

## E-news update January 23 2006

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### POLICY

- 1.1. EU governments urged to act on buildings energy

16 January 2006, Environment Daily 2017

Groups representing several important European industries have called for full implementation of the 2003 energy performance of buildings directive followed by its speedy and ambitious revision. In a statement issued on Friday, seven associations deplored the slow progress made by governments and demanded the European commission take a tough line with backsliders. EU governments were required to transpose and begin implementing the directive by 4 January. Only a minority have met the deadline, while many - all 25 according to Friday's statement - are seeking extra time to implement key provisions (ED 05/01/06 <http://www.environmentdaily.com/20101>). The seven EU industry associations demanded an early revision of the directive, firstly to extend to all residential buildings the directive's minimum energy standards and requirement to carry out local energy supply studies. The groups also called for requirements for regular inspection to cover smaller boilers, air conditioning systems and even lighting installations. They demanded tougher rules for public buildings, plus a broader definition that would capture theatres, supermarkets, banks and sports facilities, not just publicly owned buildings. Industry sectors behind the statement include domestic appliance and lighting manufacturers, the construction industry, firms involved in co-generation of heat and power and producers of renewable energy. The European association for the conservation of energy and the sustainable energy campaign group E5 are also signatories. Follow-up: See statement: [http://www.cogen.org/Downloadables/News/130106\\_EPBD\\_Joint\\_Statement\\_final.pdf](http://www.cogen.org/Downloadables/News/130106_EPBD_Joint_Statement_final.pdf).

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- 1.2. EU states chided over future energy efficiency plans

13 January 2006, Environment Daily 2016

EU member states are showing little imagination in the fight to improve energy efficiency and may lack the appetite for strong measures to cut consumption, according to a senior advisor to EU energy commissioner Andris Piebalgs. Christopher Jones, deputy head of Mr Piebalgs' 'cabinet' of political advisors, told a seminar in London yesterday that governments' responses to a consultation on last year's EU green paper on energy efficiency had been "disappointing" (ED 20/06/05 <http://www.environmentdaily.com/19033>). "In focus groups member states have failed to come up with new ideas," Mr Jones told the meeting, which was held on Thursday at the commission's UK representative office. He also questioned whether they were willing to take a "strong approach" to energy efficiency. The action plan is due from the commission in early March; Mr Jones said it would have to include "concrete actions" to achieve the green paper's proposal for a 20% cut in energy consumption over the next 20 years. While stressing that the commission had yet to decide on the action plan's content, Mr Jones said possible measures included a new EU appliance labelling system. The system would tell consumers how much money they would save instead of just the current A-B-C rating. "Current labels mean very little", he said. There might also be an annually-updated EU energy efficiency benchmarking handbook and an EU energy efficiency programme for schools. EU governments' recent form on energy efficiency is poor. Last year they finally signed up to new legislation setting targets to improve energy efficiency over nine years to 2017. But the targets are non-binding and less ambitious than the European commission and European parliament had pushed for (ED 07/12/05 <http://www.environmentdaily.com/19981>). Mr Piebalgs has taken a much stronger interest in energy efficiency than his predecessor Loyola de Palacio, however, justifying his drive as much on the benefits to energy security as to the environment. Recent high oil prices and gas supply scares may help him cajole member states into tougher action. At the same time, support from the European parliament for new initiatives may be about to soften. In a preliminary report to the assembly on the green paper, rapporteur Alejandro Vidal-Quadras Roca says he wants the EU to focus on implementing existing legislation. It is "necessary to delimit...the scope" of the commission's green paper, the Spanish centre-right MEP says.

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### 1.3. Momentum grows for common EU energy policy

January 12 2006, Reuters

<http://www.alertnet.org/thenews/newsdesk/L11526613.htm>: By Jeff Mason: Momentum is growing in the European Union for a common policy to diversify and secure energy resources after a pricing dispute between Russia and Ukraine disrupted gas supply to Europe. British Prime Minister Tony Blair called for a common EU energy policy last year, and Austria, which holds the bloc's rotating presidency, has said it will put the issue at the top of its list during its six-month tenure. "Half of the energy we are using comes from abroad. That makes the European Union very vulnerable to our energy suppliers, and it needs to be tackled at a European level," said an official from the European Commission, which is drafting a policy paper on the subject for leaders to discuss in March. The EU's dependence on foreign energy sources is increasing as its own supplies run out. The Commission forecasts import dependence could grow to 70 percent of general energy consumption by 2030 and 90 percent for certain fuels like oil. Twenty-five percent of the EU's gas supplies come from Russia, and 80 percent of those snake through pipelines in Ukraine, highlighting the EU's vulnerability to disputes between the two, and the importance of an EU voice in such a crisis. "I wonder whether anyone ... would believe that individual member states would be better placed to deal with this than as part of the EU setup?" Austrian Chancellor Wolfgang Schuessel said at a news conference this week. Member states have long resisted attempts to wrest away control of energy policies but have shown support for initiatives that could range from harnessing the bloc's combined negotiating might to boosting development of environmentally friendly energy sources like solar and wind power. "The point about a common energy policy is stability, stability, stability," said a spokesman for Spain's Industry Ministry. "The key is that it will help the stability of supply and promote greater competition in the energy sector. What a policy would look like is up for debate. Blair said in October it would include improving the EU's internal energy market, dialogue with key suppliers at the European level, energy efficiency, and development of "clean" technologies. Wide range of issues: The Commission's green paper is likely to touch on many of those issues, though member states will be wary of attempts to bolster the EU executive's powers. "The difficulty will be coming up with something which fits with member states' existing responsibilities and autonomy," an EU diplomat said. "Energy policy isn't for the Commission. It's a member state competence." The Commission official, speaking on condition of anonymity, said the paper would likely include a chapter on energy efficiency, which EU

energy chief Andris Piebalgs champions and which proponents see as a win-win for reducing emissions of carbon dioxide (CO<sub>2</sub>) and lowering reliance on foreign suppliers. States will also be pressed to finish creating an internal energy market in the EU. The Commission has criticised member nations for dragging their feet on opening up electricity and gas markets to more competition. The touchy topic of nuclear power has already entered the discussion. Britain's Blair called for a common position on the subject within the bloc, but national opinions vary widely and the Commission is officially neutral. "It's hard enough to imagine a common policy on energy," the EU diplomat said. Consensus on nuclear was "for the birds". New EU energy policy should tackle problems with the power grid, which does not easily move power around Europe, said Christian Egenhofer, senior fellow at the Brussels-based Centre for European Policy Studies, adding a common EU grid operator would boost security and help avoid blackouts. EU states will also push to diversify sources of supply. "Greece is promoting energy networks such as the natural gas pipeline linking Turkey, Greece and Italy. Europe needs to secure its energy supply with more suppliers," said Nikos Stefanou, general secretary at Greece's development ministry. The EU already has "dialogues" with OPEC and Russia, two of the bloc's biggest suppliers, which could be used as a model for talks with other partners. The union has also committed to increase the share of renewable sources in its energy mix, though some say that can be developed further. With North Sea oil sources depleting and gas getting expensive, "renewables" like biofuels or hydro power are seen as crucial to establishing more home-grown energy supplies. (additional reporting by Joe Ortiz in Madrid and George Georgiopoulos in Athens)

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## ENERGY AND EMISSIONS

### 2.1. Green marks for black stuff

16 January 2006, Technology News, The Engineer

<http://83.219.63.174/Articles/293222/Green+marks+for+black+stuff.htm>: A method of generating energy from coal without actually burning it could form the basis of power stations whose carbon emissions can be easily captured and stored. Combining two types of chemical process - one well-established, the other new - the technique, currently being developed at Cambridge University, could have huge potential in the energy-hungry, rapidly-industrialising Chinese and Indian markets. Once seen as yesterday's fuel, coal is making a comeback. Vast untapped reserves - and a high growth in demand for power - in India and China mean that coal-fired stations are likely to be the fastest-growing power generation sector in the coming decades. But coal can still be a threat to the environment. Its energy content is far lower than natural gas, meaning that for every unit of heat produced, it gives off a larger amount of carbon dioxide. But because of the potential size of the market, 'clean coal' technologies, are attracting much attention. At Cambridge, chemical engineer John Dennis is working on a method which releases the energy content of the coal, but should produce only steam and virtually pure carbon dioxide as by-products. 'That means that you can just condense the steam to collect the carbon dioxide, which is simple and cheap,' said Dennis. This makes capturing the carbon dioxide, for sequestration in exhausted oil wells, for example, much cheaper. 'For conventional coal-fired power stations, the flue gases are about 10 per cent carbon dioxide, with large amount of nitrogen oxides,' he said. 'The cost of separating out the CO<sub>2</sub> is considerable.' Energy researchers at Chalmers University in Gothenburg, Sweden, have estimated the cost of sequestration of pure CO<sub>2</sub> to be \$2-8 (£1-5)/tonne of carbon, compared with \$100-200/tonne for removing CO<sub>2</sub> from flue gases. Dennis's technology 'combusts' the coal chemically, first converting its carbon content into a gaseous mixture of carbon monoxide and hydrogen, known as synthesis gas or syngas, then bringing this into contact with a solid metal oxide which can easily lose its oxygen. The system uses a technique known as chemical looping, where a single reactor serves several different functions in succession. The reactor is a type known as a fluidised bed, where a thick layer of granules is made to act like a liquid by a gas pumped upwards through it at high pressure; in Dennis's system, the granules initially consist of a porous solid such as aluminium or titanium oxide, supporting a layer of a copper oxide. In the first phase, the bed is fluidised by steam at 800-1,000°C, and powdered coal is fed into the reactor to mix with the copper-containing granules. The hot steam reacts with the carbon to produce syngas. Known as coal gasification, this has been used for many years in oil-poor, coal-rich countries - syngas will itself burn readily, although this produces the same type of flue gas as burning any other hydrocarbon. The next phase of the process, occurring almost simultaneously, sees both syngas components reacting with the copper oxide, transforming hydrogen into steam and CO into CO<sub>2</sub>. Many metal oxides could perform these reactions, said Dennis, but only copper will do it while

releasing heat from both the hydrogen and the CO. This energy can be captured in a heat exchanger and used to generate the high-energy steam needed to spin turbines. After a time, the researchers will stop the coal feed into the reactor and allow the remaining coal in the reactor to gasify and react, using up the remaining oxygen content of the copper oxide. Once this process is completed, the flow of hot steam into the reactor stops and is replaced by hot air, whose oxygen recombines with the copper to regenerate the oxide. The process then 'loops around', with the steam and coal feeds beginning again. Chemical looping is being pioneered at Chalmers, said Dennis, but the team there is working with pure methane and natural gas feeds. 'Nobody has ever tried this with solid hydrocarbon feeds before,' he said. 'We think it might also work with biomass feeds, which would be even better for the environment, because they're classified as carbon neutral.' Dennis is currently overseeing the construction of his first pilot reactor, which will allow him to test different types of feed, and assess the potential for increasing the scale. He will also start refining the oxygen carrier oxide. 'Copper seems to be the most promising, but we need to find a form which is robust enough to cope with the cycling of temperatures,' he said. At this stage, Cambridge is not seeking a commercial partner for the research - 'it's a pre-competitive technology at the moment, and some of it should be patentable,' Dennis said. If the team can perfect the system, export opportunities are likely to follow.

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## CLIMATE IMPACTS

### 3.1. Warmer seas will wipe out plankton, source of ocean life

19 January 2006, The Independent

By Steve Connor: The microscopic plants that underpin all life in the oceans are likely to be destroyed by global warming, a study has found. Scientists have discovered a way that the vital plankton of the oceans can be starved of nutrients as a result of the seas getting warmer. They believe the findings have catastrophic implications for the entire marine habitat, which ultimately relies on plankton at the base of the food chain. The study is also potentially devastating because it has thrown up a new "positive feedback" mechanism that could result in more carbon dioxide ending up in the atmosphere to cause a runaway greenhouse effect. Scientists led by Jef Huisman of the University of Amsterdam have calculated that global warming, which is causing the temperature of the sea surface to rise, will also interfere with the vital upward movement of nutrients from the deep sea. These nutrients, containing nitrogen, phosphorus and iron, are vital food for phytoplankton. If the supply is interrupted the plants die off, which prevents them from absorbing carbon dioxide from the atmosphere. "Global warming of the surface layers of the oceans reduces the upward transport of nutrients into the surface layers. This generates chaos among the plankton," the professor said. The sea is one of nature's "carbon sinks", which removes carbon dioxide from the atmosphere and deposits the carbon in a long-term store - dissolved in the ocean or deposited as organic waste on the seabed. The vast quantities of phytoplankton in the oceans absorb huge amounts of carbon dioxide. When the organisms die they fall to the seabed, carrying their store of carbon with them, where it stays for many thousands of years - thereby helping to counter global warming. "Plankton... forms the basis of the marine food web. Moreover, phytoplankton consumes the greenhouse gas carbon dioxide during photosynthesis," Professor Huisman said. "Uptake of carbon dioxide by phytoplankton across the vast expanses of the oceans reduces the rising carbon dioxide levels in the atmosphere." Warmer surface water caused by global warming causes greater temperature stratification, with warm surface layers sitting on deeper, colder layers, to prevent mixing of nutrients. Professor Huisman shows in a study published in Nature that warmer sea surfaces will deliver a potentially devastating blow to the supply of deep-sea nutrients for phytoplankton. His computer model of the impact was tested on real measurements made in the Pacific Ocean, where sea surface temperatures tend to be higher than in other parts of the world. He found that his computer predictions of how nutrient movement would be interrupted were accurate. "A larger temperature difference between two water layers implies less mixing of chemicals between these water layers," he said. "Global warming of the surface layers of the oceans, owing to climate change, strengthens the stratification and thereby reduces the upward mixing of nutrients." Scientists had believed phytoplankton, which survives best at depths of about 100 metres, is largely stable and immune from the impact of global warming. "This model prediction was rather unexpected," Professor Huisman said. "Reduced stability of the plankton, caused by global warming of the oceans, may result in a decline of oceanic production and reduced sequestration of the greenhouse gas carbon dioxide into the oceans." Vital link in the food chain: Microscopic plankton comes in animal and plant forms. The plants are known as phytoplankton. They lie at the base of the

marine food chain because they convert sunlight and carbon dioxide into organic carbon - food for everything else. Smaller animals such as shrimp-like krill feed on plankton and are themselves eaten by larger organisms, from small fish to the biggest whales. Without phytoplankton, the oceans would soon become marine deserts. Phytoplankton are also important because of the role they play in the carbon cycle, which determines how much carbon dioxide - the most important greenhouse gas - ends up in the atmosphere to cause global warming. Huge amounts of carbon dioxide from the atmosphere, which dissolves in the oceans, are absorbed by phytoplankton and converted to organic carbon. When the phytoplankton die, their shells and bodies sink to the seabed, carrying this carbon with them. Phytoplankton therefore acts as a carbon "sink" which takes carbon dioxide from the atmosphere and deposits the carbon in long-term stores that can remain undisturbed for thousands of years. If the growth of phytoplankton is interrupted by global warming, this ability to act as a buffer against global warming is also affected - leading to a much-feared positive feedback. The microscopic plants that underpin all life in the oceans are likely to be destroyed by global warming, a study has found. Scientists have discovered a way that the vital plankton of the oceans can be starved of nutrients as a result of the seas getting warmer. They believe the findings have catastrophic implications for the entire marine habitat, which ultimately relies on plankton at the base of the food chain. The study is also potentially devastating because it has thrown up a new "positive feedback" mechanism that could result in more carbon dioxide ending up in the atmosphere to cause a runaway greenhouse effect. Scientists led by Jef Huisman of the University of Amsterdam have calculated that global warming, which is causing the temperature of the sea surface to rise, will also interfere with the vital upward movement of nutrients from the deep sea. These nutrients, containing nitrogen, phosphorus and iron, are vital food for phytoplankton. If the supply is interrupted the plants die off, which prevents them from absorbing carbon dioxide from the atmosphere. "Global warming of the surface layers of the oceans reduces the upward transport of nutrients into the surface layers. This generates chaos among the plankton," the professor said. The sea is one of nature's "carbon sinks", which removes carbon dioxide from the atmosphere and deposits the carbon in a long-term store - dissolved in the ocean or deposited as organic waste on the seabed. The vast quantities of phytoplankton in the oceans absorb huge amounts of carbon dioxide. When the organisms die they fall to the seabed, carrying their store of carbon with them, where it stays for many thousands of years - thereby helping to counter global warming. "Plankton... forms the basis of the marine food web. Moreover, phytoplankton consumes the greenhouse gas carbon dioxide during photosynthesis," Professor Huisman said. "Uptake of carbon dioxide by phytoplankton across the vast expanses of the oceans reduces the rising carbon dioxide levels in the atmosphere." Warmer surface water caused by global warming causes greater temperature stratification, with warm surface layers sitting on deeper, colder layers, to prevent mixing of nutrients. Professor Huisman shows in a study published in Nature that warmer sea surfaces will deliver a potentially devastating blow to the supply of deep-sea nutrients for phytoplankton.

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### 3.2. Europe's largest climate change experiment launched

18 January 2006, EurekAlert

Scientists at the University of Liverpool have launched a large scale experiment to monitor the impact of climate change on freshwater systems. Dr Heidrun Feuchtmayr and a team from the School of Biological Sciences are conducting a two year project in collaboration with scientists from Belgium, Germany, Norway, Iceland and Denmark, to assess whether a predicted rise in climate temperature for the UK and parts of Europe will increase the toxicity of algae in the country's lakes and ponds. The project - the largest climate change experiment in Europe to date - is based at Ness Botanic Gardens and will involve testing a type of algae in 48 heated water tanks. Scientists will examine whether a rise in climate temperature will increase the growth of blue-green algae - known as cyanobacteria - many species of which are toxic and can affect fish, snails and other lake dwellers. It has also been known to cause irritation of the skin, headaches and sickness in humans and animals. Dr Heidrun Feuchtmayr said: "There is limited knowledge about the impact of global climate change on freshwater systems. Many lakes in Europe have suffered problems with blue-green algae through the introduction of fertilisers, discharges from farms and organic chemicals such as washing powder into the water. We now need to look at how these problems may be exacerbated with an increase in temperature." Pets or livestock drinking toxic lake water can suffer skin irritation and severe disorders involving the circulatory, nervous and digestive systems. In extreme cases, the effects can prove fatal. Humans are also affected by blue-green algae. Military training in lakes containing toxic algae has

induced sickness in soldiers, such as vomiting, abdominal pain and sore throats. Dr Feuchtmayr added: "Climate temperature is predicted to rise by 3 to 5 °C in the UK and parts of Europe in the next half century. We will investigate if blue-green algae blooms are more likely to form in heated water tanks and if the toxicity will increase with higher temperatures. We will also assess changes to aquatic communities and food webs."

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### 3.3. Global warming to speed up as carbon levels show sharp rise

15 January 2006, The Independent on Sunday

By Geoffrey Lean: Global warming is set to accelerate alarmingly because of a sharp jump in the amount of carbon dioxide in the atmosphere. Preliminary figures, exclusively obtained by The Independent on Sunday, show that levels of the gas - the main cause of climate change - have risen abruptly in the past four years. Scientists fear that warming is entering a new phase, and may accelerate further. But a summit of the most polluting countries, convened by the Bush administration, last week refused to set targets for reducing their carbon dioxide emissions. Set up in competition to the Kyoto Protocol, the summit, held in Sydney and attended by Australia, China, India, Japan and South Korea as well as the United States, instead pledged to develop cleaner technologies - which some experts believe will not arrive in time. The climb in carbon dioxide content showed up in readings from the US government's National Oceanic and Atmospheric Administration, taken at the summit of Mauna Loa, Hawaii. The measurements have been taken regularly since 1958 in the 11,400ft peak's pristine conditions, 2,000 miles from the nearest landmass and protected by unusual climatic conditions from the pollution of Hawaii, two miles below. Through most of the past half-century, levels of the gas rose by an average of 1.3 parts per million a year; in the late 1990s, this figure rose to 1.6 ppm, and again to 2ppm in 2002 and 2003. But unpublished figures for the first 10 months of this year show a rise of 2.2ppm. Scientists believe this may be the first evidence that climate change is starting to produce itself, as rising temperatures so alter natural systems that the Earth itself releases more gas, driving the thermometer ever higher.

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## CONFERENCES

### 4.1. The European Forum of FEDRE

European Foundation for the Sustainable Development of the Regions will take place in Geneva from January 23 to 27, on the theme "Climate Changes: Energy and Mobility". The Swiss NCCR Climate will be represented in the Conference: - 1st Session on "Climate Changes": Prof. Juerg Luterbacher, University of Bern and Prof. Martin Beniston, University of Fribourg, will be among the speakers. - 2nd Session on "Electrical Power Production": Prof. Alexander Wokaun, Paul Scherrer Institute (PSI) will be the chairperson of the section on "Renewable Energies". - 5th Session on "Energy Efficiency": I will speak on "Energy and Corporate Decision-making". Please find all details on <http://www.fedre.org/forum2006/en/>. The registration form is available online.

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### 4.2. CAN-E General Assembly

Please note: CAN E General Assembly will take place on the 13 - 14 March 2006 in Brussels. Further details will be sent out in due course.

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## PUBLICATIONS

### 5.1. The Economics of Wind Power with Energy Storage

By: Liliana E. Dragulescu, Pablo C. Benitez and G. Cornelis van Kooten; The Resource and Environmental Economics and Policy Analysis (REPA) Research Group of the Department of Economics, University of Victoria (Canada). Abstract: We develop a mathematical programming model for investigating the economic and environmental implications of wind penetration in electricity grids and evaluating how hydropower storage could be used to offset wind power intermittence. When wind power is added to an electrical grid consisting of thermal and hydropower plants, it increases system variability and results in a need for additional peak-load, gas-fired generators. Our empirical application using load data for Alberta's electrical grid shows that 34% wind penetration (normalized

to peak demand) results in a net cost increase of \$C4.7/ MW, while 67% wind penetration results in an increase of \$C10.3/MW. Costs of reducing CO2 emissions are between \$C41 and \$C45 per t CO2 . When pumped hydro storage is introduced in the system or the capacity of the water reservoirs is enhanced, the hydropower facility could provide most of the peak load requirements obviating the need to build large peak-load gas generators. This article could be downloaded from: <http://repa.econ.uvic.ca/publications.htm#Working%20Papers>.

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5.2. In from the Cold: The Climate Conference in Montreal Breathes New Life into the Kyoto Protocol  
The Wuppertal Institute assesses the results of the recent Climate Summit in Montreal. The UN climate conference in Montreal (28 November to 10 December 2005) included a meeting of the COP (11) and the first meeting of the 157 Parties to the Kyoto Protocol (MOP 1). After two weeks of negotiations, climate diplomats completed the implementation of the Protocol, refined some of its instruments for implementation and agreed on processes (termed "Innovation") for moving forward beyond the first Kyoto commitment period. The report by the Wuppertal Institute provides an overview and assessment of the agreements reached in Montreal. The report and further information on climate policy are available at: <http://www.wupperinst.org/cop11-mop1/english.html>. A proposal by 14 scientists on the future of international climate policy, Ott et al.: "South-North dialogue on equity in the greenhouse. A proposal for an adequate and equitable global climate agreement" is available at <http://www.south-north-dialogue.net>.

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5.3. Forest Vocation Lands and Forest Policy: When Simpler is Better  
Reference: Nascimento, José Rente (2005). RUR-05-03. Washington, D.C.: Inter-American Development Bank. You can download a copy at: [http://www.iadb.org/sds/ENV/publication/publication\\_210\\_4298\\_e.htm](http://www.iadb.org/sds/ENV/publication/publication_210_4298_e.htm). Summary: This paper just published addresses forest policies concerned with the adequate provision of forest related externalities. This group of policies seeks to reduce negative externalities and produce adequate levels of the services (positive externalities or public goods) that societies require. Despite the use of the forest vocation land (FVL) concept in many Latin American countries, the discussion in the scientific literature about forest policies based on it is modest. This paper seeks to contribute to this debate. For this, it presents facts, defines concepts, examines analytical frameworks, and investigates policy alternatives related to these externalities in private lands. Forest policies based on the use of the FVL methodology are shown to be effective and efficient alternatives to address specially water and soil related externalities and contribute to improve the competitiveness of forest businesses. The paper discusses land use planning methodologies, concepts which have been used frequently to identify sites for specific uses or having particular characteristics as well as their advantages and disadvantages. Next, it explores the use of a framework based on the vocation of lands as a strategic approach in the design and implementation of effective forest policies that to address these externalities.. To improve the understanding and applications of the vocation land methodology, the paper discusses the land rent model as applied to land use assignation. The model can help to explain, for instance, when landowners may find it to their advantage to assign a forest use to land, the consequences of additional costs associated with the adoption of soil and water conservation measures in agriculture production, as well as the consequences of externalities not being considered by the landowner; what happens to land use choice if environmental services compensations are made for certain forest use of land; and when deforestation is good or bad for society. The paper concludes that FVL is a useful model for the design of forest policies that seek to assure the provision of forest related externalities. Such policies are especially useful for developing counties because they are relatively easy to understand; are less intrusive in the forest business decision making processes and, thereby, allow for greater freedom of action; are less costly to monitor, enforce, and comply with; reduce corruptive activities and illegality associated with forests; and do not require adjustments as technologies and market conditions change. Last, the paper explores and summarizes the implications for forest policy from the use of the forest vocation land methodology. The implications for the following issues are explored: biodiversity preservation; carbon sequestration and stock; illegality associated with management plans and custody chain controls; payments for environmental services; and poverty in the forest.

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