the above problems (e.g. by the issuing of JMD 1726/03), in order to push RES development forward, coupled with the large number (~ 200 MW<sub>e</sub>) of new RES projects (mostly wind parks), which are already in the licensing pipeline, and which have based their business / materialisation plans on the existing RES support framework (Law

2601/98 – EPAN/CSF III funds), effectively precludes any serious thought of drastically changing this framework, at least in the immediate future (until 2010). Such drastic changes (e.g. the introduction of a quota / green certificate scheme) will only create new uncertainties, in an already burdened by problems and still immature (high risk) domestic RES market, and will lead to the shelving / abandonment of many ongoing RES projects and to diminishing domestic RES investment, before the current support system has a fair chance to prove its long-term potential and effectiveness (assisted by the State's corrective actions, presently under way).

#### 2.4.3.2 Constraints due to prevailing patterns of further RES development in Greece up to 2010

There is an even more important reason for not substantially altering the current RES support framework, which is largely based on a stable feed-in tariffification system, coupled with significant capital subsidies for RES investments. This reason is linked to the basic patterns of further RES development in Greece, which are expected to prevail at least until 2010.

More specifically, the main body of future (next 5-8 years) wind park development in the country, i.e. the backbone of Greece's future RES development, is expected to take place in geographical areas of moderate wind potential ( $< 6-7 \text{ m/s}$ , annually averaged wind speed). This is so, because :

- i) Most of the available areas and readily accessible sites of high wind potential ( $> 7-8 \text{ m/s}$ ) have already been developed (e.g. in Southern Euboea, Thrace, etc.)
- ii) The remaining high-wind areas are currently unavailable for commercial development, and they will continue to be so, for at least the next 5 years, due to :
  - Grid saturation (Southern Euboea, Thrace, Lakonia)
  - Insufficient grid connection (Cyclades Islands)
  - Public reactions (Lakonia)

Therefore, until the time-consuming grid extension / upgrading works in windy areas are completed, wind park investments will, by necessity, focus on geographical

regions of Greece with moderate wind potential, in mountainous, difficult-to-access sites, such as in Continental Greece (Sterea Ellada), Peloponnese (except Lakonia), Eastern Macedonia, etc. It is exactly those regions and sites that comprise the large majority of electricity generation licenses already granted for wind parks by the Ministry of Development and RAE, but which have not been realised yet. The said sites are marginally viable, economically, even under the current favourable RES support framework, let alone under a substantially altered, more market-oriented (i.e. higher-risk) support scheme.

#### 2.4.3.3 Potential improvements to the current RES support framework

It readily follows from the above discussion that efforts to improve the current RES support system in Greece should concentrate, at least in the immediate future (2004-2010), on :

- Maintaining its basic structure and provisions (feed-in tariffs, capital subsidies)
- Resolving urgent administrative and technical problems and barriers, seriously delaying further RES development (licensing procedures, grid saturation, public information campaigns, etc.)
- Improving certain aspects / provisions / incentives of the current RES support framework

Such improvements may include :

- i) Differentiation of the buy-back (by the TSO) price of RES electricity, according to RES technology / type. This differentiation already applies to the level of capital subsidy on RES investment, granted by the EPAN/CSF III Programme (Action 2.1.3). Given the current modest level of this KWh price, i.e. 6.5 Eurocents/KWh (uniform for all RES), it is recommended that this level is retained for the commercially mature wind energy and small hydro technologies, and that it is substantially increased for solar, geothermal and (to a lesser extent) biomass-produced electricity.
- ii) As far as the EPAN/CSF III Programme is concerned, it is recommended that the cost ceiling of  $900 \text{ Euro}/\text{kW}$ , which is applied in Action 2.1.3 to the specific capital cost of wind parks that is eligible for subsidy, should be raised to at least  $1000\text{-}1100 \text{ Euro}/\text{kW}$ , in order to reflect current developments in the size and cost

of new-generation wind turbines. Also, the separate EPAN instrument (Action 6.3.4 or Measure 6.5), which has been created to provide 50% financing (subsidy) to the cost of grid connection of a RES installation (mid- or high-voltage line + transformer), but which has been totally inactive - financially - so far, should be promptly activated, to provide important financial support to many RES projects, currently under realisation with CSF III or Law 2601/98 support.

iii) Concerning the National Development Law 2601/98 and its recent modifications, the following RES-related improvements are recommended :

1. Inclusion of the grid connection cost (mid- or high-voltage line + transformer) to the capital cost of a RES project, which is eligible for subsidy. Currently, this connection cost, which, of course, is an integral part of any RES project, is many times not eligible to receive subsidy, due to a clause of Electricity Law 2773/99, according to which any newly constructed electricity line becomes, upon completion, property of the Public Power Corporation. This clause is in direct conflict with the National Development Law 2601/98, which decrees that the ownership of any capital asset that has received public subsidy under the said law cannot be transferred for at least 5 years. A simple solution, that would allow the grid connection cost to be subsidised, in a manner (and level) similar to the rest of the RES project's cost, is a modification of Law 2773/99. This modification will state that the ownership of a newly constructed grid connection line (+ transformer) of a RES project stays with the investor for the first 5 years and, afterwards, it is automatically transferred to the Public Power Corporation.
2. Establishment and prompt activation of the long overdue TPF (Third Party Financing) mechanism for RES investments, through the passing of a relevant law. Interestingly enough, the TPF mechanism is foreseen in both financial support instruments for RES investments, namely Law 2601/98 and EPAN/CSFIII/Action 2.1.3. In fact, EPAN/CSFIII favours RES investment proposals employing TPF, by giving them higher grades in the proposal evaluation scheme. However, TPF is still totally absent from existing and planned RES projects, because of the lack of the necessary legal framework (TPF Law). This law, several drafts of which have been

prepared and discussed in the last few years (but none has proceeded further), should deal with and regulate important issues linked to the TPF scheme. Such legal and financial issues include transfer of ownership, method for capital cost depreciation, VAT payment arrangements, handling of accumulated losses on the balance sheet, etc.

3. Abolishment of the current distinction / differentiation of Law 2601/98 incentives, between "new" (< 5 years) and "old" (> 5 years) enterprises / investors. Such a distinction does not serve any real purpose, except, perhaps, to cause the proliferation of new enterprise names and the establishment of hoards of new companies on paper. Its abolishment should, necessarily, be combined with the application of the total subsidy cap (maximum), currently in effect, per project, not per company / investor. This subsidy cap is presently 14.6 million Euro, a level set by Law 2601/98 back in 1998. Obviously, this level should be adjusted, at least for inflation (e.g. to 18 million Euro).
4. Adjustment of the payment schedule for public subsidies granted under Law 2601/98 to the corresponding payment schedule of CSF III/EPAN/Action 2.1.3 subsidies. This last schedule is more gradual, thus matches better the actual cash flows (expenses) of a RES investment project, during its materialisation phase.
5. Return of the current percentages of cash subsidies (30%) and tax-free reserves (70%), granted to wind park investments under Law 2601/98, to their initial values (40% and 100%, respectively), which were in effect before the recent (January 2004) modification of Law 2601/98. This substantial decrease in subsidy, targeted specifically to wind parks, while having a small quantitative effect on the State budget (annual savings of about 10-15 million Euro) has already had a strong negative influence on domestic RES market activity, as the market goes through the present crucial stage of planning its further development (see discussion in previous chapters). The return of Law 2601/98 capital subsidies for wind park investments to their initial percentage value (40%) may be combined, as a balancing measure, with the abolishment of the accompanying interest-rate subsidy (30% ; see Ch. 1.2.2.3).

It is important to note that both State financial - support instruments for RES investments, namely EPAN/CSF III (Action 2.1.3) and Law 2601/98, are based on significant capital subsidies (30-50% of capital cost, depending on RES type), rather than on KWh price subsidies. This has been a successful choice in practice, because it has encouraged the realisation of many RES projects by small - and medium - size investors (SMEs), whose cash flows are strengthened considerably by the upfront infusion of cash subsidy, while the financiability (by banks) of their RES projects is also improved. This is important, and it will continue to be so in the next few years, given the substantial uncertainties and risks still plaguing RES investment efforts in Greece: complex, time- and cash-consuming licensing procedures, negative public attitudes, legal battles, a forced shift (due to grid saturation) towards development of areas and sites with moderate or low RES potential, etc.

Beyond 2010, and assuming that State (public) capital subsidies for RES investments will be decreasing, a stronger RES electricity - price support may be necessary. Such a KWh price support may be combined with a more market-oriented RES support scheme, similar to the current Spanish system, where the buy-back price of RES electricity is comprised of a market (pool) electricity price component (fluctuating) plus a fixed environmental bonus (Eurocents / KWh). Such a system incorporates, in a satisfactory manner, the market price signals, while, at the same time, providing sufficient stability and reliability in business plan and cash flow predictions, that are necessary to ensure viability and financiability of commercial RES projects.

#### 2.4.4 Conclusions and recommendations

The following major points, regarding the present and future RES support framework in Greece, can be summarised from the discussion in the preceding chapter :

1. The RES financial support scheme, currently in effect in Greece, is based on a mix of : a) feed-in tariffs for RES electricity and b) capital subsidies or equivalent tax incentives (deductions) on RES investments. This mix (support scheme) has been in place since 1994 (Law 2244/94), but it was practically activated in 1998, when the National Development Law 2601/98 was passed and the CSF II public funds for RES/RUE/CHP investments were made available for the first time. Macroscopically, the Greek RES support scheme appears to have produced, in its 6-year course, substantial positive and measurable results,



as far as development, construction and operation of commercial-scale RES power capacity in Greece is concerned : from only 71 MW<sub>e</sub> in 1997 (the same as in 1994), the RES installed capacity in the country reached 500 MW<sub>e</sub> in the beginning of 2004. The largest part of this RES capacity, in excess of 400 MW<sub>e</sub> (or, 83% of the total), concerns wind parks. About 4200 MW<sub>e</sub> of RES power capacity have already been granted electricity generation licenses by the National Regulatory Authority for Energy (RAE) and there are, currently, at various stages of their environmental licensing process.

2. Two major points of concern regarding the future evolution of the RES sector in Greece can be identified :
  - i) The materialisation rate of RES projects already licensed by RAE is still low: only 12% of the RES projects that have been granted an electricity generation license, have materialised so far, with a further 5 % at various stages of construction (installation license granted). The slow materialisation rate of RES projects is almost entirely due to the administrative and technical problems and barriers still plaguing RES development today, namely complex RES licensing procedures, grid saturation in areas of high RES potential and negative public attitudes (reactions) / legal issues. These problems should be firmly addressed and promptly resolved, in order for the current favourable RES support framework to take full effect and produce even more positive results.
  - ii) Most of the RES development so far concerns wind parks, with minimal development of other RES power technologies (mainly some small hydro and biogas projects), while almost complete is the absence of commercial-scale solar, geothermal and biomass-electricity applications. This is largely due to the uniform, relatively low (6.5 Eurocents/KWh), buy-back tariff for RES electricity, currently in effect. This tariff does not differentiate between RES technologies, thus favours (in relative terms) the more mature, technically and economically, wind energy.
3. Two important factors should be taken into account when proposing potential improvements and/or modifications to the RES support framework, currently in effect in Greece : a) the crucial need for graduality in any change and b) the

technical / economic constraints arising from the specific patterns of further RES development in the country, which are expected to prevail, at least until 2010.

- i) The currently intensifying efforts of the Greek State to resolve the RES-related administrative and technical problems (e.g. by the issuing of JMD 1726/03), in order to push RES development forward, coupled with the large number (~ 200 MW<sub>e</sub>) of new RES projects (mostly wind parks), which are already in the licensing pipeline, and which have based their business / materialisation plans on the existing RES support framework (Law 2601/98 – EPAN/CSF III funds), effectively precludes any serious thought of drastically altering this framework, at least in the immediate future (until 2010). Drastic changes (e.g. the introduction of a quota / green certificate scheme) will only create new uncertainties, in an already burdened by problems and still immature (high risk) domestic RES market, and will lead to the shelving / abandonment of many ongoing RES projects and to diminishing domestic RES investment, before the current support system has a fair chance to prove its long-term potential and effectiveness (assisted by the State's corrective actions, presently under way).
  - ii) Until the time-consuming grid extension / upgrading works in windy areas are completed, wind park investments will, by necessity, focus on geographical regions of Greece with moderate wind potential, in mountainous, difficult-to-access sites, such as in Continental Greece (Sterea Ellada), Peloponnese (except Lakonia), Eastern Macedonia, etc. It is exactly those regions and sites that comprise the large majority of electricity generation licenses already granted for wind parks by the Ministry of Development and RAE, but which have not been realised yet. The said sites are marginally viable, economically, even under the current favourable RES support framework, let alone under a substantially altered, more market-oriented (i.e. higher-risk) support scheme.
4. Efforts to improve the current RES support system in Greece should concentrate, at least in the immediate future (2004 – 2010), on :
- Maintaining its basic structure and provisions (feed-in tariffs, capital subsidies)
  - Resolving urgent administrative and technical problems and barriers, seriously delaying further RES development ( licensing procedures, grid

saturation, public information campaigns, etc.)

- Improving certain aspects / provisions / incentives of the current RES support framework

Such improvements may include :

- i) Differentiation of the buy-back (by the TSO) price of RES electricity, according to RES technology / type. Given the current modest level of this KWh price, i.e. 6.5 Eurocents/KWh (uniform for all RES), it is recommended that this level is retained for the commercially mature wind energy and small hydro technologies, and that it is substantially increased for solar, geothermal and (to a lesser extent) biomass-produced electricity.
- ii) As far as the EPAN/CSF III Programme is concerned, it is recommended that the separate EPAN instrument (Action 6.3.4 or Measure 6.5), which has been created to provide 50% financing (subsidy) to the cost of grid connection of a RES installation (mid- or high-voltage line + transformer), but which has been totally inactive - financially - so far, should be promptly activated, to provide important financial support to many RES projects, currently under realisation with CSF III or Law 2601/98 support.
- iii) Concerning the National Development Law 2601/98 and its recent (January 2004) modifications, the following RES-related improvements are recommended :
  - a) Inclusion of the grid connection cost (mid- or high-voltage line + transformer) to the capital cost of a RES project, which is eligible for subsidy.
  - b) Establishment and prompt activation of the long overdue TPF (Third Party Financing) mechanism for RES investments, through the passing of a relevant law.
  - c) Abolishment of the current distinction / differentiation of Law 2601/98 incentives, between "new" (< 5 years) and "old" (> 5 years) enterprises / investors. This abolishment should, necessarily, be combined with the application of the total subsidy cup (maximum), currently in effect, per project, not per company / investor.

- d) Adjustment of the payment schedule for public subsidies granted under Law 2601/98 to the corresponding payment schedule of CSF III/EPAN/Action 2.1.3 subsidies. This last schedule is more gradual, thus matches better the actual cash flows (expenses) of a RES investment project, during its materialisation phase.
  - e) Return of the current percentages of cash subsidies (30%) and tax-free reserves (70%), granted to wind park investments under Law 2601/98, to their initial values (40% and 100%, respectively), which were in effect before the recent (January 2004) modification of Law 2601/98.
5. Both State financial - support instruments for RES investments, namely EPAN/CSF III (Action 2.1.3) and Law 2601/98, are based on significant capital subsidies (30-50% of capital cost, depending on RES type), rather than on KWh price subsidies. This has been a successful choice in practice, because it has encouraged the realisation of many RES projects by small - and medium - size investors (SMEs), whose cash flows are strengthened considerably by the upfront infusion of cash subsidy, while the financiability (by banks) of their RES projects is also improved. This is important, and it will continue to be so in the next few years, given the substantial uncertainties and risks still plaguing RES investment efforts in Greece: complex, time- and cash-consuming licensing procedures, negative public attitudes, legal battles, a forced shift (due to grid saturation) towards development of areas and sites with moderate or low RES potential, etc.
6. Beyond 2010, and assuming that State (public) capital subsidies for RES investments will be decreasing, a stronger RES electricity - price support may be necessary. Such a KWh price support may be combined with a more market-oriented RES support scheme, similar to the current Spanish system, where the buy-back price of RES electricity is comprised of a market (pool) electricity price component (fluctuating) plus a fixed environmental bonus (Eurocents / KWh). Such a system incorporates, in a satisfactory manner, the market price signals, while, at the same time, providing sufficient stability and reliability in business plan and cash flow predictions, that are necessary to ensure viability and financiability of commercial RES projects.

**ANNEX I : EREF'S MISSING TARGETS REPORT (2004)**