



11.2
ALPINE WIND HARVEST WP 11
Summary report

by

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The purpose of this report is to provide a summary of the research that was conducted for this work package, and more especially of the results that this research produced. It also contains recommendations to authorities in the individual subchapters.

Table of contents

11.2.1 Statistics	3
11.2.2 Economic framework conditions for wind power	4
a) Austria (Salzburg, Styria, Tyrol, Vorarlberg)	
b) France	
c) South Tyrol – Bolzano province/Italy	
d) Slovenia	
e) France	
Comparison and first recommendations to authorities	
11.2.3 Administrative framework conditions for wind power	15
Country portraits as above	
Comparison and first conclusions	
11.2.4 Political framework conditions for wind power	29
Country portraits as above	
Comparison and first conclusions	
11.2.5 Moderation and resolution of conflicts	44
Selection of examples	
Recommendations to authorities on administrative procedures	
11.2.6 Contribution to regional development	49
Country portraits as above	
Comparison and recommendations to authorities	
11.2.7 Costs	58
Selected examples on cost of wind power in Alpine settings	
Comparison and recommendations to authorities	
References	63

11.2.1 BASIC STATISTICS

Installed wind power capacity by end of year (in MW)

	1999	2000	2001	2002	2003	2004
Austria	42	78	95	139	415	607
France	23	79	85	147	240	390
Italy	211	389	697	785	891	1265
Slovenia						
Switzerland	3	3	5	5	5	8.87

Source: Data for Austria, France, Italy and Switzerland from *Windpower Monthly*, April issues of 2001, 2003 and 2005; IEA (for Switzerland 2004).

Targets under directive 2001/77/EC and target achievement by 2004 (share of RES-E in gross domestic consumption of electricity)

	Share in 1997	Progress by 2004	Target for 2010 in %
Austria	70%		78%
France	15%		21% 10.000-14.000MW of wind power**
Italy	16%		25%
Slovenia	29.9%		33.6%
Switzerland*	2.1 MW in 97***	Only 10% of target achieved by end of 2003	50-100 MW of wind power

Source: European Commission 2004; for Switzerland: Horbaty 2004

**Rhonalpénergie-Environnement 2004, annex 8, p.7

Specific target for wind energy announced in Nov 2001 for 2010: 50-100 GWh, corresponding to about 50-100 MW of installed capacity (Horbaty 2004).

*** Beatrice Langraf/Thiemo Kellner (2000) *Windenergie in Europa: Was bringen Gesetze und Fördermaßnahmen*, Interwind/Bundesamt für Energie, Zürich 2000, p.25.

11.2.2 ECONOMIC FRAMEWORK CONDITIONS FOR WIND POWER

11.2.2.1 AUSTRIA

Current regulation

In Austria, there is currently (as of 1 January 2005) no legislation or decree to support wind power by special feed-in rates, quotas, certificates, auctions or other way. This is due to a legislative mishap that is likely to be remedied some time during the year 2005 (see below); a proposal from the ministry of economic affairs is already in the consultation process. The only support that currently exists is an investment subsidy that varies between provinces. There is no special financial support for wind power development in the Alpine regions.

However, a special feed-in rate of Eurocent 7.8/kWh of wind power, payable for 13 years, started to be applicable beginning in January 2003; it still applies to all installations that obtained all necessary permits by 31 December 2004 and that are now connected or will go on stream by 30 June 2006 (the end date may well be postponed).

This rate is based on a decree of 2002 by the Ministry of Economic Affairs which implements the law on eco-electricity of the same year.

This regulatory situation (the favourable rate plus the knowledge that this rate was set to run out within a short time as far as new installations were concerned) created a temporary boom for wind power as for other kinds of electricity from renewable energy sources (RES-E) that will last for some time to come, at least until mid-2006. It seems likely that legislation will be adopted before this boom ends, but undoubtedly recent developments concerning RES-E and more specifically wind power since late 2003 are not very encouraging for potential investors. Wind power in particular has been targeted for reduced support.

Power to regulate RES-E support; current political conflicts

Austria is a federal state. Under the Austrian Constitution, energy matters are split between the federal and the nine provincial governments. In a succession of compensation regimes that varied very frequently, feed-in rates for RES-E were generally set by the provinces or Länder until 2002. Most Länder introduced quite favourable rates in the late 1990s or early 2000s. However, as the rate schedules differed from one Land to the other (and also varied – but not according to a common schedule – according to installation size, time of the day, season of the year and other considerations), this made for a very complicated system. In 2002, a law on eco-electricity moved the power to regulate this subject-matter to the federal level; a major intention of this law was to reduce the extra cost caused by the deployment of RES-E. As this implied a change of the constitution, a “constitutional clause” requiring a two-thirds majority in parliament had to be incorporated into this law. Achieving this majority in turn required the consent not only of the parliamentary majority of Conservatives and Freedom Party MPs, but also of the social democrats (in opposition), who in exchange received high rates of support for combined heat and power, something that is important for large cities which are traditionally governed by social democrats (Vienna, but also some others such as Linz or Salzburg).

The eco-electricity law of 2002 provided a quite generous feed-in rate for wind power (the rate was controversial from the outset, but experience was still lacking at the time). As a result, a boom in wind power began to develop as soon as the eco-electricity law came into force. Total installed capacity grew, from 139 MW at the end of 2002, to 415 MW at the end of 2003 and 607 MW at the end of 2004 (Windpower Monthly, April issues of 2003, 2004 and 2005 respectively). Under the impact of this development (possibly also misled by problematic calculations on the extra cost of RES-E put forward by electricity regulator E-control, the electric supply industry - long organised on the basis of territorial monopolies and still largely intact despite liberalisation - and the Association of Austrian Industry), the three industrial social partners (Industry Association, Business Chamber and Chamber of Labour) in early 2004 started to protest against the “excessive” cost of RES-E that they argued was “about to explode”, burdening industry and households. This protest was taken up by the Ministry of Economy and Labour Affairs which is largely in charge of RES-E under the eco-electricity act, and whose minister announced that the eco-electricity act had to be scrapped

altogether since it had become too expensive, indeed a threat to Austrian competitiveness in a globalised world (Lauber 2005).

In late summer 2004, this ministry produced a draft that cut back RES-E support dramatically. In the future, wind energy were to be subjected to a tender system, with a cap both on the amount that could be spent on support and on the feed-in rates that could be applied for. It was clear that very few, if any, new installations would be built under this regime. Other RES-E were similarly affected.

Due to protests from most of the provinces (who wanted to keep the eco-electricity law) and the Ministry of Agriculture, Forestry, Environment and Water Management which has a word to say in matters of eco-electricity and is also the political advocate of the farm sector (biomass, small hydro), this draft was watered down somewhat and adopted as a government bill in October 2004. Because of the benefits to CHP it contained, it was widely expected that this bill would muster the necessary two-thirds majority in parliament with the support of the social democrats. But at the very last moment, the social democratic leadership declared that they would not agree to this cutback of the RES-E programme, which they said was going directly against Austria's Kyoto commitments.

As a result, the bill failed in mid-December 2004. No new bill was submitted so far (i.e. by mid-2005). Discussions appear to be ongoing again for a basic revision of the law (Umweltschutz 3/2005, 34 of March 2005). However, the government could also simply reform the rates based on the eco-electricity law of 2002 since those rates are in any case set by decree. Whether there is a real chance for a political consensus on this subject among the major parties remains an open question. Many Austrian project developers are currently looking for opportunities – or already active - abroad.

11.2.2.2 France – Département Rhone-Alpes¹

¹ Unless otherwise specified, this information is based on Rhonalpénergie-Environnement (2004), Activity Report no. 2, October.

In France, RES-E was long subjected to a bidding system which was extremely restrictive and resulted in a mere 23 MW of wind power by the end of 1999. The biggest impulse came with a decree of 8 June 2001 which set the conditions under which wind power was to be bought. This regulation copied the German Renewable Energy Act of 2002: fixed rates for each turbine according to the year when it was connected to the grid; higher rates during the first five years (8.38 Eurocent/kWh), lower and differentiated rates during the next ten years (3.05 to 8.38 Eurocent, depending on the quality of the site; this should help avoid the excessive concentration of wind farms in the windiest areas); annually declining rates for new turbines according to a pre-established schedule (degression of 3.3% , beginning in 2003); guarantee of rates for a duration of fifteen years. However, this tariff was limited in time and volume as it was reserved for the first 1.500MW of installed capacity; after that, the tariff will drop by 10% in addition to the regular degression (Windpower Monthly, March 2005, 45), and in terms of the size of installations (it was reserved for installations under 12 MW). In addition, the government can issue tenders for large wind farms. One tender was published in 2003 (for onshore wind-farms), one (for off-shore) in 2004. In 2005, an attempt was made by windpower opponents – supported by National Assembly’s economic affairs committee - to change the law in such a way as to restrict the special tariff to installations superior to 30 MW in areas designated by the industry ministry. Supposedly this was to prevent scattered development; in any case it reflected the opposition to windpower from the angle of the protection of historical/cultural and natural landscapes (Windpower Monthly, April 2005, 8). In the end, the amended legislation – adopted on 23 June 2005 and confirmed by the Constitutional Council on July 7 - eliminated all size limits from the law and leaves it up to local authorities to set such limits (Windpower Monthly, July 2005, 60).

Special conditions for mountainous areas: Under the Mountain Law (Loi montagne of 9 January 1985), subsidies, special interest rates and other incentives are available to certain investments in mountainous areas, for reasons of distributive justice and in order to counter a trend towards increasing economic marginalisation of those areas. At the same time, wind power installations have to meet certain special conditions to be eligible for a construction permit which normally could not be awarded to a construction which “urbanises” the landscape outside the settled areas (see also the subsection on regional development). Since wind turbines have to respect a minimum distance to built-up areas of about 400-500 meters, this would normally present a problem. However, as long as turbines fulfil a public service

function, the permit can be awarded. This is held to be the case – according to an inter-ministerial circular of 10 September 2003 – if the electricity generated is sold to the public. Overall, even though the Mountain Law provides for special conditions of finance, it does not seem possible to quantify those conditions.

11.2.2.3 Italy² - South Tyrol/Alto Adige

In Italy, two systems of compensation for RES-E are currently in operation. One of them is a feed-in tariff, based on decree CIP 6/92 of 1992.. The other one is a system of quotas and tradable certificates, introduced in several steps beginning with the reorganisation of the electricity sector by the Bersani decree. In addition to these support systems, there is also a variety of other instruments (fiscal measures, subsidies and ad hoc programmes at the national, regional, provincial and local level.

The **feed-in tariff** was introduced in 1992 and suspended in 1996 except for those projects which already have an approved site. Due to long delays (administration, grid connection, technical problems), most of the RES plants that went on stream in recent years still benefit from this regime. From 2006 onwards, the installed capacity of RES-E plant benefiting from these tariffs should decline (the rate is limited to eight years after grid connection). In 2003, these rates ranged from 0.0952 Euro/kWh to 0.068/kWh, depending on the date when the installations went on stream and other parameters. After that time, wind turbines receive a price of about 0.05 Euro/kWh, (the normal market rate in Italy amounted to 0.05-0.06 €/kWh in recent years).

Quota for RES-E for producers or importers of electricity exceeding an annual volume of 100 GWh were introduced in 2002. For 2002-2003, the quota was 2%. It was stepped up for 2004-2006 to 2.35% and is expected to be increased further for 2007-2009 and 2010-2012. If producers or importers subject to quotas do not fulfil their obligation, they have to pay a buyout penalty of one and one half times the value of the certificates (see below), i.e. about 0.12 to 0.15 €/kWh. This is generally not considered to represent a sufficient incentive.

² Most of this section relies on the report by Rosaria di Nucci, see subsection 11.3.3 of this report

Green certificates for RES-E plant were also introduced in principle by the Bersani decree. In principle, they should be traded, so that a market price will establish itself. In fact however, there is an administered market since the certificates from CIP6/92 installations sold by the national grid operator GRTN – which in fact exceed demand – are sold at a reference price which in 2003 amounted to 0.082 €/kWh. For 2004, the reference price for GRTN certificates was set at 0.09739 €/kWh. Certificates not used in a given year can be carried over to the next three years (“banking”), something that should make the system more stable and prices less volatile.

In general, quota/certificate systems are introduced to bring prices down by introducing more competition to the market than is expected under a feed-in tariff system. For this reason it is remarkable that the Italian system is probably the most expensive in Europe, at least currently, as it leads to a compensation for wind power of somewhere between 13 and 16 cents per kWh for eight years – substantially more than in most countries. Even so, installation figures are not particularly high, although in 2004 they have recovered from the stagnation in 2002 and 2003 that followed the introduction of the quota/certificate system. This is due to long and complicated administrative procedures and to problems with grid access as well as to a growing opposition to wind power in some areas (see subchapter 3.3 below).

Subsidies: Law 488/92 provides investment subsidies to enterprises in a variety of sectors, including energy. Subsidies cover up to 50% of investments for SMEs, 35% for larger firms. This law was crucial in providing finance for wind power in the structurally weak regions, particularly in the south and on the islands of Sicily and Sardinia. Under legislative decree 387/03 from 2003, regions may also take measures in addition to those taken at the national level to promote RES-E (di Nucci 2005, p.41). Some regional laws allow additional support for RES-E investments. This is also the case in South Tyrol/Alto Adige (30% investment support).

11.2.2.4 Slovenia

In Slovenia, the EU directive on the single market for electricity of 1996 was transposed into national law in 1999. On that occasion, a coalition for sustainable energy consisting of independent experts, interest groups of independent power generators and environmental

citizen organisations succeeded in securing cross-party support for regulations in favour of independent power producers that were incorporated in the Energy Act. That act is neutral with regard to instruments and allows for a quota/certificate system but also for feed-in tariffs. Investment subsidies are also possible without specific legal framework. Based on foreign and domestic experience, it was decided to proceed first with feed-in tariffs (Tomsic and Klemenc, 2005).

Feed-in tariffs had in fact existed since the early 1990s. Combined with soft loans, they led to a boom of small hydro constructions. Because some of them were poorly done (crude construction, disregarding environmental considerations) but at the same time supposedly very profitable, public opinion turned against them. Even though inflation was quite high, the government from late 1998 to early 2002 did not adjust the rate levels, which in turn lost 30% in value over a time period of a little more than three years.

In March 2002, the Slovenian government published the rules for setting feed-in rates; it also issued a decree on prices that theoretically has to be reviewed at least annually, “taking into account” the consumer price index, fuel prices and electricity prices – this says very little if anything about the outcome of this process. The generator also has the possibility of selling his power directly on the market and of obtaining the premium for RES-E (special rate, e.g. for wind power, minus the value of electricity set at 3.56 Eurocent/kWh).

These rates were revised not in 2003, as they should have, but only in March 2004. The rates were not adjusted to inflation: in Slovenian currency (SIT), the rates remained nominally the same, whereas they declined by 6.3% in Euro terms – more than any other RES-E rate except for geothermal and large municipal waste (Tomsic/Klemenc, 2005).

In 2002 and 2004, the rates for wind power were as follows):

Table 1 (Feed-in rates for wind power in Slovenia, 2002 and 2004, in Eurocent)

	< 1 MW	>1 MW
2002	6.47	6.24
2004	6.06	5.85

Tomsic and Klemenc conclude that at these rates, wind power is not profitable. This may seem surprising in light of a large project that is currently pending (47 turbines of 850kW). However, it appears that this project is politically driven; if there are no profits, this will not be too disturbing to the investor, a distribution company that can do without profits on this particular investment since it is in a position to expect compensation in other ways.

In principle, there is no investment subsidy for plants which receive the feed-in tariff. However, there may have been individual breaches of this rule.

11.2.2.5 Switzerland³

Financial incentives for RES-E exist and reflect the federal structure of the Swiss state. There is a regulation on **feed-in tariffs** in the Swiss Energy Law (Energiegesetz, 26 June 1998, 730.0), supplemented by the Energy Decree (Energieverordnung, 7 December 1998, 730.1) which makes it compulsory for utilities (territorial monopolies) to buy RES-E generated by independent producers at a price that reflects the cost of “equivalent energy” generated by new Swiss generation plants, a somewhat flexible term that gives rise to differing interpretations. (Note that only independent power producers receive these special tariffs. Utilities may have a participation in them of at most 50%. As a result, many utilities are hostile to this law). Theoretically, these costs – and accordingly the tariff rates – are adjusted regularly in order to reflect the average costs of the past five years. In addition, RES-E generators are free to sell green certificates to anyone. There is a trade of those certificates that relies on voluntary purchases, not on quotas.

In 2004, the price for RES-E was about 0.1 €/kWh (average between summer/winter, high and low tariff) which is considered as too low by most investors, who say they need about 0.15 €/kWh (small wind farms, expensive planning procedures, high cost of labour, relatively poor wind conditions – only rarely over 1.500 hours of full load per year; labour costs make up about 40% of total cost).

³ Based largely on Robert Horbaty, report for Wind Harvest project, June 2004.

There is also another hitch: Most utilities are very small (more than 1.100 different utilities in Switzerland) and many find it difficult to pay for the extra cost. To remedy this problem, the cantons are supposed to set up funds fed by all the utilities in the canton, to compensate small utilities if they have a disproportionate share of RES-E fed into their system. However, no canton so far (2004) has set up such a fund. In general, there is unsatisfactory security for investors as jurisprudence on RES-E issues concerns only small hydro.

In addition, there is a voluntary market for **green certificates**, but no quota obligation. A quota obligation was being discussed for new legislation. Green certificates are marketed by green producers for extra income.

A reform in 2004 modified this regime. The compensation fund for small utilities was disbanded; it never functioned properly. The extra cost of distribution operators due to RES-E from independent producers is compensated from a surcharge levelled at the high voltage grid operators. An independent authority was created which will distribute the extra cost of RES-E evenly among all distribution operators (www.energie-schweiz.ch/internet/03753/index.html/lang=de). The rate of compensation is about 10.5 Eurocent, depending on the exchange rate (IEA 2005; Windpower Monthly, March 2005, 46).

Currently a reform of RES-E compensation is discussed in the Swiss parliament. The National Council's energy and environment commission proposes a minimum price that should cover all costs. A corresponding bill will be discussed in summer 2005 (Windpower Monthly, June 2005, 14).

Investment incentives: Only cantons can give subsidies which will then be matched with an equal amount from the federal government, However, this is very difficult at the moment due to the difficult budget situation of most cantons and due to the fact that cantons concentrate their subsidies on biomass and energy efficient buildings rather than on wind energy projects. Rates vary between 20% (plus 20% from the federal government) in some cantons, and zero in others.

Preparatory planning activities (site assessment, planning, site promotion) can be assisted on a very modest scale by Suisse Eole, a paragovernmental body.

Special incentive for mountainous regions: For structurally weak regions there is a law on aid to investment (Investitionshilfegesetz für Berggebiete). This instrument has already been used successfully to support wind power investments.

There are no tax incentives for wind power in Switzerland.

11.2.2.6 Comparison and first recommendations

Compensation varies a great deal between the five countries/regions studied here. It varies, first, by the amount: between 13-16 Eurocents for eight years in Italy under the new certificates regime and 5.58 cents in Slovenia (see table below). It also varies according to the certainty with which it can be relied upon. This certainty is highest under feed-in tariffs with specified time periods, and lowest in the case of certificates where important swings of the market price of certificates are theoretically possible (for this reason quota/certificate systems are likely to be more expensive than systems relying on feed-in tariffs, at least in Europe – see Lauber and Toke, 2005). However, this may largely be ruled out in Italy as the market for certificates is currently a highly political market and likely to stay that way for some time; and in any case compensation is so high that even a moderate decline of prices would not change the high profitability of such investments. Even so, the immediate impact of the introduction of the certificate system was stagnation for about two years – probably until the financial community became accustomed to the new instrument. Compensation varies finally with the subsidies granted to investment. Here too, Italy has the highest ratio of support.

	Austria	France	Italy	Slovenia	Switzerland
Amount (in Eurocent)	7.8 for thirteen years	8.38 for first five years, 3.05 to 8.38 for next ten (plus annual decline)	13-16 for eight years	5.85, amount to be updated regularly	10 cents
Security	High	High	Medium	Low	High

Investment aid	Small (exc. 2003-04)	medium	High to very high	Possible but uncertain	modest
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It is remarkable that this variation in the amount of compensation is not reflected directly and proportionally in the installation rates of the five countries under consideration (see statistics on page 1). The main reason for this resides probably in the different administrative and political frameworks in the several countries.

Recommendation to authorities:

1. If the goal is to minimise costs of windpower development while at the same time encouraging its expansion, current experience shows that this can be achieved better by a feed-in tariff. Current quota/ tradeable green certificate systems such as the Renewables Obligation in the UK or under the Italian system carry a much higher price tag per kWh than the German or French feed-in tariff. This is partly the result of the increased insecurity of green certificate systems (it is impossible to know the certificate prices ahead, even for a period of eight years) and, resulting from this, the increased cost of capital resulting from the higher risk.

11.2.3 LEGAL AND ADMINISTRATIVE FRAMEWORK CONDITIONS FOR WIND POWER

In all the countries/regions of this study, administrative procedures present a problem for investors, although the intensity of these problems varies greatly. Partly this is due to a complex system of permits that need to be issued, partly – and probably to a larger extent – to the fact that wind power has become controversial, and particularly controversial in Alpine regions. The present chapter deals with the legal and administrative framework. The controversies surrounding wind power installations in specific settings are dealt with in Chapter 4.

11.2.6.1 Austria

The Austrian bureaucracy has a reputation of being comparatively efficient. Even so, permit procedures can take several years.

For small RES-E generation facilities, the possibility for a simplified procedure (notification only, instead of a permit) was introduced by a federal law in 1998 (ElWOG). This law was implemented by the Länder in a differentiated way. But in all of them the “small facilities” as defined by Länder laws are hardly relevant any more, as the threshold is in the area of 200-500kW. Even in Alpine areas, the most common size is now well over 1 MW.

For normal size turbines, a project developer needs one or two preliminary permits: one from the district authority for road clearing and cables across forested areas, and one from the Land authority in charge of air transport (decides whether there is an obstacle to air traffic and whether the turbine will have to be made visible in a particular way).

The central permit procedure then takes place before the local community authority which is in charge of spatial planning. In alpine terrain, the developer will normally need a special individual permit under the spatial planning law. The decision of the local community is subject to supervision by the district authority. This decision is based on an expert opinion on whether the wind power installation will interfere with competing use of the land. The local community also has to take into account the opinion of the nature protection official at the

district authority (based on a catalogue of guidelines). Neighbouring communities and interest groups have a right to make statements.

The decision of the local community is then passed on to the district authority for control. In the case of a positive outcome, several other permits will be needed:

- nature protection (expert at district authority. This includes a judgement on whether the character of the landscape will be changed; here decision criteria are currently notoriously incomplete. The district authority may impose measures of compensation for damages to landscape.
- construction permit (by the mayor of the commune, or by the district authority if residential buildings are affected)
- electricity permit (by Land authority)
- water law permit (by district authority)

Theoretically these procedures can be concentrated in a single one in some of the Länder (such as Salzburg), but normally this occurs only in an environmental impact procedure, which in turn is only required for installations consisting of 20 MW, or 10 MW or ten turbines in protected zones. Under EIS procedures – even simplified as in this case – citizen initiatives are allowed to take part (but without right to appeal).

At the end there needs to be a certification of the turbines from a technical point of view and as qualifying for a special rate; this is a precondition for a contract for RES-E.

Total time for such procedures can last at least three years, and longer if there are conflicts involved. The investor can appeal the decision of the local community to the district authority, but normally it is the local community which is more likely to favour wind projects. One part of the problem is that many of the authorities are political and legal at the same time: thus the governor of a land or other member of the provincial government, are elected officials who may issue instructions to a district authority which may be inspired by non-legal considerations but disguised behind a screen of legalism; this has a long tradition in Austria.

11.2.6.2 France

In France, the administrative procedures are estimated to take up about 3 to 5 years on average (Rhonalpénergie-Environnement 2004, 18-20; Windpower Monthly, March 2005, 45: “four years on average”) and involve some two dozen different administrations. They involve a series of steps:

- Change of zoning regulation by the mayor
- Preliminary examination of demand for a construction permit by the mayor
- Examination of request for a construction permit by prefect or mayor. This involves the participation of several authorities:
Direction régionale de l’environnement - DIREN- regional environmental authority (gives opinion on impact assessment), prefect or mayor (holds a public inquiry), civil aviation authorities and air space defence authorities (regulations on aeronautics and radio-electricity, servitudes); environment ministry and landscape/monument protection authorities if the turbines are to be located in a special site; DIREN (if NATURA 2000 site); ministry of forestry or prefect (authorisation to clear woodland if above a certain size);
- prefect (to certify obligation to buy the electricity generated above a certain capacity);
- energy minister (authorisation to commercially exploit turbines);
- prefect (for connection to the grid)

In mountainous areas, wind farms have to meet certain additional conditions (ibid., 1-26) .

- agricultural land in principle has to be preserved (but an exception can be made if the electricity is sold to the public – service public; however, they have to respect a certain number of conditions so that they do not hinder agricultural activities). They could also be declared as a factor of diversification for agricultural activities; in this case they would be treated as constructions necessary for agricultural activities.
- Urbanisation must take place in the immediate vicinity of settlements. Due to the obligation to respect a distance of 400-500m from buildings, turbines could not meet this criterion. However, if EDF certifies that it will buy the electricity generated by the wind power installation, this service public argument will take precedence.

- The natural and cultural heritage characteristic of mountain areas must be preserved. This principle is the most restrictive. However, even in this case the number of exceptions is growing.

There are essentially two reasons for this substantial regulation of mountainous areas by the 1985 Mountain Law: the development of skiing resorts in the 1970s (which were often a disgrace to the cultural and landscape heritage) and the need to develop rural areas if they were to keep up with national economic and social development. This potential conflict still exists today and is likely to be a source of friction - and of source of problems for wind farm developers (see also section on wind power controversies in alpine areas).

A positive impulse is likely to come from the energy law adopted in June 2005. This law provides the setting up of “wind power development zones” – zones de développement de l'éolien). Local communities may propose such zones to the prefect, who has to take a decision within six months of the receipt of such a proposal, taking into account wind potential, grid connection, landscape and monument protection as well as the opinions of different administrations and neighbouring communities (Windpower Monthly, July 2005; mail from IWR Pressedienst, 14 July 2005). In Germany, the setting up of such zones proved to be a key contribution to the spread of wind power. (Jacobsson and Lauber, 2006).

11.2.3.3 Italy – South Tyrol/Alto Adige

In Italy, complex administrative procedures represent probably the biggest hurdle to wind power deployment. However, as can be seen from the table on installed capacity in the five countries/regions under consideration, Italy has by far the largest installed capacity, with regular growth over many years. So even if the administrative framework may represent a serious obstacle, it has not discouraged development altogether.

Complex legal and administrative procedures are not peculiar just to wind power. There is a long legalistic tradition in Italy, with many subjects being “over-regulated”, and sometimes subject to conflicting regulation. With regard to spatial planning and landscape use, there is also in Italy a landscape that is particularly dense in historical sites, given the many surviving vestiges and monuments of a rich history.

In recent years, there have been efforts to simplify administrative procedures by decentralisation measures and by reducing the number of permits that are necessary. However, it is not clear to which extent the most recent – and potentially the most important – reform of 2003 has been translated into changed administrative practice. For this reason, both the “old” system prevailing before 2003 and the new system prevailing since then will be presented here summarily.

Under the old system, the following table gives an overview of the complexity of the procedures that were - and in fact still are, as the new system is still held up - necessary:

Synopsis of the permit procedures (simplified old procedure) for a wind energy project (not considering regional peculiarities)

Relevant Legal Norms	Competent authority	Nature of the intervention	Necessary documentation	Conditions/ prerequisites	Duration
Stage 1: Acquisition of a VIA and application for various “nihil obstat” and permits					
<p>D.P.R (Decree of the President) of 12 4.1996 as modified and integrated by DPCM (Decree of the prime minister) of 3.9.1999, esp. Annex C (environmental impact assessment study) and D (screening)</p> <p>DPR. 357 of 8.9.1997 as modified and integrated by DPR 120 of 12.3.2003, especially Annex G (Valutazione di incidenza)</p> <p>Landscape protection: Legislative Decree 42 of 22.1.2004 “Codice dei beni culturali e del paesaggio, ai sensi dell articolo 10 della L. 6 Luglio 2002, n. 137”. Esp. Art.</p>	<p>Region (Department of Environment; regional environment Agencies)</p> <p>Regional or provincial - Forest office -Military authority - Genio civile, - Earthquake Authority, etc</p> <p>Region (Superintendent for cultural and landscape asset) Ministry for</p>	<p>VIA (environmental impact assessment)</p> <p>Valutazione di incidenza</p> <p>Various “Nihil obstat”</p> <p>Landscape & nature protection conformity authorisation</p>	<p>Application with annexes (description of infrastructure and all elements necessary for the authorisation of the project in two copies)</p> <p>Annexes to the Application:</p>	<p>Execution of an environmental impact assessment</p>	<p>Conclusion 1. stage</p> <ul style="list-style-type: none"> • In the case of a positive outcome: <p>Secondary application + beginning of the phase 2</p> <ul style="list-style-type: none"> • In the case of application rejection: premature end of the procedure

<p>146 (capo IV- Controllo e gestione dei beni soggetti a tutela, Art.146: Autorizzazione)</p> <p>DPR 380 of 6.6.2001 "testo unico delle disposizioni legislative e regolamentari in materia edilizia"</p> <p>Law 241 of 7.8.1990 "Nuove norme in materia di procedimento amministrativo e di diritto di accesso ai documenti amministrativi" and following integrations and modifications</p> <p>Regional Guidelines on wind power installations (not available in all regions)</p> <p>Protocollo di Intesa (Agreement protocol) between the Ministries of Industry, Environment, "Cultural assets & active-ties" and the Regions on the diffusion of wind power and its integration in the landscape.</p> <p>Regional Guidelines and energy plans (PEAR) <i>Delibera di Giunta</i> (decision of the regional council on VIA) Regional laws. Regional norms for the erection of wind-energy installations, e.g.</p> <ul style="list-style-type: none"> • Apulia -Deliberazione G.R. 02.03.2004 No.131 • Calabria -Deliberazione G.R. No. 564 "04.08.2003 • Campania -Deliberazione G.R. N 6148 15.11.2001 • The Marches -Deliberazione G.R. 16.07.2002 No. 324 • Sicily- Dec. Ass. 10.09.2003 	<p>"cultural assets & activities "</p> <p>Municipality</p> <p>Conferenza dei Servizi</p> <p>Region</p> <p>Region</p> <p>Region</p>	<p>Building permit</p> <p>Single authorisation</p>	<ul style="list-style-type: none"> ▪ study on wind potentials of the area; ▪ project study; ▪ certification of the plant; ▪ conformity to security criteria; ▪ documentation of grid connection; ▪ socio-economic study; ▪ environmental study; ▪ commitment declaration 	<p>(VIA) or screening, depending on regional legislation and environmental relevance of the siting</p>	
<p>Relevant Legal Norms</p>	<p>Competent</p>	<p>Nature of</p>	<p>Necessary</p>	<p>Conditions/</p>	<p>Procedure/Duration</p>

	authority	the intervention	documentation	prerequisites	
Stage 2: Technical investigation and verification (istruttoria tecnica e verifica)					
	Region (Department of energy or Department for “strategic objectives”)	Technical examination Final approval (Collaudo)	<ul style="list-style-type: none"> • “destinazione urbanistica”(town planning utilisation) of the location • scope & existence of infrastructures • consent of the administration to the installation • presence of local economy (trade + services+ manpower) 	Successful VIA A number of “nihil obstat” e.g. hydro-geological, scenic, archeologic, seismic, flight-security , etc <ul style="list-style-type: none"> • optimisation of the neighbouring area esp. grid connection, • minimisation of aesthetic and acoustic impact • no interferences with Radio-telecommunication network 	The investigation starts 30 days after presentation of the complete documentation. Collaudo (Test) 90 days after positive VIA <ul style="list-style-type: none"> • In the case of a positive outcome, conclusion of an agreement („convenzione “, between the applicants and the local community • communication to all concerned authorities An application rejection can take place also in this phase
Stage 3: Authorisation and establishment of grid connection					
GRTN resolution of Mai 2003, entered into power in June 2003	GRTN (national transmission system operator) or regional TSO	Grid connection GRTN is responsible for the realisation of the grid connection and the applicant for the user-connection.	Application		After the presentation of the application, the department “Pianificazione rete” " of GRTN supplies connection options within 90-180 days. The applicant may propose alternative options or accept them within 60 days. Subsequently, the file is forwarded to the GRTN-“Ingegneria” department. Within 6 months after the request for connection has been approved, the applicant must present a project-schedule and the current state of the permits acquisition.

	Provincial technical office	Power lines		Nihil obstat from involved municipalities and provinces, telecommunication office (regional area), military command (regional area); forest direction, regional environment agency etc.	100-240 days for eventual objections
Final Stage for possible objections					
					Final Authorisation 30 days after the end of the objection time limit

Source: Di Nucci (2005), National Regulation and practices in Italy, report for Alpine Wind Harvest Project, pp.39-40.

In recent years, several innovations have changed this picture at least in theory if perhaps not always in practice. The reform of the Italian constitution of 2001 gave regional and local governments a number of competences in the energy sector, e.g. approval and concession of siting permits. In November 2002, the decree “sblocca centrali” (power plant acceleration decree) envisions a single authorisation by the Ministry of Industry within 6 months, or 12 months if an environmental impact statement is necessary (di Nucci, p. 35). Perhaps most importantly, legislative decree 387/03 of 2003 established that construction and operation of power plants using renewable sources are subject to a single authorisation granted in a single procedure involving all the administrative departments concerned and lasting no more than 180 days. Guidelines for the single procedure are to be approved by the “conferenza unificata” (consisting of national, regional and local governments); these guidelines should guarantee that wind farms are properly integrated into the landscape.

The major steps of the single authorisation procedure are as follows:

- Authorisation request by project applicant
- Conferenza di servizi (commission formed by involved municipalities, stakeholders and experts) is called together within 30 days of request. All administrations involved send a single official to this body.
- The Conferenza must complete its work within 90 days. Should an environmental impact assessment (“VIA”) be necessary, it must be completed within these 90 days, the Conferenza has to decide after an additional 30 days.

- If the VIA is positive, other administrations (environment, landscape protection) cannot make objections. However, an objection may still be made for health risks.
- The Conferenza terminates the procedure with a memorandum of agreement (“protocollo di intesa”) which lays down all the necessary permits (environmental, town planning, building...).
- In addition to national laws, the Conferenza also has to take into account regional guidelines on wind power installations if those exist. In the Alto Adige/South Tyrol region, these are still in the process of formulation.
- Modifications may be requested once, this will extend the permissible duration of the procedure by 30 or 60 days, but in no case the procedure may exceed 180 days.

In early 2005, the implementation of legislative decree 387/03 of 2003 was still not implemented (Windpower Monthly, March 2005, 43).

Legislative decree 387/03 also brought some other important innovations. The role of regions is reinforced, especially with regard to regional targets. Also, a permit cannot be made dependent nor even envisage compensation measures in favour of regions or provinces. This breaks with past practice when additional agreements were often made between developers and local communities.

11.2.3.4 Slovenia⁴

There is a series of hurdles that need to be cleared for any wind turbine installation. A typical procedure includes both administrative and legislative activities. They are as follows:

Energy licence and energy permit: Generation, transmission and distribution of electricity require an energy license; the construction of a facility for generation or transport of electricity requires an energy permit. To obtain a licence, the potential license holder must employ at least one expert qualified for the operation of small power plants and have at his

⁴ Based on [Borut Santej](#) (2004), Construction of wind power facilities: the legal requirements. Report to the project Alpine Wind Harvest, 19 pages.

disposal at least 200.000 SIT (less than 1.000 Euro). The licenses are granted for five years and can be renewed. A licence is not required for a self-generator.

A permit is necessary for the construction of a generation facility larger than 1 MW or of a transmission facility exceeding 1 kV. The permit is confirmation that the planned facility is in compliance with national energy policy. The person applying for the permit must be a licence holder or have a contract with one. To secure a permit, the proposed facility must

- operate safely (opinion of the network operator to which it will be connected)
- meet the requirements of spatial planning acts (local or national)
- accord with long-term national energy balance sheet
- make use of state-of-the-art environmental protection technology

Spatial Planning. This is a more difficult hurdle and a potential stumbling bloc. Turbines can only be constructed in accordance with spatial planning acts. These are legislative acts, not individual administrative decisions; accordingly, the investor has to persuade the national and/or municipal legislature; the strong influence of the public adds to making the outcome unpredictable.

At the national level, plans are prepared by the Environment Ministry (Ministry for Environment, Spatial Planning and Energy) and adopted either by the National Assembly (parliament) in the case of the National Development Strategy or by the Slovenian Government (in the case of a National Detailed Plan which plans in detail a particular facility of national significance). At the municipal level, a Municipal Spatial Planning Strategy laying down the framework of spatial organisation is adopted by the municipal council, as is the Municipal Spatial Planning Order which is the municipal zoning act. A Municipal Detailed Plan formulates a detail plan for particular facility of local significance and is also adopted by the municipal council. A regional plan is optional.

Developers can propose amending existing plans or adopting new ones. In the case of detailed plans, the developer will at least co-finance the plan; in other cases the preparation of new planning acts will be financed by the governmental authorities concerned.

Many authorities are “authorised stakeholders” and contribute to this plan. In the only case of a wind farm planning procedure, 21 different authorities were asked for guidelines (17 were received); they range from ministries to public utility companies. The public can also participate in spatial planning conferences or public presentations, ask questions etc. Spatial planning conferences are a meeting of authorities in charge, environmental and other NGOs,

professional associations, and other influential groups. The plan must theoretically take all inputs into account (a utopian provision).

Spatial planning acts will make use of environmental impact procedures and assessments.

When a plan interferes with a territory governed by nature protection, the nature protection authorities will be asked for their opinion during the environmental impact assessment procedure.

Wind power facilities of 10 MW or more are considered of national significance and therefore must be planned in detail by the national detailed plan; only a minister (most likely the head of MESPE) can propose the adoption or change of a national planning act. For those facilities, the construction and operation permit must be issued by the ministry MESPE. Smaller facilities are the object of municipal planning acts (normally a municipal detailed plan), a process which can take up to a year or more; the “administrative unit” (the territorial unit of the national administration) grants the relevant permits. For the time being however, all wind farms- regardless of size – are “of local significance” until a new National Development Strategy of Slovenia has been adopted. In the case of the large wind project by Elektro Primorska, the national parliament with a very large majority transferred the licensing power to the local level to accelerate the procedure (Nikionok-Ehrlich 2003):

Environmental permit: It is not yet certain whether such a permit is necessary; it may be so because of noise emissions.

Construction permit: The procedure is much facilitated if the permit is based on a detailed plan rather than on a spatial order. In that case, neighbours and others affected by the proposed construction do not participate in the procedure, project guidelines and opinions are not required, and environmental impact assessment consent was already given in the planning procedure. Obtaining a permit based on a detailed plan is more or less just a formality.

Operation permit: It is granted after inspection of the completed facility by a commission representing the stakeholders that gave guidelines and opinions during the preceding planning or construction permit procedure.

Even though any connection of a facility to the energy infrastructure needs an energy consent, an exception is made for wind power plants.

11.2.3.5 Switzerland

Spatial planning: This is regulated by the *Raumplanungsgesetz* (law on spatial planning) and *Raumplanungsverordnung* (decree on spatial planning). One to three turbines may be installed under the planning law without a special zone; four or more turbines require a decision establishing a special wind energy zone. This is very time consuming but includes opponents at a very early stage, which yields faster results in the end. All projects must prove that they are environmentally compatible according to the criteria of the decree.

Construction permit: All projects require a construction permit based on state and local (communal) legislation which varies from one canton to the other.

Consent of aviation authority: The Federal Office of Civil Aviation must approve the dimension of the plant.

Landscape protection: Turbines must not conflict with landscape protection. This has become a major impediment. As turbines became very controversial in recent years, the Swiss Foundation for Landscape Protection (members are local communities, cantons, the federal government and private organisations) has objected to most of the bigger wind power installations as a matter of principle (earlier on, the Foundation had accepted wind energy, but at that time turbines were considerably smaller than they are today – 500 kW and less). It seems likely that all these projects will end up in court. (The Foundation has this right to make such objections under the Swiss Law on Environmental Protection – *Umweltschutzgesetz* – along with some other organisations).

As a result of the desire of the federal government to make progress with the development of wind energy and taking into account the conflicts surrounding this particular source of renewable energy, a novel approach was developed in 2004: the Swiss Wind Energy Concept, presented in August 2004 by the Federal Office of Energy. With the help of GIS technique, both optimal installation size and 94 appropriate locations fulfilling technical criteria (wind speed etc.) were identified. In a second step, 28 locations were given priority on the basis both of cantonal plans and of projects already known to be under preparation (this does not mean that other sites cannot be developed). The criteria for selection were worked out and agreed upon not only by all the government services involved (Federal Office of Energy, Federal Office for the Environment (BUWAL) and Federal Office for Spatial Planning and Development (ARE), but also by NGOs for landscape and environmental protection and by the wind energy and electricity sector associations. There are also other ways in which the

Federal Government helps developers, e.g. by setting up Suisse Eole which in turn gives support to planners and operators of wind energy projects.

In recent practice, the most important constraint on wind power today comes from its opponents. Even though a strong majority is in favour of renewable energies in general and wind power in particular – in a poll conducted in 2003 only 27% stated that they definitely (10%) or “rather” (17%) would not want to live close to wind turbines (homepage Suisse Eole, accessed 15 July 2005) – opposition is powerful thanks to the legal system, not so much in administrative procedures as in the challenges to administrative decisions before the court system.

11.2.3.6 Comparisons and first conclusions

There are clearly important differences between the administrative framework conditions in the different countries/regions. In many cases these have to do with traditional administrative practices and are not easily changed. To some extent they reflect the interests and power of interest groups; this too is not changed easily.

It seems clear that procedures that last five years or longer for projects the size of a small or medium sized Alpine wind farm, with one to about ten turbines, have a deterrent effect on investors and do not appear desirable. Concentrated procedures as they exist in some of the countries under consideration which are equally thorough in considering the various interests and objections appear much preferable. However, this is not easily changed.

Several questions require first a discussions of the political conditions under which windpower is developing today in the Alpine area. Those recommendations will therefore be formulated later on.

One recommendation can be formulated here on the basis of best practice. This is the encouragement given to interested local communities to select, prior to and independent from any application for a wind power project, zones in which such projects will find both the necessary wind resources and the approval of the authorities. As mentioned before, such legislation (introducing however an obligation rather than an encouragement) was very

helpful in promoting wind power in Germany. It made it unnecessary for investors to obtain a derogation from the spatial plan, which otherwise would have been necessary for erecting a wind power plant. At the same time, this permitted a more objective discussion of the advantages and disadvantages of locating wind power plants in particular areas without an immediate conflict at hand. (The recommendation formulated here however is for a mere encouragement rather than a general obligation since in Alpine communities the locations appropriate for wind power will be few, so that a general obligation would introduce unnecessary work for many local communities whose budgets are often strained anyhow).

For a local community such a procedure would have another advantage: it would secure greater independence vis-à-vis investors. Not only would it become more attractive to investors, it could also benefit from not depending on a single project proposal on a take-it-or-leave-it basis (this might be the case if only one project developer is interested).

11.2.4 Political framework conditions for increasing wind power use in the Alpine space

To an extent that could hardly be foreseen at the time when the application for this project was prepared in 2002, political framework conditions have changed in most of the regions or countries involved in this project. In 2002 these conditions were largely favourable, even though there was a certain amount of resistance from the conventional electricity producers in most cases. But things were about to change then. By 2005, the opposition against wind power has become a serious problem in some areas, particularly – but not exclusively - Alpine areas. It remains to be seen whether this phenomenon is durable or whether it will decline in importance as seems to have been the case in Britain, and more specifically in Wales. There seem to be some parallels between the Welsh situation and that of the Alpine space.

In Britain, wind power met with strong opposition early on, beginning in the 1990s, at the time when the Non-Fossil Fuel Obligation (NFFO) was the chief mechanism to support RES-E deployment. This had several reasons. First, due to the strong economic pressure on projects under the British system of the NFFO (bidding system which drove down prices very quickly, at least on paper), developers went straight for the best wind sites even if these were in choice landscape spots and could be seen far away (hilltops, scenic coastal areas etc.). Second, developers were not seeking to involve the local population financially – such a model appeared in Britain only much later, even in 2004 there seemed to be only one case of a wind turbine financed by a co-operative (Toke 2005). Actually, a Japanese developer without any roots in Britain (Tomen) was involved in many of the planned projects. Turbines were still small, so that many sites were explored, stimulating fears that no hilltop would remain without a turbine. Opposition to projects became frequent and seemed to enjoy widespread support. Soon it became organised by a new movement, the “Country Guardians”, which stimulated the fear of wind turbines in a very systematic way and painted the picture of landscapes dominated by wind turbines hazardous to people’s health and drowning the area in constant noise. Moreover, the organisation was headed by a former advisor to Margaret Thatcher who had taken up a position in the nuclear power industry, the industrial sector most directly competing with wind power for expansion; the movement served other interests

besides those of landowners afraid of ugly sights. Nevertheless, on the local level conflicts arose particularly in local planning councils where a small number of land owners could effectively hold up permits as much for political as for legal reasons and managed to deter political office holders from taking decisions that appeared as intensely controversial. For many years it seemed as if wind power would get nowhere in Britain, the country with the best wind resources in Europe – wind power there grew only at a snail’s pace.

However, during the last two years the situation has changed dramatically. The “movement” against wind power seems to have run its course; many of the exaggerated claims of the opponents are no longer effective with the public. At the same time, the advantages of wind power have become more apparent. A new compensation mechanism, the Renewables Obligation introduced in 2002, has helped to facilitate things. As a result, approvals by local councils have become much more frequent, a counter-movement to Country Guardians arose and the mood seems to have shifted to quite favourable attitude towards wind power, even in Wales, the place of strongest resistance (Windpower Monthly, various issues). In 2005, the Welsh government formulated ambitious plans for setting up wind power facilities.

In the following section several questions shall be discussed for each region/country: What is the general perception of wind power by the population? Who are the main actors in the conflicts around wind power? What are their arguments? What are the fears of the populations? Can any particular groups or interests be identified? What are the consequences of these conflicts for typical “project careers”, more particularly the authorisation procedures and for deployment of wind power generally? On a more general level – and not just as country-specific level, additional questions shall be raised: What lessons can be drawn from this, and how could the resulting problems be remedied? Are there any model solutions or best practices? What recommendations can be formulated on this basis?

11.2.4.1 Austria

In Austria, RES-E in general met with much scepticism until fairly late, as can be seen from the chapter above on the economic framework for wind power. Most electricity in Austria comes from domestic hydropower built up primarily for economic reasons (and also because the nuclear path was blocked by referendum). Wind pioneers met with great scepticism until the late 1990s and in fact beyond. Many attacks on wind power today still focus on the price,

even though the Austrian rate of compensation does not appear very high compared to Italy or Switzerland.

Since the eco-electricity act of 2003, wind has experienced a very sudden boom (see the statistics at the beginning of this report). This intensified the “economic” criticism but added a new element which was just about absent before, when wind turbines met mostly with much sympathy. As in most other countries under consideration here, wind energy enjoys strong public sympathy in opinion polls. Nonetheless wind turbines more recently have come under attack for a variety of reasons, and some of the opponents have become quite professional in their presentations, operating throughout German-speaking territories, pooling arguments and resources in their scaremongering (DVDs on the devastating consequences of wind power, which is presented as a danger to health, to the economy, to tourism, to landscape beauty, to the historical dimension of local territories, to forests, fauna etc.) and in other techniques that serve to discredit wind power investors and planners (“rip-off” at the expense of the public) .

The claim that seems to have caught on most strongly is that landscape, nature and tourism are threatened by irreversible damage. The nature protection organisations have been split in their reaction. The more traditional ones are more favourable, the only strong exceptions are BirdLife International and some local chapters of the Alpine Club (which in a more distant past was characterised by particularly conservative, even right-wing and anti-semitic politics). Some in the Alpine Club have painted the spectre of the Alpine arc surmounted by huge turbines from West to East, clearly not a realistic perspective.

The effect this has had on political leaders in the Alpine Länder is quite clear. While most of them are sympathetic to RES-E (something that they demonstrated as recently as summer 2004 with the reform of the act on eco-electricity), most of them have withdrawn support from wind power as from a hot potato. Presumably they see a no-win situation under current conditions. Some of them however have come out very openly against wind power, stating that it simply does not fit in an Alpine landscape. Under current law such a determination requires certain legal procedures, expert opinions etc.; it is somewhat problematic if such statements are made outside of such procedures, by persons who may be called to decide those issues on appeal. But this problem results from the fact – already mentioned – that in the Austrian political-administrative structure politically elected officials are often called upon to decide legal issues.

In a region as heavily dependent on tourism as the Austrian Alps, it is understandable that some of the above critiques fall on a fertile ground, all the more so as experience with wind power is still limited in the Alps (see the report on Austria, work package 11.3.1). This creates a regulatory challenge: how can this situation be taken into account on the level of the administrative framework?

11.2.4.2 France

In general terms, it must be remembered that France was comparatively late in developing wind power, partly due to its strong nuclear programme and the subsequent surplus of electricity generated domestically, so that export of electricity was a much more important theme in the 1980s than the need for additional generation. It is safe to assume that the established actors in the electricity industry such as EDF (the national quasi-monopolist) or the industry ministry are no great supporters of wind power. Thus in the department of Rhone-Alpes, it is rumoured, the many letters to the editors of local newspapers that expressed opposition to windpower were authored by the numerous EDF engineers stationed in that department's small hydro plants. These circumstances were not changed decisively by the law of 2001 which introduced the special tariff (inspired by the German feed-in tariff) as the Leftist-Green government who voted this law was voted out of office the subsequent year. The conservative government remained somewhat ambiguous towards wind power, in any case it did not give it decisive support by appropriate instructions to the prefects. As a result, many prefects remain ambivalent. The new energy law of 2005 may change this somewhat.

Given the modest rate of development (and considering the vast surface of the country, among the largest in the European Union), it is surprising how quickly adverse reactions to wind power came about. It almost seems as if the opposition movement developed before the turbines. As to the popular basis of this opposition movement, it is good to look at public opinion data. A survey on French attitudes towards wind energy was in fact conducted in 2002 (Ademe/Demoscopie), with a particularly strong sample for the department Aude where most wind turbines were then concentrated. It showed 95% of respondents favourable to wind energy because it is a clean form of energy which does not damage the environment. At the same time, 63% felt that it has negative impact on the landscape. In the department Aude,

positive views were stronger, so that actual experience seems to reduce negative views. On the question of esthetics however, the division was marked: 55% thought turbines esthetic, 45% unesthetic. 76% of the respondents declared that they would accept a wind farm in the region, 62% that they would accept a small project within 1 km or more from their home. While it is clear that such results have to be taken with a grain of salt, they do show that opposition to wind power is likely to be narrowly based.

What people seem to worry about most is that siting issues will be decided without their having any say in the process; two-thirds want to have a real consultation of the population on this question. As this is not part of the administrative procedure, it is up to the project developers to keep the population informed. This is often neglected; often all they do is talk to the mayors of the local communities, partly to protect their commercial interests, partly presumably to avoid extra efforts for which no regulation exists, partly because they may not care about environmental consequences.

Particularly in rural areas, this secrecy leads quickly to all sorts of suspicions (the fact of an application itself will not remain secret for long) which in turn are likely to encourage opposition to a project. For about two years now, local opposition has been able to find support at the national level, particularly from the organisation “Vents de colère” (“winds of anger”) which while somewhat unscrupulous in its claims (see below) is quite professional in its mobilisation efforts (achieving media coverage, stimulating and inducing fears among the population), addressing critical groups, intervening with local government or preparing court interventions. Especially the Administrative Tribunal offers a relatively cheap way to stop a project for some time, raising costs to project developers while at the same time reducing project income due to the annually declining tariff rates, since compensation per kWh declines with every year that the project is delayed. Also, a construction permit may expire, as it is only valid for two years (Rhonalpénergie-environnement 2004, 70).

From available experience (e.g. in Saint Agrève in the département Ardèche, part of the Rhone-Alpes region), it appears that a project which is thoroughly discussed, with significant public participation will not be prone to such conflicts.

The standard argumentation of Vents de colère relies on the following points:

- Wind power is dangerous to nature and humans; it is unecological: does not reduce but increase greenhouse gas emissions because of the need for balancing energy, endangers human health due to its noise emissions, destroys the landscape and makes them less attractive, perturbs the water table and endangers birds and other animals...
- Wind power is a cheat in energy terms: France already has excess electricity, there is no need to generate more; 10.000 MW -the target for all of France for 2010 - will produce less than 1% of total electricity (NB: this would produce about 5%), thousands of turbines will disturb the landscape (NB: France currently has 240.000 poles for the high tension grid); wind power disturbs the functioning of the electricity supply system by its intermittent generation (NB: a problem that has been solved in other countries)...
- Wind power is a financial cheat: The local economic benefits (taxe professionnelle) do not compensate the destruction of the landscape, developers mislead the public by exaggerating its volume, the costs of dismantling remain with local authorities; wind power will deter tourists and reduce property values (NB: this has never been observed so far, occasionally the opposite effect was observed); tariff rates are excessive and attract only greedy people; local employment does not benefit; there are generally no positive economic consequences for the local population.

Many of these points are easily refuted; some others raise empirical questions that are dealt with in other parts of this report, especially the question of local economic benefits).

Vents de colère and generally the associations formed to oppose wind power cannot count on a large membership; their strength and importance results from their skills of mobilisation and of using the mass media. They have only limited appeal for the traditional rural population (who often welcomes wind turbines as an important economic activity). Their impact is strongest on the “new rurals” who moved to the countryside (or bought a secondary residence there) to escape the city and its over-technicised environment. They often feel that together with their real property they acquired a right to an unchanged landscape.

In the RAEE report from France, the following recommendations have been formulated to deal with the fears underlying the opposition to wind turbines:

General measures:

- Maximum transparency for all the reports submitted to the administration: impact studies, public inquiry) by making them accessible via internet

- Upper limit for turbines that can be erected in a given territorial unit so as to calm fears of “unlimited” construction, fears that one project will be followed by the next one etc.
- A voluntary agreement, to be concluded between public authorities dealing with renewable energy and the wind power sector, should provide for co-operation and transparency, e.g. by establishing a code of behaviour which among other things would encourage participation of the local population

To promote local acceptance:

- Involve a social scientist in the same way as other professional (for nature or landscape protection) are involved
- Make an effort to obtain independent expert opinions from local actors such as associations
- Better work by landscape experts (more independent and objective; take neighbours better into account; photomontage of turbines from each inhabited house in the community
- Conceive wind parks as part of regional development and try to involve local communities

11.2.4.3 Italy

The general context of Italy is in some ways the opposite of France. Italy has to import electricity from abroad; this problem is enhanced by a strong increase in demand in recent years (hot summers meant an increase in the use of air conditioners); and the inter-connectors with foreign countries (especially France and Switzerland) represent a bottleneck for electricity supply. As a result, RES-E has been encouraged for quite some time. This is also true for wind power: Not only the environment ministry, but remarkably also the industry ministry have been favourable to its development. Opposition has come however from the cultural heritage ministry (beni culturali). Even the big utilities are involved in wind power projects and do not oppose it on principle, though they may be difficult partners when it comes to grid connections.

More specifically concerning South Tyrol/Alto Adige, this is a region which in many respects is a showcase of RES development, from solar and biomass heating to small hydro and other sources. However, there is almost no use of wind power in South Tyrol so far (presumably

because the resource was not considered substantial enough: the most important resources are to be found in Southern and South-Central Italy as well as in Sicily and Sardinia). As a result, experience with conflicts regarding wind turbines are limited there. However, certain lessons can probably be derived from other Italian experiences, although it is not sure to which extent these lessons can be fully transposed.

Wind power in Italy has been growing steadily since the mid-1990s. In the initial phase there was a rather high public acceptance of wind power, also at the local level. Most of the investments were in poor regions which also hold the best wind resources, and for small municipalities in economically disadvantaged regions in central and southern Apennine areas, where people live mainly from livestock, wind held substantial advantages: additional revenue for the local government (taxes, leasing fees paid to landowner, plus 1.5% of the revenues from electricity sales plus a flat rate for each turbine each year). In fact, the attraction of these advantages made some administrations grant permits in problematic locations (specially protected areas etc.). After a certain delay, this practice backfired, had a negative impact on public acceptance and thus made future permits all the more difficult. Protests against wind power became substantial around the year 2000, earlier than in most of the other Wind Harvest countries.

There was another reason why the permitting process left to be desired during this first phase of wind power expansion. At that time, many powers were transferred from the central state to the regions, in particular in the areas of spatial planning and energy. The regions however did not seem sufficiently prepared to play this role, so that the municipalities were usually left alone with the management of this difficult phase (de Nucci 2005, 59). When conflicts around wind power became more intense, many local authorities reacted by withdrawing into a more passive role, delaying decisions in this area for fear of alienating the public.

The major actors in the conflict in Italy are local oppositions and, on the national level, environmental groups which however are divided on the issue.

- The “modern” environmental groups such Legambiente, Greenpeace and WWF consider RES-E essential for a modern energy system and for carbon reduction. Legambiente is particularly involved in this subject. It advocates minimising the effect on the landscape and systematically involving the local communities in siting wind farms. For this purpose it has signed a protocol of agreement with ANEV, the Italian Wind Energy Association

which was created only in June 2002 (joined the European Wind Energy Association in 2004). This protocol sets up precise requirements for projects and highly transparent procedures and aims to ensure the correct integration of wind power into the landscape.

- Italia Nostra, an organisation created in the 1950s to limit the damages resulting from the new construction boom, is devoted to protection of the cultural heritage and equally of the environment. It published a document in September 2001 in which it supported RES-E plants provided they are small and do not involve new roads or electrical lines or excavations in particularly sensitive zones such as the mountains. They also demand citizen participation and a more planned approach at the national and regional levels, with national regulations and regional plans to avoid disparities between different points of the national territory. As long as such plans do not exist, it appeals to the regional governments to initiate a moratorium on permits until such regulations and plans are in operation.
- Comitato Nazionale del Paesaggio (CNP) or National Landscape Committee was established in 2001 by Ripa di Meana, a former environment commissioner of the EU. Since 2002, the Committee joined forces with the farmers association Coldiretti and a number of national and regional nature protection associations (CAI or Italian Alps Association, Pro Nature, Mountain Wilderness) and regional and local groups. In March 2004, CNP launched a flaming appeal against wind power, asking for a moratorium as long as no clear national and regional plans for this RES existed. This stance is still taken today, with Ripa di Meana downplaying the potential role for wind power in Italy (Windpower Monthly, July 2005, 31).

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Moratoria effectively exist in two of the top four wind regions in Italy: in Sardinia (where this is contained in legislation for the protection of the island's coastlands adopted in November 2004) and in Puglia (where the regional government has asked local municipalities to halt construction of new wind projects until a new energy plan is approved at the end of the present year (Windpower Monthly, July 2005, 30-31).

While almost all 21 Italian regions have developed regional environmental and energy plans (the seven regions which do not are in the process of defining one; di Nucci 2005, 54, table 10), less than half published regional energy guidelines. The guidelines published by Tuscany are regarded as outstanding; they are very detailed and very well structured. In Sardinia, the existence of guidelines was not sufficient to prevent a moratorium on wind

power by the regional government. The province of Bolzano does not have such guidelines; however, it has targets for wind power (di Nucci p. 53).

In summing up, it seems that opposition to wind power comes more from the angle of protecting the cultural and sometimes landscape heritage, less from environmental protection. With regard to legal regulations (criteria, plans for orderly development) and administrative procedures, criticism focuses on the relative absence of such rules and instruments in order to ensure integration in the landscape. Efforts to solve the conflict - thus the Legambiente-ANEV-protocol of agreement - rely (in addition to demanding more framework rules) on strengthening transparency both of procedures and of the participation of the public.

It may also be worth mentioning in this context that although there are no officially accredited environmental dispute mediators in Italy, many universities offer this specialisation and many individuals act de facto as mediators (“facilitatori”).

11.2.4.4 Slovenia⁵

In Slovenia, protest against wind power emerged almost simultaneously with the first discussion of plans for windfarms, even before first projects were submitted. This has to do with the special constellation of geographical, cultural, economic and political factors that characterise Slovenian in Slovenia today.

In terms of geography, there are only two areas of the country that offer interesting sites for wind power. The best site is the karst region near Slovenia’s coast, where the bora swoops down over the mountains and onto the sea. Because of the unique quality of this site, it is natural that the focus should be on this location.

But the karst is a unique area in many respects. It is rich in cultural heritage (such as the Skocjan caves, a UNESCO cultural heritage site). It has a very special flora, and certain areas were proposed for NATURA 2000 – but then withdrawn again when the wind farm project came on the scene. It is close to important urban centers (Koper, also Ljubljana). It is judged by some to be a very promising region that might once become Slovenia’s Tuscany –

⁵ Based on Klemenc (2004) and Dinica (2004b).

provided it is not industrialised and rendered unattractive before it can realise this potential. Also, it is a small area geographically, so that not too many land uses can coexist easily.

A Spanish renewable energy firm (EHN, one of the biggest operators of wind power plant worldwide) became interested in this area and took the initiative to propose a wind farm project which is huge not just for Slovenian conditions: several hundred turbines were projected to be erected in the karst area if those plans should come to fruition. It found an ally in the form of local utility Elektro Primorska. This came about at a time when Slovenia had practically no experience with wind power at all – whether at the level of government, industry, population, NGOs etc. So the first project was a huge project. This fact helps to explain the nature of the conflict.

Another feature that characterises the situation is the support of the national government for this project. The government saw the interest in wind power in the need to live up to the Kyoto protocol (and to “burden sharing” under this protocol within the EU) and to realise the goals of the EU RES-E directive of 2001; EU enlargement was already looming. For this reason, the government or certain ministers not only changed a proposal for NATURA 2000 for part of the Karst area (Dinica 2004b, 30), they also applied the law on spatial planning in such a way as to help the project (all projects are for the time being considered of local significance regardless of size until a New National Development Strategy is adopted; Santej 2004, 40,45-46). In so doing, they contributed to “steamrolling” local communities and populations. The result was a strong protest movement directed for a good part at the national government for the role it has played in this context.

Under these circumstances, the protest against the local projects which are all part of the big “Spanish” project has taken the form of grass-roots protest directed not only against the gigantism of the immediate project planners, but also against the national government. It is an issue of David versus Goliath, with wind power (in the form of this dominant project) assimilated to Goliath, a very special constellation indeed. Other projects hardly exist; there is however at least one project with a much smaller number of turbines – about a dozen – which was approved on the local level without generating much controversy.

The resistance against wind power has taken the form of citizen initiatives which are often strongly internet-based, with a membership that is predominantly young, well educated,

computer-skilled that is more or less supported by established traditional local foresters, hunters, farmers and environmental protection NGOs. In several cases it has forced the local utility to reduce its projects or to renounce them altogether. Much of the inspiration of the resistance seems to have come from Spain. Its vision is a karst area that is developed according to sustainable development, with green tourism and eco-friendly SMEs rather than being “industrialised” by big wind power. But among the opponents are also supporters of nuclear power who argue that at least nuclear energy does not consume as much landscape as wind power.

On the whole, the impression predominates that the controversy over wind power is shaped largely ad hoc by this one single project. Alternative scenarios for wind power are hardly explored.

11.2.4.5 Switzerland

In Switzerland, the conflict over wind power is embedded in a larger conflict over the future of nuclear energy that has been going on for over a decade. In this conflict, many popular initiatives against nuclear power or for the promotion of renewable energy sources, and many parliamentary or government bills designed to support RES-E, failed to achieve the necessary majority either among the population (which in Switzerland can play a decisive role by voting directly on legislation) or in parliament. The situation is characterised by a stalemate (Horbaty 2004; Rechsteiner 2003).

As is evident from the statistics on page 1 of this summary report, windpower is still in an early phase in Switzerland. To be sure, there are hundreds of turbines, but most of them are very small – a few or a few dozen kW at most. In 2004, two big turbines – 1.75 MW on the Mont Soleil – were erected, but they represent an exception so far.

The issue of size plays an important role in the Swiss controversy on wind power. Wind turbines enjoyed broad support among the supporters of a “green” course of energy development until the new megawatt-sized turbines came onto the market. For quite a few former supporters, this changed the very character of the technology. As a result, they turned into ardent critics, joined by those who opposed wind power all along as uneconomic. The

chief arguments are over landscape and over wind power's contribution to the national energy supply. The critics argue that it is not worth to blemish the entire Swiss landscape for a minor amount of electricity. When they are confronted with the argument that only a few dozen sites are seriously considered (under the Swiss Wind Energy Concept prepared in 2003 and presented in 2004), they will say that this shows just how irrelevant wind power is in Switzerland.

Under the impact of this controversy, the Swiss Federal Office of Energy came up with the idea of the Swiss Wind Energy Concept, discussed in the preceding section on Switzerland (11.2.3.5). The concept is a model of integrating all stakeholders in the process of preparing a list of sites for wind farms. However, even the best preparation cannot replace decision-making in individual cases. Complicating the issue is the fact that the Foundation for Landscape protection, which had come to support wind power in a compromise, turned back on this decision when confronted with the new, larger turbines (which at the same time would lead to a smaller number of turbines overall).

This resulted in a pattern in which most projects may now end up in court. The outcome of these decisions is uncertain. An important decision was rendered in the case of the Cret-Meuron wind farm in the canton Neuchatel/Neuenburg in April 2005. The administrative court held that the protection of the landscape, laid down in a specific law of the canton (on protecting mountain ridges) had greater weight than the energy concepts and energy and climate strategies of the canton and national government (both executive and legislative). This despite the fact that the windfarm enjoyed broad support among neighbouring communities and the big environmental NGOs (WWF, Pro Natura). The court also argued that the situation might be different if there were an emergency situation with regard to the electricity supply and ignored the fact that such an emergency may well come about once nuclear power is phased out – and also due to the growing consumption existing today (Communication by Suisse Eole, 5 April 2005). The decision was appealed to the federal court by the Neuchatel government, the Federal Energy Office and the project developers of Cret-Meuron, on the grounds that both the cantonal and the federal constitution oblige the executives to develop domestic and renewable sources of energy free of greenhouse gas or toxic emissions, and that the impact on human settlements, landscape and nature is negligible in the case of this project (Communication by the Neuchatel chancellery, 9 May 2005).

11.2.4.6 Comparisons and First Conclusions

It is evident that during the last few years opposition to windpower has become a widespread phenomenon in the five Wind Harvest countries/regions. We are obliged to guess on the basis of incomplete information where this opposition comes from, how strong it is in sociological terms, or how it is organised. What is clear however is that this opposition has had an impact on a wider public, and that this impact should be taken into account in designing an appropriate administrative framework.

As to the origin of this opposition, it draws from two very different paradigms. One is the opposition to RES-E generally, as a supposedly expensive, inefficient, decentralised source of energy that does not fit the structure of conventional generation and limits the chances of expansion of conventional generators. This opposition is found with many utilities eager to preserve their position, and supported by industrial organisations reluctant to change or to accept the costs of changing to new energy sources. This probably explains much of the opposition in Austria and France and to some extent Switzerland. However, this does not fit the situation in Italy or Slovenia. In both countries large utilities are involved in wind power projects, in Italy the scarcity of domestic sources of energy for electricity generation makes RES-E also interesting for such utilities. The second opposition paradigm criticises wind power out of a concern for cultural and natural landscapes, human health etc.

The sociological origins of the critics of windpower reflect these different paradigms. The professionally organised movements such as *as vents de colère* in France, Country Guardians in Britain and similar organisations in Germany may well come from the first paradigm and care little about ecology, sustainability etc.; what they put forward however is the second paradigm – they present themselves as the real protectors of sustainable development. It is these arguments which make an impact on the public. The same argument comes from many authentic – mostly conservative – nature and landscape protection organisations, to be found in all five regions/countries. It is these arguments that find an echo among the public.

The nature of the echo is so far unclear. At the general level, public opinion polls show strong support for renewable energy, including wind power, in most industrial countries (although things may be different in Eastern Europe and the former Soviet Union). This is certainly the case in Austria, France, Italy and Switzerland; no public opinion polls could be identified for

Slovenia (which has a very special constellation with regard to wind power). At the local level there seem to be authentic worries among at least a small part of the population.

The conflict turns on the interpretation of wind farms, of what they mean for human society. Most people seem to view them as symbols of sustainable energy and another form of development; they do not mind their presence and do not find them intrusive; some indeed find them aesthetically attractive in their sleek elegance. Most surveys which put the question to tourists found that tourists do not mind turbines (presumably if they do not occupy the whole horizon), indeed find them attractive. (For part of the local population, it is a welcome source of additional income). Thus a study of tourists in Scottish moors showed that only a few percent of tourists were bothered by the presence of turbines, whereas others saw in the turbines an additional reason to return to the area in the future. This was confirmed by several studies in Germany. Such attitudes are also widespread in Alpine areas. However, immediate experience with windpower in the Alpine areas is very limited, as the number of turbines actually running under mountainous conditions is quite small.

The fear that wind turbines might come to dominate Alpine landscapes in large numbers – has played a particularly strong role in Alpine and other mountainous areas because of the particular importance attached there to the “landscape”, especially with regard to tourism. In Austria, very few new permits have been granted for Alpine locations, and no permits at all were issued so far in Tyrol (in Vorarlberg there were no applications); in Salzburg, a first permit was issued in one single case, out of several applications. In France, there are some installations in mountainous areas but not in the Alps properly speaking; the controversy has clearly intensified there. In Italy, or rather in South Tyrol/Bozen province, there is only one turbine functioning, with a temporary permit; the provincial government is still striving to define a general approach to wind power (by contrast, many wind power installations exist in the Apennine, but in a very different socio-economic milieu: poor local communities, little tourism, a declining agriculture as chief source of income – here the revenues offered by wind power were highly estimated). In Slovenia, a series of large projects by a regional utility – all of them for a rather small area, five mountains in the Karst – have led to strong resistance. In Switzerland, the Landscape Foundation – a privileged organisation under Swiss Law – is opposing most projects with wind turbines larger than 660kW, which means that for the moment there is practically no new construction.

Administrative and even legislative authorities are thus caught in a difficult situation. Administrative authorities in most of the countries/regions concerned are asking for more detailed guidelines, especially on the matter of landscape protection; current regulations are widely seen as unsatisfactory. There is the danger of a legitimacy deficit. But legislative authorities are also confronted with a similar problem as on many issues, there is simply insufficient experience with wind turbines and their impact on Alpine landscapes and environments. The question then arises of how the authorities should deal with such a problem.

For some time yet, society in the Alpine areas will have to grapple with the problem of wind power. This can only take place if experiments with wind power are possible. As far as we can see, there is no threat of dire consequences if wind farms are started on a small scale. We propose then that development should be allowed to take place, though at first on a modest scale and with a high degree of caution with regard to procedures. These experiments and these procedures should not just make decisions with regard to the siting of turbines, but also maximise social learning with regard to wind power. It is evident that some institutional arrangements are more favourable to such learning than others.

Valuable suggestions are coming in this respect from organisations which reflect this division of society, which favour sustainable development but also care about nature and landscape protection, transparent procedures and democratic participation. Their demands are similar throughout the Wind Harvest regions: develop clear criteria for landscape protection; allow for a maximum of transparency and secure participation so that local population can play a role in the preparation of decisions about windpower implantations.

On this basis, a set of recommendations is formulated at the end of the next chapter, after looking at promising approaches to the moderation and resolution of conflicts about wind power.

11.2.5 Moderation and resolution of conflicts

This part of the report does not follow the scheme of the other parts – it is not based on individual country studies since the purpose was not to make comparative empirical studies of wind power mediation but rather to look at the promise of mediation as an approach to moderate and resolve conflicts in a more sophisticated way than that resulting from hostile

and rudimentary relations between developers, the local population (and also legal authorities). It appears likely that such a search would have been extremely difficult and probably would not have yielded much in terms of results as mediation is not widespread yet and may have been used only in very isolated cases in the area of wind power.

Instead, the report authored by Astrid Rössler looks at experience with mediation generally, its preconditions, advantages and problems as used in the field of environmental conflicts. It then examines concrete possibilities to transpose those experiences into the area of wind power conflicts, describing the basics of such a procedure in order to reduce transaction costs for any developer or group of citizens that might have recourse to this method. For this purpose it analyses the typical conflicts around wind power, the positions taken by stakeholders in Austria, the results of public opinion polls. It also analyses alternative methods used in this area to bring about decisions, such as referenda, polls etc.

The chief point of mediation is bring out the true nature of the interests involved and to seek to accommodate them as far as possible, even when they appear conflicting and even incompatible at first. In the process, the facts of each project and its impact on a particular community, region and/or landscape should come out as clearly as possible, and solutions to problems should be envisioned as freely as possible. This is quite different from what might otherwise result from procedures before public authorities (and the non-participation of some interests in those procedures). There certain parties might get away with holding back information from the public, both sides might use arguments which cannot be verified in a systematic way, and emotions may get the better of reason.

The manifold informations offered in this report cannot easily be reduced to few pages. However, many of these informations were used in the formulation of the set of recommendations to public authorities on the design of administrative procedures for handling wind power in the Alpine space.

11.2.5.1 Recommendations to Authorities on the design of administrative procedures for handling wind power in the Alpine space

Recommendations

1. Recognise the special character of the situation
2. Design regulations that will allow the gathering of experience by careful experimentation. Experience can only be had by taking some initiatives. But these initiatives should be carefully defined.
3. Maximise the legitimacy of administrative procedures and decisions by special precautions (transparency, participation, search for local consensus).
4. Encourage the formation of voluntary codes of behaviour that can later be used as sources of inspiration for legislation and official practices.
5. Maximise the contribution of wind power to local and regional sustainable development

Ad 1: Recognise the special character of the situation

The special character of the situation results not just from the intensity of the controversy, but also from the fact that there is not enough experience available concerning the impact of wind power in Alpine environments. This is all the more true as some of the impacts under consideration are subjective in nature (e.g. questions of impact on the landscape, visual impact etc). While in some cases “objective” experience can be gathered in due course (impact on nature, e.g. birds, or impacts on tourism), experience with regard to subjective elements is even more difficult to gain. On the other hand, wind power may be able to make an important contribution to the local economy (see next chapter the contribution of wind power to regional development), the energy and the greenhouse gas situation, so that it should not be subjected to an indefinite moratorium. Experience can only be collected if some wind farms are operating, as we cannot know about their effects otherwise. Impacts on landscape, on nature etc. vary greatly with settings.

Ad 2: Gather experience by promoting experimentation

Given the lack of precise knowledge, it would be difficult to define valid regulation in general terms. It seems more appropriate to proceed in a stepwise fashion. This could be done e.g. by permitting only a limited number of relatively small wind farms (about 1-10 turbines) in any given landscape unit (such as a valley, or area from which a wind farm can be seen) and by making it clear that any such decision will not set a precedent until more experience has been gathered. A time interval should be set during which no further permits will be considered. If things work well (e.g. if the impacts feared by critics can be limited or do not come about at all, if positive expectations on the other hand are confirmed), such wind farms might be given, at a later point in time, a permit to expand.

This should also deal with the fear that the Alps as a whole will – in big stretches – be “devastated” by wind power development. On a broader level, a province, district or local community might define a general upper limit for wind power development on its territory that may not be surpassed during a certain period.

Ad 3: Maximise the legitimacy of administrative procedures and decisions (transparency, participation, search for local consensus)

Transparency: Given the suspicions and anxieties generated by some wind power opponents, it is important to minimise these phenomena by appropriate precautions and to inform the population as much as is practicable. All reports, opinions, applications, decisions etc. should be made available via internet and also to those who do not have access to the internet. Sufficient time should be given so that learning processes are supported.

Participation: In current conflicts concerning wind power, the discussion often remains at the abstract level and can thus remain “ideological”, i.e. detached from the specific local conditions and interests. At this level it is difficult to find a satisfactory solution. It is probably helpful to involve the local population in some form; this will on the one hand “bring the matter down to earth”, i.e. make the interests and situations of the various participants clearer and help to legitimise a decision. It might emerge e.g. that opponents – this seems to be the case in some areas in France – are new country dwellers who bought a home or secondary residence and want to keep the landscape as a “holiday landscape” ideally untainted by economic activities. Traditional country dwellers such as farmers on the other hand might be interested in diversifying their economic activities. A clear and open confrontation of these interests is likely to “de-ideologise” the debate and probably more helpful than abstract argument.

Search for consensus: Related to the above, efforts to promote consensus through different models are likely to be helpful. In the strongest case this would be done by a professional mediation procedure in which all the parties to the controversy (if there is controversy) agree to such procedure and to accept the conclusion it will arrive at as a basis for the administrative proceedings that will be resumed after the mediation is completed (see special report on mediation for wind power projects). Other models can be imagined: thus a local consensus conference in which a panel of the local population, over a sufficient period, acquires familiarity with wind power and its likely impacts and makes a recommendation based on this

experience. Here again, this will allow to gauge the nature of the opposition and the interests governing the conflict.

Ad 4: Encourage the formation of voluntary codes of behaviour. Such a code would respond to the widespread desire for more criteria for the granting of wind power permits and for observing rules of fairness in dealing with the local population, while recognising that criteria are still in the making and that it may be too early to legislate in detail. The desire for more specific criteria was voiced by many organisations in Austria, France and Italy. In Italy, such a voluntary code was formulated and agreed upon between environmental NGO Legambiente and the Italian Wind Power Association (see above, 11.2.7.3). Such codes could also take the form of self-commitments on the part of the industry or individual developers, although wide participation of the sector seems to be desirable.

Ad 5: Maximise the contribution of wind power to local and regional sustainable development

Wind power development is regarded by its adversaries as a profiteering operation that will produce damages on the local level and possibly beyond. It is important to allow for the possibility that a local community may want to use this energy on its own for the purpose of sustainable local development while making a contribution to regional sustainable development as well.

Sustainable development contains three elements: ecological, economic and social. Wind power has as its strongest positive aspect the production of electricity with minimal contribution to greenhouse gases and other pollutants; this needs to be balanced against potential impacts on nature. Wind power is capable of producing economic wealth and thus of making a contribution to the local economy (tax revenues, land rents, jobs, tourist attraction etc.); this needs to be balanced against potential economic damages (e.g. the feared impact on tourism). Wind power can make a positive contribution to social cohesion but can also create conflict, e.g. if the advantages are concentrated on an outsider (the wind farm operator) and disadvantages accrue to the local population.

To make sure that the local population receives a fair deal, local communities could be encouraged to take the initiative in developing a wind farm along the lines they consider optimal and not limit themselves to reacting to applicants' requests for permits. Such a proactive role is more likely to produce the desired results for the community, even if the task of construction is left to the developer. Successful examples of this can be found in France (see

the full report). A developer is not likely to integrate as many local concerns, if only by the lack of appropriate information. On the other hand, a developer may be quite willing to integrate such concerns if they are clearly defined.

To improve the responsiveness of wind power developers to the concerns of nature and landscape protection plus the economic concerns of the local population, regional authorities could encourage the development of a voluntary code of behaviour for wind power developers and of a model contract that is to govern their relations with other interested parties (local population, local land owners, nature and landscape protection organisations etc.). (Something of this kind was done in Italy at the national level, see the full report). Economic interests of the local population can also be taken into account by encouraging wind power co-operatives or other legal forms that allow a financial participation of local residents and/or of local communities (governmental units) as a whole.

It is conceivable that a wind power developer can be asked to make a contribution to local communities to compensate for the modification of the landscape (depending especially on the visual impact on a wind farm). It is probably helpful if such a compensation goes to a special fund and not into the general budget of a local community as this might lead to problematic motivations (experienced e.g. in some Apennine communities, where this practice gained an ill reputation). If a local government takes a pro-active role in the development of a wind farm (see the first item under this heading), it would also be plausible if it were to use such income for other infrastructures such as water supply and the like.

11.2.6 Contribution of wind power to regional development⁶

Wind power fits well the criteria of the Guidelines for the Structural Funds and Cohesion Funds which state that regional development should focus on fostering employment by means of “sustainable growth and competitiveness in the regions”. They mention specifically, inter alia, renewable energy resources and supporting innovation by modernising the productive base (developing human capabilities, R&D etc.). Nine types of regional benefits of harnessing wind power were identified:

⁶ Based on Valentina Dinica (2004a), Benefits of wind power for regional development, Report to Wind Harvest Project, Summer 2004.

1. direct and indirect socio-economic benefits (income opportunities by means of ownership of wind plant ownership, land rents which may amount to a few percent of the wind plant's revenue and thus to several thousand Euro per 1 MW turbine, reducing cost of electricity due to self-generation), local tax income or other benefits to local communities or royalties, direct and indirect employment).(Dinica 2004a, 2).
2. stimulate the regional industrial basis and dynamics: domestic wind plant manufacturing, services: feasibility studies, planning, legal, financing services, local contractor services e.g. for construction work. It is estimated that in the European context, about 25% of the investment in a wind plant is typically spent with local contractors (Dinica 2004a, .4). This may give new impulses to economic development and specialisation, especially where demand for turbines is large enough and where efforts are made to increase local content.
3. Increased security of supply, avoidance of transmission grid costs, price stability (by reducing regional dependence on fossil fuels such as gas, with greatly varying prices in recent years), energy independence at times of possibly peaking oil and gas production.
4. Improvement of the regional environmental quality, reduction of regional CO₂ , SO₂ and NO_x emissions, depending on the fuels replaced.
5. Improve regional tourism, provided wind turbines are embedded in a program of green or "soft" tourism (hiking or bike routes, platforms for observation and photography, visitor centres, integration into eco-tourism offered by travel agents...
6. Modernisation of the educational system at the professional and academic levels
7. Increased public awareness of sustainability issues (wind turbines can be the subject of – or at least built into – public information campaigns, seminars, school campaigns, telephone hotlines, other efforts of public education).
8. Regional innovation and activity and networks may be stimulated (research centres, industrial clusters, SMEs...)
9. Reduced outflow of funds due to greater reliance on indigenous resources.

Four of the Wind Harvest regions/countries are then analyzed to see what impact these factors had and how they are perceived. France/Rhone-Alpes is not included in this analysis as the study by RAEE followed a somewhat different design from the beginning, so that the data available there are not directly comparable in most cases.

11.2.6.1 Austria

For Austria, the impact was studied with special reference to **Styria**, the only Land in which wind turbines in high Alpine locations are already in operation. In Styria, slightly more than 20 MW of such were installed by 2004, most of them in the community of Oberzeiring. Wind power was supported by Land politics some years ago (this was reflected in legislation at the time, and still is in the current work of institutions such as the Landesenergieverein). The regional government is in general very supportive of renewable energy and RES-E but no longer of wind power which has become quite controversial; instead, it prefers to support particularly biomass and biogas, and small hydro, all of which are less controversial. The three projects existing in mid-2004 generate income for owners (in Oberzeiring through community co-financing). In Oberzeiring the land is owned by the project owners, so that there are no land rents being paid out. In general, those **land rents** are somewhere in the range of 1 – 1.5% (the figure recommended by the Austrian Wind Energy Association) and 4–5%, with a tendency to rise towards the higher figure (these rents are higher at Alpine sites – where there are few alternatives – than in flat land). **Royalties** also show an upward trend. In 2004 the average payment in Austria was about Euro 500-1000 per 1 MW turbine, and probably higher in Alpine areas. **Direct employment** due to regional wind farm development is quite modest (as is development itself). A development of about 100 MW of installed capacity would mean about 560 person-years for construction, but only about 15 permanent jobs for maintenance and operation. Of course additional jobs are created in the wind turbine industry, but not necessarily in Austria. However, Austria is involved in the manufacturing chain of turbines: ELIN in Styria is employing about 200 persons for producing wind generators for large firms such as Vestas and Nordex, and a firm in Upper Austria – Hexcel – is producing raw material for rotor blades, a special product for Vestas. These jobs in the manufacturing sector are more or less unrelated to regional wind power installation. Some more employment (also not necessarily regional) comes from project development, feasibility studies, civil engineering, electrical engineering, financing etc. In 2004 only one company in Styria specialised in wind power project development there. It was also active elsewhere due to the uncertain outlook for wind power in Styria. In terms of **security of supply additional** wind power investments could be quite interesting since there is a shortage of electricity in the Land. However, utilities and experts thinking in the traditional mode of the electricity sector prefer another solution to this problem: the completion of a North-South interconnector

which has been held up in Styria for decades. This interconnector will also improve chances for wind energy in Burgenland and Lower Austria to reach Styria, but most of all it will upgrade the high voltage transmission grid for all other purposes, including electricity exports. The annual production of the Oberzeiring wind farm as it stood in 2004 was about 38-45 GWh, about 0.8% of the electricity needs of Styria. This amounted to saving about 37.000 tons of CO₂ (**greenhouse gas reduction**). If the currently known technical and economic potential in Styria were used, about 2.2% of electricity consumption could be covered in this way., by using about 0.02% of the total surface of the Land. As to **tourism** and **public awareness of sustainability issues**, there is currently one mountainous installation on the Plankogel which is used for purposes of instruction available to the public interested in renewable energy in Eastern Styria, in many ways a model region for the use of renewable energy in Austria (solar thermal, biomass, biofuel, photovoltaics etc.). Compared to other cases – e.g. in Freiburg in Germany – the efforts to publicise the Energielehrpfad (renewable energy trail that connects several renewable energy installations) still seem modest. There is no educational effort by the Land in favour of wind energy; however, there is some general public information about RES when public funds are spent on specific projects. This reserve with regard to wind is explained in part by the fear that campaigns in favour of wind power might backfire and raise the level of controversy as they might spread the idea that turbines are planned for every corner of the Alps. There is no effort to help counter anti-wind campaigns, even when they spread information that is plainly incorrect. Not surprisingly given the modest level of current wind power plans, there are no **regional innovation activities with regard to wind power**, as this would require a political commitment.

In sum, it seems that the potential contribution of wind power to the regional economy is underestimated currently at the level of government, while its negative impacts may be overestimated and the potential for a positive appreciation of wind power neglected. The result is that wind power policy is paralyzed for the time being.

The main benefits for regional development in Austria are seen to reside in additional income and increased social welfare for local population from land rents and royalties, from soft or green tourism (generating additional income) and from regional innovation activities, as there is a strong industrial base (mechanical engineering especially) that could benefit from participating in the wind turbine value chain and thus benefit from the expansion of wind power all over the world, a development which is likely to continue.

11.2.6.2 South Tyrol/Italy

In South Tyrol there is currently only one wind turbine in operation, a 1.2 MW machine in the project Windkraft Marein in Mals which operates with a temporary permit. This turbine is also a basis for the regional government to gather experience about different aspects of wind power. For the builder, a local manufacturer (Leitner) engaged mostly in the production of ski lifts, this is a new business activity which he views as very promising. The turbine is owned by four local communities and four organisations with ownership shares (all organisations were already active in the business of electricity production before, especially in hydropower). In the region, hydropower is a very serious competitor for wind; so is biomass. In general, the region is very open to renewable energies and has reached a very high level of introduction for many technologies. Currently planning is under way for a project just South of the Brenner pass where good wind resources combine with other favourable conditions such as available infrastructure. The regional government strongly supports RES plants by means of subsidies. For a stand-alone turbine, total subsidies to investment may go as high as 80%.

Generating additional **local income** is not as important in South Tyrol as it is in some other mountainous parts of Italy, such as the many poor communities on the Apennine for which wind power represents a key source of revenue. By comparison, the economy of South Tyrol is booming (for many years now), and there is no lack of other income opportunities, even in the RES sector. **Royalties** in Italy are generally in the range of 1%; they are not likely to sway public opinion in favour as they might in a poorer region. **Increased industrial innovation** can be expected if Leitner is successful in developing this business. The area around Bolzano is traditionally strong in a variety of relevant industries: mechanical engineering, metal processing, electrical industry, many of them in small firms. They can be expected to pick up impulses from a new field of manufacturing such as wind turbines. Already several manufacturers are suppliers of turbine firms, including one that is directly engaged in producing small wind turbines (ROPATEC). Increased **security of supply** and improved **environmental quality** are both important in South Tyrol, which has a strong commitment to climate policy, the support of environmentally friendly technology and the reduction of air pollution. The installation of about 60 MW of turbine capacity – the estimated technical and economic potential – would mean a savings of about 100 000 tons of CO₂. Programs for **eco-tourism** and **public awareness of sustainability issues** were scheduled to start at Mals in

2004, in cooperation with Swiss partners. In addition, the RENERTEC Institute in Bozen/Bolzano plans to make RES plants of all kinds a tourist destination to raise public awareness and to build up the image of the region as being particularly active in the field of RES. This will be marketed in a variety of ways – internet sites, tourism companies, the SMG (South Tyrolean Marketing Company). Excursions to selected facilities are planned for a target population of tourists who are already in the area for other purposes (such as skiing) or who have a professional interest in the field. This is also seen as a way to reduce opposition to wind power by making people familiar with its actual impact. The government also conducts public information campaigns (pamphlets, special events, school projects, services of advisory bodies on energy efficiency and climate protection issues).

The main benefits from wind power in South Tyrol, given the socio-economic make-up of the region, is seen in wind turbines as tourist attractions with spin-off social-economic activities and regional innovation.

11.2.6.3 Slovenia

In the Karst area of Slovenia which is the prime target currently for wind power development, regional development plans prepared as recently as 2001-2 did not identify any interest in wind power; as explained above, this interest came from outside (from the Spanish company EHN, one of the biggest operators of wind power plant, and Elektro Primorska, a regional utility), and from top down in terms of Slovenian politics. Instead, a development was envisioned that emphasised cultural tradition, the well-preserved semi-wilderness as a basis for green tourism, organic agriculture and some high-innovation SMEs. Wind power on a grand scale however gained some support in some local municipalities, based on the prospect of infrastructure investments, land rents and royalties. This was particularly true of Ilirska Bistrica, which has a high rate of unemployment (14.5%), more than double the national average, is facing a decline of industrial activities and lack of new investments. The other municipalities concerned are in a better situation economically.

The following benefits were identified as likely in the case of the Slovenia Karst region:

Land rents were discussed in the range of 1500 to 2000Euro per MW per year in the area of Ilirska Bistrica (which the mayor wants to spend on building a new college, something the national government is not prepared to do otherwise). **Employment:** Important effects during construction; one durable job for each five 1.5 MW turbines for operation and maintenance. **Improvement of environmental quality:** Slovenia is currently strongly dependent on fossil fuels for electricity generation. The envisioned 287 MW of wind power would generate about 700 GWh of electricity per year, out of a total electricity consumption of about 13.000 GWh (by 2010, in case of modest demand growth) per year. Most benefits are of course highly speculative at this point, since the wind farms under consideration are not even approved yet. On the basis of interviews with experts, Dinica concluded that the main regional benefits were likely to be found in the improvement in regional environmental quality and in attracting tourism and spin-off social-economic activities.

11.2.6.4 Switzerland

In Switzerland, the deployment of wind power is still extremely modest. As a result, empirical data were not available for some of the items which were the object of this research. This refers e.g. to land rents. In the past, compensation was often unattractive, so that projects were not asked to make contributions to the local budget, via royalties or taxes. In terms of employment, one can only extrapolate from experiences in other countries. In terms of the diversification of industry, there is certainly potential as several Swiss companies are already active in this area (electrical industry, turbine technology, etc.). Some specialise on turbines directly (Bertholdi produces generators, Technocon produces inverters, Meteotest is a leading firm for meteorological analyses). Security of supply would benefit greatly from the synergy between wind power and hydro, due to the potential of hydro storage and the different production curves which supplement each other. Environmental benefits available mostly by the potential to displace nuclear energy generation. However, the contribution to windpower would necessarily be modest. Even by 2050, with target of 4000 GWh of annual production from wind according to the national energy plan, wind could not replace even one 1000 MW reactor. Interest in tourism around wind power seems likely; at one wind farm such activities exist and meet with significant interest, even a special visitor's center holding 40 persons was built; there is strong support from the regional tourist office. A centre of competence was developed under the name "Wind Power Generation in Alpine Areas" to improve the

expertise of local companies in wind power project development and operation in mountainous terrain. The main regional development benefits were seen to flow from tourism-related activities and from regional innovation activities and networks.

11.2.6.5 Comparison and recommendations

It is evident from the above that the impact of windpower deployment on regional development depends on many circumstances.

It will always reduce the outflow of funds for electricity generation unless more efficient investment opportunities in RES-E generation are available. For the same reason and with the same reservation, it is likely to contribute to the security of supply. The impact on regional environmental quality depends on what fuels for electricity generation are replaced.

Whether additional income for the local population can be generated depends in part on the possible profit margin available to wind power projects. As the Swiss example shows, the absence of profitability or a low level of profitability means that no land rents and no royalties are being paid. On the other hand, excessive demands on the part of the local land owners or communities should also be avoided; they will damage the financial viability of projects and will be questionable from an ethical point of view. (Probably in most of the regions under consideration, it is considered normal that major projects should also produce benefits for the local population – this was already the practice with hydro plants some decades earlier). The impact of such payments also depends on the socio-economic context. In prosperous regions such as South Tyrol with sufficient availability of local capital and many opportunities for profitable investments, the extra income derived from wind power may not be an important consideration. This is quite different in areas characterised by depopulation, high unemployment and relative economic decline (as e.g. in some areas of Slovenia).

Some impacts such as the contribution to innovation dynamics depend on current economic structures. If the region has a diversified industrial base in sectors that can make a contribution to wind power (e.g. mechanical engineering, it will be in a better position to respond to the impulses coming from wind power deployment.

On the other hand it is evident that regional development policies can shape the impact that wind power deployment can have. Thus innovation dynamics can be promoted by government action (e.g. creation and/or support of innovation centres, education and training

courses, setting minimum requirements for local content (an instrument used with success in Spain, although in the context of very significant programs of wind power introduction). Government action can most likely also make a difference as to how wind power is perceived. Wind power can be implemented in an “industrial” fashion without much regard for landscape and cultural traditions; in this case a backlash is likely to come about (as may be happening in some of the karst area of Slovenia). It can also exercise great care in optimising the embedding of wind power into the landscape and in helping to define – by public education programs explaining the importance of RES-E and the regional contribution to it, by helping to integrate wind power into a program of soft tourism – the public’s response to wind power.

Recommendations to authorities:

- 1. With regard to local ownership:** Facilitate cooperative or even public financing of wind power plant (e.g. by public-private partnership). This will make it easier to make sure that the local population benefits from such installations. This reasoning applies not only to Alpine areas, but it may be more important in those areas and their small installations which may still greatly affect a community’ development than it is in the case of large wind farms, which are increasingly financed commercially and along commercial considerations alone and which serve a much larger territory.
- 2. With regard to land rents and royalties:** The system and amount of compensation for RES-E should be sufficiently generous as to allow some compensation for local land owners and local communities. It is legitimate that such payments should be somewhat higher than in flat terrain as favourable locations for wind power in the mountains are much rarer there. On the other hand, such payments should not run out of control, as they have a tendency to in some areas. Since it will be difficult to set absolute limits, it will be helpful to encourage voluntary agreements between wind power or RES-E associations and organisations capable of representing the interests of landowners, farmers etc. to help establish good practices and prevents excessive upward drift.
- 3. With regard to innovation dynamics:** Encourage positive economic impacts from wind power deployment in the region by appropriate support for soft tourism, public education programmes, and knowledge creation centers.

- 4. Recommendations specific for each region:** As most additional recommendations and their relative priority are context and therefore region dependent, we refer to the section on the benefits of regional development contained in the final report on work package 11 (i.e. 11.6).

11.2.7 Cost structure

For regulating wind power, especially questions of compensation/support systems, tax incentives, subsidies etc., it is important to have some knowledge of the economics of the wind power sector. But data are incomplete in many respects, especially with regard to the cost of generation per kWh. Other elements however are often better known.

Wind power installations in Alpine settings are still rare, especially at high altitudes. Some of them seem not very relevant as references for future construction because they use small turbines (below 200 kW) or date from a time when wind turbines were still substantially more expensive.

Below there is a list of wind power installations and a selection of key data that seem interesting from a regulator's perspective. For a more precise breakdown of the data, see report number 11.7 on costs.

Austria:

Oberzeiring

Operator: Tauernwind

Start of operation: September 2002

11 Vestas turbines of 1.75 MW each (as of summer 2004).

Annual production: about 39-45 GWh

Altitude: 1950m

Total investment cost: 1240 Euro/kW

Equipment cost (turbine): about 880 Euro/kW

22 km power line necessary for connection to the grid raised total cost, around 334 Euro/kW

Financing:

15,29% equity

75.55 bank loan

5.49 investment subsidy Austrian government

4.88 investment subsidy EU

0.4% regional government subsidy via ALTENER

Präbichl

Operator Rudolf Schartner

Start of operations: December 2001

1 Enercon E40/6.44 of 600kW

Annual production: about 1.2 GWh

Plankogel

Operator: Almwind

Start of operations: May 1999

1 NEG-Micon turbine, 750 kW

Annual production: about 1.5 GWh

Equipment cost 767 Euro/kW

Finance:

19% equity

31% bank loan

28% investment subsidy Austrian government

22% regional government subsidy

Land rent fees in Austria: Austrian Wind Energy Association recommends 1.2-2.5%; in Alpine settings 4-5% seem more common in recent years, due to scarcity of locations.

Royalties: 1000-2000Euro per turbine annually, again higher in Alpine settings

Wind resources: in Styria, best wind resources are at 1500-2000m, wind speeds there are comparable to the Danish coast, although greater variations in wind quality.

Italy:

Mals

Operator: Windkraft Marein

Start of operation: autumn 2003

1 Leitwind/Leitner AG prototype, 1.2 MW

Altitude: 1500m

Total investment cost: 1250 Euro/kW

Slovenia

No turbines running; only estimates of future costs are available. Thus, there is a government estimate of the cost of installing 383 turbines of 750 kW each, with total investment cost (not just equipment cost) of 645 Euro/kW. Even with important economies of scale, this figure appears extremely low. In fact, Elektro Primorska announced already that a larger turbine (1.5 MW) would be used.

Switzerland

Gütsch

Operator: Elektrizitätswerk Ursern

Altitude: 2300m

Start of operation: 2002. 800 kW Lagerwey turbine, blade damage in 2003, replaced by Enercon turbine E-40, 600 kW.

Total investment cost (old turbine): 1.513 Euro/kW

Equipment cost: 1000 Euro/kW

Production cost: calculated at 12 Eurocent/kWh

As a result of damage (technical availability 50%): 35 Eurocent

Reduced by investment subsidy to 22 Eurocent

Expected yield: 1.5 GWh/year.

Mont Crosin

Operator: Juvent

Altitude: 1200m

Six Vestas turbines (3 Vestas V44, 1 Vestas V47, 2 Vestas V52), totalling 4.16 MW

Annual yield: 5 GWh

Total investment cost: 1.202 Euro/kW

Equipment cost: 721 Euro/kW

Technical availability: 98-99%

France

No specific data for individual sites, only aggregated data for all locations (not just for Alpine locations) available.

On the basis of questionnaires sent out to several wind developers, the RAEE study shows the following costs:

Overall investment costs of 850 – 1200 Euro/kW

Breakdown of these cost:

Cost of equipment (turbine): 600-1000 Euro/kW

Civil engineering: 170-210 Euro/kW

Transport: 5-8% of overall cost

Connection to grid: 10-100 Euro/kW

Annual maintenance: 20 Euro/kW for first 10 years, then up to 30 Euro/kW

There seems to be a tendency towards lower costs if smaller turbines (850 kW or less) are used. The hypothesis is that such turbines have advantages in terms of lower transportation costs, lower grid connection costs, lower purchase prices due to high learning effects already obtained.

Higher cost of wind power in Alpine locations?

Overall, the opinions concur that the cost of wind power in the Alps is somewhat higher than in flat terrain. The extra cost is due to higher costs of transport and grid connection (although this varies substantially with sites), stronger and more irregular winds requiring stronger equipment, the cost of access during operation and maintenance, the cost of de-icing the blades and also higher cost of identifying wind resources (access problems, icing...). Added to this may be higher cost of permit procedures, land rents and royalties.

The very detailed discussion and argumentation of report 11.7 leads in particular to the following

Recommendations to authorities:

1. Provide incentives) so that investors will favour turbines with
 - strong generators able to face Alpine wind conditions
 - pitch control rather than stall control
 - variable speed/two speed rotors
 - adequate ice-removal facilities

These incentives could take the form of tax incentives or of technical standards for manufacturers competing in the calls for tenders in order to be eligible for government subsidised price support.

2. Provide government R&D support for work on ice removal systems
3. Create/maintain a stable policy with regard to support systems for wind energy; such support systems should be in place for at least 10 years. This increases the range of developers, investors, industrial companies and other stakeholders to become active in the wind power sector, increases competition and thereby prices.
4. Keep land rent fees and royalties under control by means of facilitating voluntary agreements between investors (or the Austrian Wind Energy Association) and such bodies as are able to represent land owners and local communities, i.e. the beneficiaries of the payments referred to above.

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Note:

The reports cited above are already a highly concentrated source of information and contain a multitude of further references.

Many references to windpower periodicals (especially to Windpower Monthly) are made directly in the text and not listed again here.