Using Patent Law’s Teaching Function to Introduce an Environmental Ethic into the Process of Technical Innovation

David L Booton
Carolyn R Abbot

Available at: https://works.bepress.com/david_booton/1/
Abstract

This article suggests that patent law be amended so as to demand that applicants disclose, as a condition of grant, the ‘best available technique’ for carrying out the claimed invention. This amendment, it is argued, would give patent law a useful role in promoting sustainable production by providing an incentive to shift production patterns in line with the concept of sustainable consumption and production (SCP). Delivering goods and services with lower environmental impacts is commonly acknowledged as a key component of sustainable development, with national governments and international organisations prioritising the SCP agenda. In recognising the role of patents in promoting innovation and the development of new technologies, we recommend the introduction of an environmental disclosure requirement into the patent application process. In doing so, we emphasise the important teaching and learning functions served by the patent system, and the role that providing access to environmental information can play in achieving environmental protection objectives. We also tackle the most obvious objections to our proposal, in particular those relating to compliance costs and enforcement.
Using Patent Law’s Teaching Function to Introduce an Environmental Ethic into the Process of Technical Innovation

Carolyn Abbot and David Booton

Introduction

As demand for new products and services grows with our increasing prosperity, so does the impact on the natural environment and the drain on finite and increasingly scarce natural resources. From the extraction of raw materials, through manufacture, distribution, use and final disposal, production and consumption have significant environmental effects at all stages in the ‘life-cycle’ of consumer goods and services. That economic and social progress should not come at the expense of further environmental degradation is at the heart of a concept known as ‘sustainable consumption and production’ (SCP) which sets out ‘to promote social and economic

1. We are grateful to all those who have commented on this piece but are particularly indebted to Professors Anthony Ogus and Maria Lee for their invaluable advice and encouragement.

2. It is clear that something must be done if we are to maintain economic progress in the long term without approaching the limits of the Earth’s capacity to absorb pollution and provide resources. Estimates vary considerably, but according to the World Wildlife Fund for example, if current developed country patterns of consumption and production were replicated globally, this could require three planets’ worth of resources: see WWF, Living Planet Report (2004) http://www.panda.org/news_facts/publications/general/livingplanet/index.cfm.
development within the carrying capacity of ecosystems...[so] delinking economic growth and environmental degradation’.³

The international community has long supported a commitment to sustainable consumption and production. Agenda 21 for example, agreed at the Rio Conference on Sustainable Development in 1992 and seen by many as a lengthy blueprint for realising sustainable development, devoted a whole chapter to SCP, recognising that ‘the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries, which is a matter of grave concern ...’⁴ More recent support was given in the Johannesburg Declaration (2002) which advocates the need for all countries to promote ‘sustainable consumption and production patterns with the developed countries taking the lead and with all countries benefiting from the process ...’⁵

National governments have also developed SCP strategies. The UK government, for example, has gone some way to adopting an SCP strategy by way of a range of initiatives targeted at producers and consumers.⁶ Furthermore, its Sustainable production initiatives include fiscal measures such as the climate change levy and the landfill tax, positive incentives such as tax credits for research and development to stimulate new investment in resource efficiency and funding programmes to stimulate technological innovation such as the Technologies Programme. Sustainable consumption initiatives include, e.g., the promotion of green purchasing through the use of environmental and eco-labels.

---
⁵ Above n 3 (Johannesburg) Ch 3 at para. 14.
⁶ Sustainable production initiatives include fiscal measures such as the climate change levy and the landfill tax, positive incentives such as tax credits for research and development to stimulate new investment in resource efficiency and funding programmes to stimulate technological innovation such as the Technologies Programme. Sustainable consumption initiatives include, e.g., the promotion of green purchasing through the use of environmental and eco-labels.
Development Strategy, for example, has identified SCP as one of its four priorities, along with climate change, natural resource protection and sustainable communities.\(^7\) SCP has also been given explicit recognition in a UK Government policy document advancing a framework aimed at changing patterns of consumption and production.\(^8\) This framework represents a commitment to ‘getting more from less’ by ensuring, for example, more efficient and profitable production using fewer raw materials, and fulfilling consumer needs whilst using less energy and water, and generating less waste.\(^9\) Of particular relevance to the arguments advanced in this article is a report produced by the UK’s Advisory Committee on Consumer Products and the Environment in which it was recognised that whilst an assessment of the potentially damaging environmental impacts of activities such as building development and industrial processes are an important part of the regulatory landscape, there is little regulation covering the design and manufacture of products. In view of this, the Committee recommended that ‘Government should… consider how to develop an environmental impact assessment related to products’.\(^{10}\) To be effective this would require that environmental issues be taken into account at the earliest stages of product development.


8. DTI and DEFRA, above n 3, at 11.


The United States has also made a commitment to pursuing an SCP agenda. Although it does not have an overarching policy for SCP or indeed sustainable development, at both federal and state level, strategies have been put in place to promote SCP through partnerships with other governments, the private sector, civic society and other organisations.\(^1\) The Product Stewardship Partnership, for example, encourages manufacturers, retailers and others to voluntarily reduce the life-cycle impacts of products whilst the Design for the Environment programme empowers industry to take into account environmental considerations when designing products and processes. Other programmes promote *inter alia* the identification of energy savings in the industrial, domestic and transportation sectors and the introduction of innovative changes in manufacturing and production processes to reduce the use of priority chemicals.

So, both the US and UK governments have introduced a range of initiatives designed to influence patterns of SCP. In this article, we argue that one important mechanism has, however, potentially been overlooked in the drive towards sustainable production in particular. According to the German Federal Environment Agency, more than approximately 80% of all product-related environmental impacts are determined by product design.\(^2\) The raw materials used in the product, the natural resources consumed during its manufacture, the waste by-products emanating from the manufacturing process and the options for disposal, recycling or reuse at the end of the

---


product’s life are all determined at an early stage in its development.\textsuperscript{13} The UK Government has in fact acknowledged that a move towards sustainable development requires: ‘a major shift to deliver new products and services with lower environmental impacts across their life cycle, whilst at the same time boosting competitiveness’.\textsuperscript{14} Patents are a policy tool aimed at encouraging the pursuit of socially useful ideas. By way of providing the incentive that is an exclusive right to exploit an invention, patents aim to promote innovation and encourage the development of new technologies.\textsuperscript{15} Patent law then is \textit{one} obvious candidate to press into service with a view to shifting patterns of production and consumption. There is in fact some evidence that this is beginning to be recognised for in May 2008 the European Patent

\textsuperscript{13} The importance of giving early consideration to environmental matters in the design and development of new products is recognised in, e.g., those provisions of the European Community’s Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC OJ L37/24) which regulate product design, collection, treatment and recovery and in those of its ‘sister’ Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC OJ L37/19) which ban the use of lead, mercury and cadmium in new products.

\textsuperscript{14} DEFRA, above n 7, at 43.

\textsuperscript{15} Importantly, although the rights granted vest in individuals who benefit directly from them, this effect is only a vehicle by which the broader interest of society is served. Thus, as observed by the US Supreme Court, citing no less a figure than Thomas Jefferson, ‘[i]nventions then cannot, in nature, be a subject of property. Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from any body’: \textit{Graham v. John Deere Co.}, 383 U.S. 1, 9 (1966).
Office\textsuperscript{16} hosted the first ever international conference on climate technology and patenting strategies.\textsuperscript{17}

To an extent, patent law is already tailored to an environmental agenda in that a claimed invention’s predicted environmental impact may be taken into account in assessing its patentability. In the first part of our analysis, we explore this prohibition on the patenting of environmentally harmful technology, contrasting the ostensible differences between the laws of Europe and the United States in this respect. We observe that those differences that exist are superficial and an ‘environmental ethic’ in fact does not condition patentability on either side of the Atlantic.

So, in neither Europe nor the US is there an effective prohibition on securing proprietary rights in environmentally destructive technology. As our review illustrates, there are many arguments in favour of such a prohibition, though these must be set against as many counter arguments. In our view it would be wrong therefore to conclude that patent law cannot be tailored to spur the development of new technologies with reduced environmental impacts. Rather we suggest that a relatively minor amendment to the rules dictating what an applicant must disclose to secure a patent for his invention could give patent law a useful role in promoting sustainable production. With that in mind, in the second part of the article, we give some consideration to the so-called ‘teaching function’ of patents. This function has so far been overlooked in terms of considering how patent law might serve to meet

\textsuperscript{16} In partnership with the European Commission, the Slovenian government and the Slovenian Intellectual Property Office.

\textsuperscript{17} European Patent Forum 2008, ‘Inventing A Cleaner Future: Climate Change and the Opportunities for IP’, held in Slovenia on May 6/7 2008 on which see generally: \url{http://www.epo.org/about-us/events/epf2008/forum.html}.  


environmental objectives. We examine in outline the current disclosure requirement under European and US patent law noting that under both systems applicants are required to give a clear and complete description of their invention so that the public may learn of and from the invention.

In the section that follows we look at how an environmental disclosure requirement might be designed. In identifying the information we believe should be made available we draw on the concept of BAT (Best Available Techniques) which is currently used in industrial pollution regulation, and reflect on what of its features might usefully be incorporated into our proposal.

We go on to argue that it is in the public interest to require of patent applicants a disclosure of the kind we outline. In this we examine the role that access to environmental information plays in achieving sustainability and environmental protection objectives. We observe that providing access to environmental information raises the ‘environmental consciousness’ of the public. Further, the process of generating information can serve a ‘learning function’ and make patent applicants investigate the environmental impact of their research and development.

The final part of the analysis sets out to anticipate and meet the more obvious practical objections that could be raised against our proposal. Whilst we accept that our proposal would burden patent applicants with higher and sometimes significant costs we argue that significant benefits would follow if it were adopted. We suggest that a demonstrable failure to comply with an enhanced disclosure requirement provide either a complete or limited defence to a claim of infringement. This, we argue, would create a powerful incentive for the owner of a commercially successful patented invention and its competitors to continually search for improved ways of working that invention in terms of minimizing its environmental impact. We do not
therefore seek to give the patent system a novel regulatory role that might be seen as inconsistent with its existing social objectives. Rather our proposal builds on an existing objective of the system: specifically teaching those skilled in the technical arts. Further, under the enforcement scheme we suggest, the highest costs would be borne only by commercially successful patented inventions, whilst for the great majority of patented inventions the costs of complying would be small. In this final section we also give some thought to the appropriate political stage for the introduction of our proposal noting that if it is to have the beneficial effects that we envisage, it must be widely adopted amongst the countries of the world.

**The Current Relationship between Patentability and Predicted Environmental Harm**

The minimum requirements demanded of signatories to the World Trade Organisation’s Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs Agreement) indicate a broad international consensus that patents should be available for inventions that are new, involve an inventive step and are capable of industrial application.\(^\text{18}\) There is less agreement as to what else should be a condition of grant. The compromise position is that Member states are permitted to exclude from patentability inventions, the prevention within their territory of the commercial

---

\(^{18}\) TRIPs, Article 27:1 requires that Member States make patents available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.
exploitation of which is necessary to protect *ordre public* or morality.\(^{19}\) Expressly allowed under this head are exclusions aimed at avoiding ‘serious prejudice to the environment’.\(^{20}\) Whilst the patent laws of the countries of Europe take advantage of this permitted exclusion, US patent law does not. At the simplest level of analysis, this difference can be seen as reflecting differing degrees of cynicism towards the notion that technological innovation is *per se* beneficial to society. The environmentalist may be tempted to contrast the US’s naïve unquestioning faith in the societal benefit value of technological progress with Europe’s more enlightened position.\(^{21}\) This would be a mistake because the ostensible difference between the laws of Europe and the US is not matched by a corresponding difference in effect.

In Europe, what is patentable is determined largely by the provisions of the European Patent Convention (EPC), as interpreted and applied by the European Patent Office (EPO).\(^{22}\) Article 53(a) EPC provides that European patents shall not be granted in respect of ‘inventions the commercial exploitation of which would be contrary to

---

19. Subject to the qualification that the exclusion must not be made merely because the exploitation is prohibited by the domestic law of the Member State: TRIPs, Article 27:2.

20. Ibid.


ordre public or morality’. This exclusion allows for account to be taken of the potential risks to the environment posed by the exploitation of a claimed invention. However, the exclusion has not proved to be an effective guardian of environmental

23. Provided that the exploitation shall not be deemed to be so merely because it is prohibited by law or regulation in some or all of the Contracting States: Article 53(a) EPC. The EPO has indicated that whilst this exclusion may not be disregarded when assessing patentability it is to be narrowly construed consistent with the view that the concept of patentability must be as wide as possible: see e.g.: T19/90 Harvard Onco-Mouse, (OJ EPO, 1990, 476), at reason 5; V0006/92 Harvard Once-Mouse (OJ EPO, 1992, 589), at reason 3; and T356/93 Plant Cells/Plant Genetic Systems (OJ EPO, 1995, 545), at reasons 8 and 12. Most recently the EPO’s Opposition Division has held that Article 53(a) EPC only applies in exceptional cases: see Harvard Onco-Mouse: Decision of the Opposition Division dated 7th November 20 (OJ EPO, 2003, 419). An essentially identical exclusion is provided for in Article 6 of Directive 98/44/EC on the legal protection of biotechnological inventions, which differs from Article 53 EPC only in also specifying subject-matter which falls within the scope of the exclusion, specifically: (a) processes for cloning human beings; (b) processes for modifying the germ line genetic identify of human beings; (c) uses of human embryos for industrial or commercial purposes; and (d) processes for modifying the genetic identity of animals which are likely to cause them suffering without any substantial medical benefit to man or animal, and also animals resulting from such processes.

24. See e.g. T356/93 Plant Cells/Plant Genetic Systems, above n 23, at reason 5; and V0006/92 Harvard/Onco-Mouse, above n 23, at reason 4. Although the precise basis for this is unclear. The EPO’s Technical Board of Appeal has held that the concept of ‘ordre public’ encompasses the protection of the environment and it follows that inventions, the exploitation of which was likely to seriously prejudice the environment, were to be excluded from patentability: T356/93 Plant Cells/Plant Genetic Systems (above) at reason 5. On the other hand, the EPO’s Examining Division, commenting on the patentability of a genetically modified mouse, expressed the view that the environment had to be protected against the uncontrolled dissemination of unwanted genes which may well justify regarding an invention as immoral: V0006/92 Harvard Onco-Mouse (above), at reason 4. The difference is perhaps explained by the way in which these cases were pleaded and argued before the EPO.
interests not least because the EPO has varied its mode of application in a way that has
favoured patent grant over refusal. In T19/90 Harvard/Onco-Mouse\textsuperscript{25} the EPO’s
Technical Board of Appeal acknowledged that there was a danger of unforeseeable
and irreversible adverse effects if a genetically modified mouse was released into the
environment. But the Board held that whether Article 53(a) EPC was a bar to the
patenting of such an animal depended on weighing up possible risks to the
environment (and the suffering of the animal) on the one hand, and the invention’s
usefulness to mankind on the other.\textsuperscript{26} Later in T356/93 Plant Cells/Plant Genetic
Systems\textsuperscript{27} the Technical Board held that the type of ‘balancing exercise’ adopted in the
Harvard/Onco-Mouse decision was particularly useful in situations in which an actual
damage and/or disadvantage existed but was just one way of assessing patentability
with regard to Article 53(a) EPC. The Board held that whether Article 53(a) EPC
applied depended on the merits of each particular case. The Board added that the
revocation\textsuperscript{28} of a patent on the grounds that the exploitation of the relevant invention
\textsuperscript{25} (OJ EPO 1990, 476).

\textsuperscript{26} The EPO’s Examining division subsequently judged that whilst the invention’s usefulness to
mankind was undeniable, there was a very limited risk of the test animals escaping the laboratory and
being released into the environment and the claimed invention could not therefore be considered
immoral or contrary to public order: V0006/92 Harvard/Onco-Mouse, above n 23, at reason 4(iv). In
subsequent opposition proceedings the EPO’s Opposition Division adopted a different approach: see n
23 above and accompanying text.

\textsuperscript{27} Above n 23.

\textsuperscript{28} EPC, Article 99(1) provides for an opposition procedure under which a European patent may be
opposed by any person within nine months from the publication of the mention of its grant of the
European patent. If such an opposition succeeds then the whole ‘bundle’ of European patents will be
revoked: see William R Cornish and David Llewelyn, Intellectual Property: Patents, Copyright, Trade
would seriously prejudice the environment required that the threat to the environment be sufficiently substantiated at the time the decision to revoke the patent was taken.29 Most recently, the EPO’s Opposition Division has indicated that what was meant by ‘ordre public’ and ‘morality’ is to be judged through an examination of laws or regulations common to most European countries. These laws and regulations, it argued, were the best indicator about what is considered right or wrong in European society. It followed that if the exploitation of an invention was allowed under the laws of most EPC Member States it would comply with the requirement of morality.30

There are fewer express or implied restrictions on patentable subject matter in the United States. Indeed the US Supreme Court has held that Congress intended patents to be available to ‘anything under the sun that is made by man’.31 The US Patents Act contains no overt provision that might allow the refusal of the grant of a

Marks and Allied Rights 164 (6th edn, 2007). For the remaining life of the patent, an action for revocation can be brought under the relevant national law: see e.g. UK Patents Act 1977, s 72. However such an action, if successful, results in the revocation of the patent in the country in which the action was brought even if that patent is one of the bundle resulting from a European application.

29. Although the Board accepted that the exploitation of the claimed invention carried the possibility of some undesired, destructive events, it held that the evidence submitted was not sufficient to substantiate the existence of a threat to the environment: T356/93 Plant Cells/Plant Genetic Systems, above n 23, at reasons 18.6-18.7.

30. Harvard Onco-Mouse: Decision of the Opposition Division dated 7th November 20, above n 23, at reasons 9.3-10. This argument can be criticised as requiring a rather idealistic degree of attention, diligence and activity on the part of national legislatures towards what for most will quite rightly be seen as the rather obscure and technical field of patent law.

patent on environmental grounds. Under early US case law, courts developed and applied a doctrine of ‘moral utility’, which, as originally formulated, allowed a patent to be refused for an invention which was considered ‘injurious to the well-being, good policy, or sound morals of society.’ More recently the Court of Appeal for the Federal Circuit in *Juicy Whip v Orange Bang* held that a rule which would mandate invalidating patents because one can use the item for deceptive or illegal purposes is no longer good law.

---

32. The origins of the doctrine lie in the judgment of Story J. in *Lowell v. Lewis*, 15 F Cas 1018, 1019 (CC Mass 1817). On the origins and development of the doctrine see Benjamin D Enerson, *Protecting Society From Patently Offensive Inventions: The Risk Of Reviving The Moral Utility Doctrine* 89 Cornell L. Rev. 685 (2004) ; and Bagley, above n 21, at 487-93. During the 19th century, courts applied the doctrine so as to refuse patents for a variety of ‘morally controversial’ inventions such as gambling machines and fraudulent articles: see e.g. *Brewer v. Lichtenstein*, 278 F. 512 (7th Cir. 1922); *Meyer v. Buckley Mfg. Co.*, 15 F. Supp. 640 (N.D. Ill. 1936); *Schultz v. Holtz*, 82 F. 448 (N.D. Cal. 1897); *Nat’l Automatic Device Co. v. Lloyd*, 40 F. 89 (N.D. Ill. 1889); *Scott & Williams, Inc. v. Aristo Hosiery Co.*, 7 F.2d 1003 (2d Cir. 1925); *Mahler v. Animarium Co.*, 111 F. 530 (8th Cir. 1901); *Rickard v. Du Bon*, 103 F. 868 (2d Cir. 1900). But by the early 20th century, courts were applying the doctrine more narrowly and in such a way that an invention could meet the moral utility requirement if it was found to have at least one moral purpose: see e.g. *Fuller v. Berger*, 120 F. 274, 275 (7th Cir. 1903) and the decision of the BPAI in *Ex p. Murphy*, 200 U.S.P.Q. (BNA) 801, 802 (Bd. App. 1977).

33. *Juicy Whip v. Orange Bang* 185 F 3d 1364, 1367-8 (Fed Cir. 1999). See also *Whistler Corp. v. Autotronics, Inc.*, 14 U.S.P.Q.2d 1885, 1886 (N.D. Tex. 1988). Note however, that in *Geneva Pharms Inc v. Glaxosmithkline PLC*, 213 F. Supp. 2d 597, 610 (E.D. Va. 2002), quoting *Callison v. Dean*, 70 F.2d 55, 58 (10th Cir. 1934), the court held that a patent will possess utility ‘if it will operate to perform the functions and secure the results intended, and its use is not contrary to law, moral principles, or public policy’ and to similar effect see *Am. Standard Inc. v. Pfizer Inc.*, 722 F. Supp. 86, 150 (D. Del. 1989). Furthermore, notwithstanding the CAFC’s decision in *Juicy Whip*, the US Patent and Trademark Office does claim still to consider the ‘moral utility’ of inventions: see, e.g., Media Advisory, Patent
It is fair to say that the US Patent and Trade Mark Office’s impotence under US patent law is matched by an absence of enthusiasm on the part of the European Patent Office to exercise its power under the EPC to refuse a patent on the ground of likely environmental harm. The prospect of an environmental ethic informing patentability under either the European or US regime seems remote for a number of reasons. In the first place there is a belief that such a condition would be futile in that denying patents to controversial inventions would not stop the underlying research.\textsuperscript{34} Indeed refusing patents to objectionable inventions leaves them open to use by all. Not only is this argument at odds with the fundamental notion that the patent system encourages innovation,\textsuperscript{35} but it can also be criticised as politically naïve and disregarding of the character of a patent as a state-sanctioned monopoly. As compellingly argued by Cornish:

\begin{quote}
…it seems disingenuous to view the patent system as some morally neutral form of State aid in recognition of the cleverness of inventors. Patents provide
\end{quote}


\textsuperscript{35} The US Supreme Court sought to meet this objection with the argument that the availability or otherwise of patents means only that ‘research efforts are [either] accelerated by the hope of reward or slowed by want of incentives.’ Diamond \textit{v.} Chakrabarty, 447 U.S. 303, 317 (1980), c.f. Bagley, above n 21, at 539.
an incentive to the introduction of novel technology within a generally competitive economy; and they survive to the extent that industries consider them necessary. The State, as granting authority, cannot disclaim responsibility for the inventions for which it grants protection. It should not hide behind the negative character of the patent right in order to avoid deciding whether a particular idea is inherently too repellent or dangerous to deserve this form of incentive.\textsuperscript{36}

The second argument often advanced in favour of a liberal patenting regime is rather more convincing. This is based on the observation that inventions are \textit{per se} morally neutral and it is only their exploitation that might raise environmental (or other) concerns. This of course explains the form of the European exclusion but at the same time makes it hard to apply because it invites difficult predictions to be made by the patent granting authority. In most cases, the potential risks in relation to the exploitation of a given invention cannot be anticipated merely on the basis of the disclosure of the invention in a patent specification. At the patent application stage, the exploitation of a claimed invention is likely to be in the initial phase when risk and safety assessment has not yet been undertaken or completed.\textsuperscript{37} Furthermore, the long-term benefits of an invention cannot be reliably anticipated at this stage.\textsuperscript{38} Underlying

\textsuperscript{36} Cornish and Llewelyn, above n 28, at 833 and see also Bagley, above n 21, at 479.

\textsuperscript{37} T356/93 \textit{Plant Cells/Plant Genetic Systems}, above n 23, at reason 18.4.

this is the broader concern that any restriction on patentability has the potential to undermine the patent law’s primary policy objective of promoting technical innovation.\textsuperscript{39}

A related argument points to the fact that a patent does not authorise the holder to implement that invention, but merely entitles him to prohibit third parties from commercially exploiting it. A patent does not therefore interfere with the myriad of laws that might regulate the use of the patented invention.\textsuperscript{40} We are aware that in the

\textsuperscript{39} This concern is a legitimate one judged against the public interest in that ‘the static gains and losses from regulation are probably small compared to the historical gains in welfare resulting from innovation and productivity growth’: Paul L Joskow, and Nancy L Rose, The Effects of Economic Regulation 1449, 1484 in Richard Schmalensee and Robert Willig (eds), Handbook of Industrial Organization (1989).

\textsuperscript{40} A point often made by those favouring a liberal approach to patentability: see e.g. V0006/92 Harvard/Onco-Mouse, above n 23, at reason 4(iv); and Recital (14) of Directive 98/44/EC on the legal protection of biotechnological inventions. Furthermore, it can be argued that the patent system contributes positively to the operation of such a regulatory framework in that the absence of patent protection creates an incentive to keep technology secret as an alternative means of protecting commercial interests: Yvonne M Cripps, The Art and Science of Genetic Modification: Re-Engineering Patent Law and Constitutional Orthodoxies 11 Ind. J. Global Leg. Stud. 1, 2-3 (2004). That said, a patent is a property right, and although it gives the owner only a right to exclude third parties, nevertheless regulation of patented technology raises issues surrounding expropriation and government interference with property rights and contractual relations: see e.g. Bagley above n 21, at 479. The idea that individuals should be able to act free from Government interference is particularly strong in the US and has a constitutional basis insofar as the Fifth Amendment to the United States Constitution asserts that no life, liberty, or property may be taken without due process of law. These issues have been raised in opposition to certain forms of post-grant ‘regulation’ of patented technology. For example, it has been argued that the recently enacted US Medical Activity Act (35 U.S.C. §287(c)) in allowing for the continued issuance of ‘medical procedure’ patents but in prohibiting their enforcement against doctors
context of environmental regulation, the advantages of ex ante versus ex post control is a big and difficult issue. We observe only that despite the range of ex post controls limiting the availability and use of environmentally damaging products and processes, one of the key advantages of forcing environmental issues to be taken into account ex ante (that is during patent prosecution) is that it effects changes in practice at an early stage in product development when, as we have already noted, the great bulk of product-related environmental impacts are determined.

It is also often observed that patent granting authorities are poorly qualified to judge questions of morality, including those relating to the prospect of environmental effects a government ‘taking’ of property: see e.g. Courtenay C Brinckerhoff, *Medical Method Patents and the Fifth Amendment: Do the New Limits on Enforceability Effect a Taking?* 4 U. Balt. Intell. Prop. L.J. 147 (1996). And the mandatory licensing provisions under the US Clean Air Act 1970 have also been criticized as precedent for an onslaught of compulsory licensing provisions: see Michael A Gollin, *Using Intellectual Property to Improve Environmental Protection* 4 Harv. L. J. & Tech. 193 (1991); and Warren F Schwartz, *Mandatory Patent Licensing of Air Pollution Control Technology* 57(5) Virginia L. R. 719 (1971). It is also perhaps pertinent to note that confidential business information claims are regularly used to limit access to health information on toxic substances and pesticides, including information on exposure risks, and on chemical identity and ingredients: see e.g. Wendy E Wagner, *Commons Ignorance: The Failure Of Environmental Law To Produce Needed Information On Health And The Environment* 53 Duke L. J. 1619 (2004); and John D Echeverria and Julie B Kaplan, *Information Disclosures By Government: Data Quality And Security Concerns Symposium: Poisonous Procedural “Reform”: In Defense of Environmental Right-to-Know* 12 Kansas J. of L. & Pub. Pol’y 579 (2003). Obviously, since there must be a disclosure of the claimed invention as a condition for the grant of a patent, a patent right cannot be used to limit access to information but the general point is that business interests have successfully argued that legitimately acquired and recognised property rights should be respected where the value of such rights is diminished by laws aimed at regulating environmental impact.
harm. Such questions, it follows, are better left to specialised regulatory agencies.\textsuperscript{41} Moral considerations can import an inappropriately subjective and vague standard into the determination of patentability\textsuperscript{42} which both increases the costs of examination\textsuperscript{43} and vests the patent office with an inappropriate legislative power.\textsuperscript{44} There are, of course, authorities both in the US and Europe, which are charged with ensuring that technology is exploited in a way that is consistent with environmental laws and regulations.\textsuperscript{45} Such regulatory authorities are clearly better placed than patent granting agencies to judge how the exploitation of a particular technology might impact on the

\begin{enumerate}
\item See e.g. James R Chiapetta, \textit{Comment, Of Mice and Machine: A Paradigmatic Challenge to Interpretation of the Patent Statute} 20 Wm. Mitchell L. Rev. 155, 178 (1994); Cripps, above n 40, at 23; and Cornish and Llewelyn, above n 28, at 881.
\item Cornish and Llewelyn observe that: ‘applications concerning inventions with considerable potential for the relief of human suffering can become embroiled in costly and long-lasting proceedings which reflect bitter, irresoluble conflicts of ideology’: above n 28, at 881.
\item Typical is the argument that ‘the search for a consensus regarding the “ethical oughts” arguably should occur in the legislature’: see e.g. Benjamin D Enerson, \textit{Protecting Society From Patently Offensive Inventions: The Risk Of Reviving The Moral Utility Doctrine} 89 Cornell L. Rev. 685, 718 (2004).
\item As observed in T356/93 \textit{Plant Cells/Plant Genetic Systems}, above n 23, at reason 18.3.
\end{enumerate}
environment. Further, given the different stages in the development of a new
technology at which such a regulatory body and the patent office are called upon to
assess the impact of that technology, it is possible that different conclusions will be
reached regarding its environmental impact. This weighs against the refusal of a
patent on environmental grounds because:

… a patent does not amount per se to an authorisation to exploit the invention
claimed in the patent. For the latter regulatory approval must be obtained.
Should the competent authorities and bodies, after having definitively assessed
the risks involved, prohibit the exploitation of the invention, the patented
subject matter could not be exploited anyhow. If, however, regulatory
approval is given based on the finding that no risks or minimal risks are
involved, then patent protection should be available …46

It is not only a desire to avoid inter-institutional disagreement that fuels the EPO’s
reluctance to exercise its power to refuse a patent on environmental grounds. The
EPO’s Technical Board has indicated that even where the regulatory framework is
inadequate, this does not vest it with authority to carry out tasks which should properly
be the duty of a special regulatory authority.47 The EPO does not see its power to
refuse a patent on moral grounds as extending the scope of its authorised tasks and it is
thus pertinent to note that the EPO understands that the function of a patent office is to

46. Ibid, at reason 18.7.

47. Ibid.
grant patents. This raises a further doubt as to whether patent granting authorities are well placed to judge the morality of a claimed invention: the likely bias in favour of grant. Given that risk assessment and management are inherently value-laden political exercises it is unlikely that any patent office could objectively assess the potential environmental impact of a claimed invention. Patent examiners, because of


49. This bias arguably manifests itself in the EPO’s view that the EPC, Article 53(a) exclusion is to be narrowly construed and rarely applied (see e.g. T356/93 Plant Cells/Plant Genetic Systems, above n 23, at reason 8 and V0006/92 Harvard/Onco-Mouse, above n 23, at reason 3. It also serves to explain why the type of ‘balancing exercise’ adopted by the EPO in the ‘Onco-Mouse’ decision was rejected as inappropriate later in T356/93 Plant Cells/Plant Genetic Systems, above n 23. This balancing test, which requires a careful weighing of the possible risks to the environment against the invention’s usefulness to mankind, would not, it is submitted, have easily justified the grant of a patent to the GSI resistant plants that were the subject-matter under consideration in T356/93. The only documented refusal of a patent on moral grounds concerned the ‘Upjohn mouse’ application, which reached the European Patent Office at almost exactly the same time as that of the Harvard ‘Onco-mouse’. The Upjohn mouse was genetically modified so as to be entirely hairless as part of the search for a cure for baldness and the European Patent Office refused to conclude that, in moral terms, its suffering was outweighed by the merely cosmetic benefits of the animal as a research tool: see Cripps, above n 40; Robert Nott, The Biotech Directive: Does Europe Need a New Draft? 17 Eur. Intell. Prop. Rev. 563, 565-6 (1995); Steve Conner, Patent Ban on Baldness “Cure” Mouse, Independent 5 (London), Feb. 2, 1992; and Lionel Bently and Brad Sherman, Intellectual Property Law 436 (2nd edn, 2004).

their background and training, are natural enthusiasts for scientific and technological development with a particular sensitivity to benefits that are achievable only if such development proceeds. This also creates a mindset which favours grant. 51 Not only this, but as observed by Landes and Posner, there is an incentive for patent examiners to dispose of applications as promptly as they can and ‘it is easier and faster to secure a final disposition by allowing a patent application than by denying it’. 52

We conclude that the European and US patent systems in all major respects are best described as environmentally neutral. 53 The incentives for inventing and using

51. The same point is made in respect of the launching of research projects by Brunk et al, ibid, at 143.

52. William M Landes and Richard A Posner The Economic Structure of Intellectual Property Law 352 (2003). This suggests that some bias in favour of grant is inevitable in a patent system with finite resources. If effectively balanced by a workable revocation process then this might be considered acceptable.

53. ‘In all major respects’ because, although US law contains no prohibition on the patenting of environmentally harmful inventions, patent applications for inventions which materially enhance the quality of the environment or contribute to the development or conservation of energy resources can benefit from an expedited examination: see §1.102 U.S. Title 37 - Code of Federal Regulations Patents, Trademarks, and Copyrights. However, these regulations have not resulted in any great shift toward more rapid issuance of patents for environmental technology: see Gollin above n 40, at 211-212. However, as of August 25, 2006, the USPTO revised the procedures for applications made special under the accelerated examination program with the goal of completing examination within twelve months of the filing date of the application: see http://www.uspto.gov/web/offices/com/sol/notices/71fr36323.htm. In addition, certain US States provide tax relief on profits derived from patents relating to environmentally-beneficial technology, see e.g.: General Laws Of Massachusetts; Part I. Administration Of The Government; Title IX. Taxation; Chapter 62: Section 2(2)(G). under which any income received from the sale, lease or other transfer of a
‘environmentally beneficial’ technology are no greater than those for environmentally harmful technology. In neither jurisdiction is there an effective prohibition on securing proprietary rights in environmentally destructive technology. Of course it is possible to emphasise the patent system’s environmental credentials by singling out those environmentally beneficial inventions that have benefited from patent protection. But this is no more than a happy coincidence and it is disappointing then that so much of the 2008 European Patent Forum was given over to rather tired observations on how the existing patent system already operated to encourage the development of ‘green’ technologies.

However, we should not rush to conclude that patent law cannot be better tailored to spur the development of new technologies with reduced environmental impacts and indeed the 2008 European Patent Forum did generate some innovate ideas in this respect. These included ‘eco-patent pools or commons’, prize funds, additional

patent identified as useful for energy conservation and related purposes or useful for alternative energy development and related purposes shall be deducted for a fixed period.

54. See e.g. F Scott Kieff, *Patents for Environmentalists* 9 Wash. U. J. L. & Pol’y 307, 318-9 (2002); the self-congratulatory statements at the conclusion of the judgment of the Federal Court in *John Zink Co v. National Airoil Burner Co*, 613 F 2d 547 (Fed Cir. 1980); and to similar effect, the press release issued by the UK’s Chartered Institute of Patent Agents on 31 August 2005 noting the ‘crucial role’ played by patent attorneys in developing the waste recycling industry: (2005) 34 CIPA J. 577.

government regulation to force innovation in environmentally beneficial technologies as well as fast track application procedures for ‘clean’ inventions.56

But perhaps the most pertinent observation came from Günter Verheugen, Vice President of the European Commission, in his keynote address to the Forum, in which he observed that support for the development of environment-friendly technologies requires an IP system that both stimulates innovation and facilitates dissemination and noted in particular the fact that patent applications are published increases common knowledge and so contributes to the dissemination of the technology.57

What follows is a detailed exploration of the so-far overlooked potential that patent law’s teaching function has in contributing to an SCP strategy. In the following section we outline the requirement that applicants for a patent must disclose a clear and complete description of their claimed invention as a condition of grant. This forced public disclosure is assumed to stimulate ideas and the development of further advances. We go on to argue that there is a compelling case for applicants to disclose, in addition to the technical information that is currently required, information relating to the environmental impact of the claimed invention.

**Patents as Sources of Information**

By demanding of applicants that they provide a clear and complete description of any claimed invention, patent law also aims at encouraging the public dissemination of

---


technological information. This forced public disclosure of information contributes to the patent system’s policy objective by stimulating ideas and encouraging the development of further advances.

58. There is an international consensus that a claimed invention be disclosed by the applicant if it is to receive patent protection in so far as Article 29.1 of the TRIPs agreement provides that WTO members require of applicant’s that they disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art.


The function of ‘adding knowledge to the public domain’ is viewed as a 
centrepiece of patent policy. Indeed it has occasionally been advanced as the primary 
justification for the patent system. The requirement that the specification disclose 
the invention is seen as the essential ‘consideration’ for the patent grant. Thus the 
patent system is understood to be ‘a carefully crafted bargain that encourages both the 
creation and the public disclosure of new and useful advances in technology, in return 
for an exclusive monopoly for a limited period of time’. The teaching function 
provided by a description of the claimed invention is the ‘quid pro quo in which the 
public is given meaningful disclosure in exchange for being excluded from practicing 
the invention’.


61. See e.g. United States v. Dubilier Condenser Corp, 289 U.S. 178, 186-7 (1933) and Cornish and Llewelyn, above n 28, at p 233.


63. Enzo Biochem v. Gen-Probe, 323 F 3d 956, 970 (Fed Cir. 2002). Of course in industries where the 
costs of reverse engineering an invention are relatively low, the notion that disclosure of the invention 
serves as the quid pro quo for a monopoly right in that invention is made nonsensical given that the 
invention will be effectively disclosed to the public by its commercial exploitation: see e.g. The 
Disclosure Function Of The Patent System (Or Lack Thereof) above n 59 citing Frederic M Scherer, 
The Economics of Human Gene Patents 77 Acad. Med. 1348, 1351-2 (2002); James D Hamilton and 
William E Beaumont, Licensing Patents and Trade Secrets (June 2000), at 
http://www.oblon.com/media/index.php?id=53. Indeed, both the Supreme Court and the Federal Circuit 
have questioned the importance of the disclosure function, see e.g.: Brenner v. Mason, 383 U.S. 519, 
533-35 (1966); and Paulik v. Rizkalla, 760 F.2d 1270, 1276 (Fed. Cir. 1985).
Under the EPC, and the corresponding national provisions of the EPC member states, it is required that a patent application disclose a claimed invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. The patent specification must contain an ‘enabling disclosure’ such as to allow the invention to be performed by a person skilled in the relevant art. This condition will not be met if the specification omits an essential element required for the invention to be performed although it need not describe every specific detail.

64. EPC, Article 83. The corresponding obligation under UK national law is contained in the Patents Act 1977, s 14(3).

65. The term ‘enabling disclosure’ is one routinely used by UK courts: see American Home Products v. Novartis Pharmaceuticals [2001] RPC 159, at 179; and Kirin-Angen v. Transkaryotic Therapies [2003] RPC 31, at 65. Note that the only disclosure requirement enforceable by revocation is sufficiency for working. After grant it is not possible directly to raise issues about the clarity or concision of the claims: Patents Act 1977, s 72(1)(c) and see also Kirin-Angen v. Transkaryotic Therapies (above) at 69.

66. See e.g. Badische Anilin v. Usines de Rhone (1898) 15 RPC 359; No Fume v. Pitchford (1935) 52 RPC 231; Valensi v. British Radio [1973] RPC 337; Mentor v. Hollister [1993] RPC 7. The person skilled in the relevant art is understood to be ordinarily intelligent and versed in the subject-matter and is supposed to bring his stock of intelligence and knowledge to bear upon the specification: British Thomson-Houston Company Ltd v. Corona Lamp Works Ltd [1922] 39 RPC 49; and T923/92 Genentech/t-PA [1996] EPOR 275. If such a person could readily rectify any mistakes or supply any omissions contained in a specification then the invention will be held sufficiently disclosed: British Thomson-Houston Company Ltd v. Corona Lamp Works Ltd (above); No Fume v. Pitchford (above); T923/92 Genentech/t-PA (above); T171/84 Air Products/Redox catalyst (OJ EPO, 1986, 95); Biogen v. Medeva [1995] RPC 1; Chiron v. Organon (No.12) [1996] FSR 153. However, a disclosure will be held insufficient if a person skilled in the art would have to exercise inventive skill or was put under an ‘undue burden’ in order to put the claimed invention into practice: No Fume v. Pitchford (above); Valensi v. British Radio (above); Mentor v. Hollister (above); T727/95 Weyershauser/Cellulose (OJ
The position in the US is similar. A requirement that a patentee disclose his invention as a condition of securing patent protection has long been a feature of US law.\(^{67}\) As in Europe, the patent specification must enable a person of ordinary skill in the art to perform the claimed invention without undue experimentation.\(^{68}\) The current requirements are contained in 35 USC §112, the material parts of which provide that:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.\(^{69}\)

\(^{67}\) See Act of Feb 21, 1793, ch 11 §3, 1 Stat 318; and Act of July 4, 1836, ch 357, §6, 5 Stat 117.

\(^{68}\) In Re Wands, 858 F 2d 731, 737 (Fed Cir. 1988).

\(^{69}\) To this is added the requirement that the specification conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. The remainder of 35 U.S.C. §112 is concerned particularly with the craft of drafting claim dependencies.

---

EPO 2001, 1); T694/92 *Mycogen/Modifying plant cells* [1998] EPOR 114. Further, the person skilled in the art should not be called upon to make a prolonged study of matters that present some initial difficulty: *Valensi v. British Radio* (above); *Badische Anilin v. Societe Chimique* (above); and *DSM NV’s Patent* [2001] RPC 675.
So as to prevent inventors from concealing from the public preferred embodiments, US law demands that applicants, in addition to providing a description of their invention, set forth the ‘best mode’ of carrying it out. This requirement has no counterpart in current European patent law although similar requirements feature in the patent laws of a number of ‘common law’ countries. Whilst enablement aims to put the claimed subject matter into the public domain, ‘best mode’ looks to whether specific instrumentalities and techniques have been developed by the inventor.

70. See Glaxo v. Novopharm, 52 F 3d 1043 (Fed Cir. 1995) citing Chemcast Corp v. Arco Indus, 913 F 2d 923, 926 (Fed Cir. 1990); and In Re Gay, 309 F 2d 769, 772 (CCPA 1962).

71. 35 U.S.C. §112.

72. See, e.g. Australian Patents Act 1990, s 40(2)(a); Canadian Patent Act ( RS, 1985, c P-4 ), s 27(3)(c); and New Zealand Patents Act 1953, s 10(3)(b). Prior to the coming into force of the current Act, UK law also contained a similar requirement in the Patents Act 1949, s 4(3)(b), considered in Fuji Photo Film Co (Kiritanis) Application [1978] RPC 413; American Cyanamid Co v. Ethicon Ltd (No 3) [1979] RPC 215; Monsanto Co v. Maxwell Hart (London) [1981] RPC 201; and Van der Lely v. Ruston’s Engineering [1993] RPC 45. It should also be noted that to establish a right of priority in the US, an applicant filing an application in another country must fully comply with US disclosure requirements. Thus an applicant who intends to pursue patent rights in the US must, notwithstanding what the rules are in his own country, draft a specification so as to comply with the US ‘best mode’ requirement.

73. The enablement requirement, thus, looks to the objective knowledge of one of ordinary skill in the art, while the best mode inquiry is a subjective, factual one, looking to the state of mind of the inventor: Glaxo v. Novopharm, 52 F 3d 1043 (Fed Cir. 1995), citing Transco Prods v. Performance Contracting, 38 F 3d 551, 558 (Fed Cir. 1994). A best mode violation does not require intentional concealment of a better mode than was disclosed, but may occur if the disclosure made is so objectively inadequate as to effectively conceal the actual best mode from the public; see US Gypsum v. National Gypsum, 74 F.3d 1209 (Fed Cir. 1996). This difference is often a fine one and it is fair to say that most of the benefits of
A detailed review and critique of the ‘best mode’ requirement is beyond the scope of this paper, but two of its features are relevant to our analysis. First, it demands in the public interest that applicants disclose information going beyond the scope of what is being claimed. Typically it requires the disclosure of information such as ‘know-how’ that might otherwise be kept secret. That said, the law requires a disclosure only of the best mode of what the applicant specifically regards as the invention as set out by the claims. Accordingly, an inventor generally need not disclose a mode for obtaining unclaimed subject matter. Nevertheless ‘best mode’ disrupts the correspondence between the scope of the monopoly claimed and what is required to be disclosed. It follows that there can be no principled objection to the requirement to disclose the best mode can often be captured by the enablement and written description doctrines.


75. Some Federal Circuit cases have held that only the best mode of items set forth *haec verba* in the patent claims need be disclosed: *Chemcast Corp. v. Arco Indus. Corp.*, 913 F.2d 923, 927 (Fed Cir. 1990); *Accord N. Telecom Ltd. v. Samsung Elecs. Co.*, 215 F.3d 1286, 1297 (Fed Cir. 2000). But other Federal Circuit cases have held that additional disclosures must be made as to non-claimed subject
requiring other information relating to the invention to be disclosed if it is in the public interest so to do. If, as the *quid pro quo* for the patent grant, inventors can be forced to disclose information such as the best mode for carrying out the invention, then the disclosure of information relating to an invention’s contemplated environmental impact can in principle also be demanded.

The second relevant observation is that the obligation is to reveal the best mode for *carrying out* the claimed invention. Thus applicants are required to consider and disclose information relating to the invention in use. That said, the time for compliance is the filing date of the application and the requirement has been held not to extend to the disclosure of ‘production details’ including commercial considerations such as equipment on hand, availability of materials, relationships with suppliers, or customer requirements. Although the requirement is thus not particularly effective at forcing disclosure of the best mode of commercially exploiting the invention, it

_________

matter which is novel, or would materially affect the characteristics or functioning of the claimed subject matter: *Dana Corp v. IPC*, 860 F 2d 415 (Fed Cir. 1988); *Spectra-Physics v. Coherent*, 827 F 2d 1524 (Fed Cir. 1997); *Applied Med Res v. US Surgical*, 147 Fed 1374 (Fed Cir. 1998); *Eli Lilly v. Barr Labs*, 251 F 3d 955 (Fed Cir. 2001).

76. See *In Re Gay*, 309 F 2d 769, 772 (CCPA 1962); *Accord N. Telecom Ltd. v. Samsung Elecs. Co.*, 215 F.3d 1286, 1297 (Fed Cir. 2000); and *Bayer v. Schein Pharmaceuticals*, 301 F 3d 1306, 1319 (Fed Cir. 2002). The requirement is thus generally easily met by anyone who is timely in drafting a patent application before, or shortly after, the invention has been reduced to practice: see Wegner, above n 74.

77. *Teleflex v. Ficosa*, 299 F 3d 1313 (Fed Cir. 2002), citing *Young Dental Mfg v. Q3 Special Prods*, 112 F 3d 1137, 1144 (Fed Cir. 1997); *Wahl Instruments, Inc. v. Acvious, Inc.*, 950 F.2d 1575 (Fed. Cir. 1991); *Christianson v. Colt Industries Operating Corp.*, 822 F.2d 1544, 1563 (Fed Cir. 1987); *Zygo Corp. v. Wyko Corp.*, 79 F.3d 1563, 1567 (Fed. Cir. 1996).
nevertheless forces applicants to conceive of and disclose ways in which the invention will be put into practice.

We are not suggesting that the requirement under US patent law to disclose the ‘best mode’ of carrying out an invention already includes an obligation to disclose information relating to its projected environmental impact. Nor would we argue that the requirement be reinterpreted in this way, not least of all because its subjectivity and the absence of any updating obligation make it a poor candidate to effect a shift in patterns of production and consumption. Rather we would point out that the best mode disclosure requirement suggests ways of thinking about the character and content of the public disclosure that is the *quid pro quo* for patent grant. In the next section we take our proposal one stage further by considering how an environmental disclosure requirement should be designed in order to maximise its effectiveness in enhancing sustainability in production and consumption.

**Designing an Environmental Disclosure Requirement for the Patent System**

Central to the design of any information-generating system is a consideration of what type of information is to be made available, to whom and on what basis. The question of who should have access and the basis on which such access should be provided is, we think, straightforward. Once a patent has been issued, the patent specification is published and is available to anyone without any need for them to establish a specific interest.\(^{78}\) There is no reason to treat a mandated disclosure of information relating to

---

\(^{78}\) See e.g. UK Patents Act 1977, s 24(3); EPC, Article 98; and 35 U.S.C. §10(a)(1).
the environmental impact of an invention any differently from anything included in the patent specification.

More problematic is the question of what information should be made available. In this, account must be taken of the huge range of patentable subject-matter. With few exceptions, patents are available for any inventions, whether products or processes, in all fields of technology.\(^79\) It is easier to arrive at a suggested form for a mandated environmental disclosure for a novel process since this allows us to draw inspiration from existing ‘process standards’ currently used in EU and UK environmental regulation.\(^80\) At their most basic, environmental process standards may do no more than specify the height of a chimney or restrict the use of certain substances in a manufacturing process. However, since the 1980s, a more sophisticated second generation of ‘technology forcing’ process standards have been

\(^79\). TRIPs, Article 27(1) requires this.

\(^80\). See generally Genevra Richardson, Anthony Ogus and Paul Burrows, *Policing Pollution: A Study of Regulation and Enforcement* (1992) Broadly speaking, the word ‘standard’ in the context of polluting activities means the precise limits imposed by law on the amount of permissible pollution in the environment. These standards are then implemented through a licence or permit system which is underpinned by criminal liability in the event of non-compliance. The Royal Commission on Environmental Pollution (RCEP) provides a more detailed definition of environmental standards: ‘We understand an environmental standard to be any judgement about the acceptability of environmental modifications resulting from human activities which fulfils both the following conditions: (a) it is formally stated after some consideration and intended to apply generally to a defined class of cases; (b) because of its relationship to certain sanctions, rewards or values, it can be expected to exert an influence, direct or indirect, on activities that affect the environment’: Royal Commission on Environmental Pollution 21st Report, *Setting Environmental Standards* (Cm 4053 1998) 1.16. Hereafter referred to as the RCEP 21st Report.
deployed.81 One such example is the BAT (‘Best Available Techniques’) standard which first appeared as BATNEEC (‘Best Available Techniques Not Entailing Excessive Cost’) in a European Framework Directive designed to tackle air emissions from industrial plants,82 and was implemented in the UK by way of the Environmental Protection Act 1990.83 The UK Department of the Environment (as was) produced the following guidance on the meaning of ‘BAT’, with the ‘NEEC’ element requiring the

81. ‘Best Available Control Technology’ is a good example of a ‘technology forcing’ process standard currently used in the United States federal Clean Air Act. The term BACT means an emission limit based on the maximum degree of reduction of each pollution which ‘the permitting authority, on a case by case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant.’ Section 169(3) Clean Air Act.

82. Although when first adopted the ‘T’ was understood as standing for ‘technology’ rather than, as now, ‘techniques’: EC Framework Directive 84/360/EEC on combating air pollution from industrial plants [1984] OJ L 188/20. The Directive, which in draft form required use of ‘state of the art’ technology was amended following pressure from the UK government to adopt instead the BATNEEC standard.

83. In essence, this Act required operators of prescribed processes to obtain a ‘pollution control authorisation’ from the Environment Agency, a condition of which was that the BATNEEC were employed.
regulator to compare the cost of techniques with the environmental damage caused by
a process\textsuperscript{84}:

‘Best’ must be taken to mean the most effective in preventing or minimising
polluting releases or render them harmless… There may be more than one set
of ‘best’ techniques.

‘Available’ should be taken to mean procurable by the operator of the process
in question. It does not imply that the technique has to be in general use, but it
does require general accessibility… It does not imply that sources outside the
UK are ‘unavailable’. Nor does it imply a competitive supply market.

‘Techniques’ embraces the plant in which the process is carried on and how the
process is operated. It should be taken to mean the components of which it is
made up and the manner in which they are connected together to make the
whole. It also includes matters such as numbers and qualifications of staff,
working methods, training and supervision and also the design, construction,
lay-out and maintenance of the buildings …\textsuperscript{85}

\textsuperscript{84} The regulator was required to consider the ability of the operator to bear extra abatement costs by
considering the resources a typical operator has available for capital expenditure and the extent to which
‘market conditions allow costs to be passed on to customers or passed back to suppliers or absorbed
through lower profitability’; see RCEP 21st Report above n 80, at para. 3.16.

7.4-7.6.
At EU and therefore UK level, BATNEEC has since been replaced with a similar, though broader concept known as BAT (‘Best Available Techniques’), broader because BAT requires an examination of issues such as energy use and site restoration as well as process emissions. In brief, after comparing the techniques that would prevent or reduce emissions and identifying the best one in terms of that which will have the lowest impact on the environment, there follows an assessment of their environmental effects. Account is taken of direct and indirect effects. So, whilst identifying and quantifying possible releases of polluting substances into any environmental media, the BAT-type of assessment also considers matters such as consumption and use of raw materials, energy efficiency and waste issues. A potential problem lies in the fact that typically only part of a manufacturing process will be claimed in a patent. In deciding how wide an environmental impact disclosure needs to be in such a case, we suggest adopting the same basic principle as


87. See DEFRA, Integrated Pollution Prevention and Control: A Practical Guide (2005, 4th ed), at para. 9.17 and 9.3. An assessment will allow the regulator to ‘rank’ alternatives and the best techniques will be BAT unless economic considerations mean that they are unavailable having regard to both operating and capital costs. In other words, the absence of a ‘NEEC’ requirement does not mean that cost is not a factor in determining the best techniques as the phrase ‘available techniques’ requires there to be a balance between cost and environmental benefits such that: ‘the more environmental damage BAT can prevent, the more the regulator can justify telling the operator to spend on it before the costs are considered excessive’: Ibid., at para. 9.3.

applies to the disclosure of the best mode of carrying out the claimed invention under US law: ie that an inventor need not disclose a mode for obtaining unclaimed subject matter.89

The breadth of relevant considerations under a modern BAT-driven assessment suggests ways of formulating a mandated environmental disclosure where a patented invention lies in a novel product. In such a case, to be fully effective, an environmental disclosure should consider the environmental impact of exploiting the claimed invention, from production, to use, through to final disposal. Information pertaining to, for example, raw materials utilised during the production phase, energy consumed in producing and using the product and the environmental implications of disposal may be legitimately required as part of an ‘impact inventory’ of a product. We would of course, in proposing the introduction of a BAT disclosure, emphasise that the concepts of BAT (and indeed BATNEEC) have proved effective in regulation of industrial processes and are structured and understood with this purpose in mind. Whilst some of the conceptual features may be usefully employed in the design of an environmental disclosure requirement for the patent system, there cannot simply be a wholesale adoption. Our proposal to mandate the inclusion of an environmental impact disclosure into the patent specification shares the aim of shifting production and consumption patterns in line with environmental protection goals. However a detailed consideration of the form of our proposed patent based environmental disclosure cannot proceed without addressing more precisely the mechanism by which we think it would operate to effect such a shift.

So, as a device aimed at introducing an ‘environmental ethic’ into the process of research and development, we would suggest that a mandated disclosure of the

89. See above n 74 and accompanying text.
environmental impact of a claimed invention should require applicants to: (1) identify the ways in which the invention could be used (including in the case of products, options at all stages in the product’s life-cycle, from production through usage to disposal); (2) consider, for each of these options, significant environmental impacts; and (3) rank alternatives according to environmental criteria.

In determining the form and content of any environmental disclosure, it is also important to consider which stakeholders would be expected to utilise the information.\textsuperscript{90} With this in mind, there are two possible ‘user groups’ of environmental information disclosed in a patent specification: members of the public (including NGOs such as environmental and consumer groups); and industry (particularly those engaged in the technical field including potential competitors and potential licensees). In most instances, the needs and capabilities of the two groups will differ greatly. Except in the most basic of technologies, it is unlikely that both user groups could benefit equally from the same disclosure. Although open to all, patent specifications are directed to persons skilled in the relevant art. By demanding of applicants that they provide a description of their invention, patent law aims to encourage the dissemination of technical information and so stimulate further developments. It is this established teaching function that we aim to use, but modified in a way aimed at inculcating, in the scientific and technological research communities, a responsibility to take account of the long-term cumulative effects of technological development. That being the goal, the environmentally best available technique for carrying out a claimed invention should be disclosed with the clarity and

completeness necessary for it to be performable by a person skilled in the relevant art.\textsuperscript{91}

It is important to understand that we seek only to exploit the existing teaching (and indeed learning) function of patents. The obligation is to provide information - not necessarily to act on it. For much the same reasons that underlie the reluctance of the European patent authorities to apply those current provisions aimed at environmental protection, we do not advocate using the patent system as means of enforcing environmental regulation measures. Nor do we suggest that patent granting authorities should provide a substitute for dedicated environmental regulators. As it is the teaching function of patents that we seek to exploit, it follows that what is ‘best’ can be judged on solely environmental impact criteria and need not take into account the costs of adopting that particular technique. As a final note on effectiveness, we observe that with rapid advances in scientific understanding and technical know-how, the utility of an environmental disclosure would be maximised if the information had to be updated regularly. The idea of ‘living assessments’ has indeed been mooted in the development control context, and viewed as an important way of recognising the desirability of post-assessment monitoring.\textsuperscript{92} Although this would add to the costs of complying with a mandated environmental disclosure, making provision for an

\textsuperscript{91} In all but a small number of cases this will limit usability to the technically competent unless it were also demanded that patentees provide a non-technical summary such as is required in planning control and environmental impact assessment under Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment and Schedule 4 of the Town and Country Planning (Environmental Impact Assessment ) Regulations 1999 (SI 1999/293).

updating obligation on renewal would ensure that the costs of updating the information are borne only by successful patents (ie those which are worth renewing).93

Adding knowledge to the public domain is an established centrepiece of patent policy. But if the forced disclosure of information is to serve the public interest, that information must be useful. Our proposal would burden patent applicants with higher and sometimes significant costs. To do no more than suggest that these costs would be offset by the benefit to the public of learning of the invention would be glib without proper analysis of the nature of that benefit. In the section which follows we illustrate how providing access to environmental information can contribute to environmental protection initiatives and consider the effect of existing regulations that provide for the public disclosure of information on the environmental impact of products and processes.

**Justifying Access to Environmental Information**

Freedom of information is a fundamental principle of sustainable development and forms an important part of legislative and policy initiatives designed to protect the environment.94 There is a consensus among Western nations that an informed public

93. The raising of the costs of renewal of a patent, thereby deterring the renewal of patents of low commercial value, would have the further benefit of putting in the public domain inventions which would otherwise yield their owners an insignificant return. On this and on the relationship between renewal, renewal fees and commercial value generally see: Landes and Posner, above n 52, at 219. The renewal costs of UK patents are published at http://www.ipo.gov.uk/patent/p-manage/p-changerenew/p-changerenew-renew.htm.

94. This has received international recognition in Principle 10 of the Rio Declaration on Environment and Development (1992) (http://www.un.org/esa/sustdev/documents/docs.htm) which states: ‘…at the
has an important role in pursuing a sustainability agenda and improving environmental protection. Internationally, access to information is acknowledged as important in the pursuit of specific environmental objectives such as limiting climate change and protecting biological diversity.⁹⁵ European policy statements stress the need for access to ‘relevant, transparent, up to date and easily understandable’ environmental information in pursuing key environmental priorities such as climate change, nature and biodiversity, quality of life, and natural resources.⁹⁶ And the UK Government’s most recent Sustainable Development Strategy highlights the important role that information plays in changing behaviour and attitudes.⁹⁷

A commitment to providing access to environmental information extends beyond the policy context. Successive UK and US governments have in fact legislated so as to recognise the value and importance of environmental information held by national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available.’

95. See e.g. United Nations Framework Convention on Climate Change (1992), Article 6(a)(ii) (http://unfccc.int/resource/docs/convkp/conveng.pdf) which represents a clear commitment to the provision of information on climate change and para. 7 of the preamble to the United Nations Convention on Biological Diversity (1992) (http://www.biodiv.org/doc/legal/cbd-un-en.pdf) which states that the contracting parties are ‘aware of the general lack of information and acknowledge regarding biological diversity and of the urgent need to develop scientific, technical and institutional capacities to provide the basic understanding upon which to plan and implement appropriate measures.’


97. DEFRA, above n 7.
public bodies and private entities. In both countries there exists a complex and detailed framework making information available to citizens and other interested parties by way of laws providing both for ‘freedom of information’⁹⁸ and laws giving

⁹⁸. That is the ability of the public to obtain information in the possession of government in response to a specific request. For freedom of environmental information in the UK see Royal Commission on Environmental Pollution, 10th Report, Tackling Pollution - Experience and Prospects Cmd 914 (1984) para. 2.77; and Public Access to Environmental Information 3 North American Environmental Law and Policy Series 159-169 (1999-00).


Despite the fact that there is some doubt as to the extent to which public registers actually promote public access (see Jeremy Rowan-Robinson, Andrea Ross, William Walton and Julie Rothnie, Public Access to Environmental Information: A Means to What End? 8(1) J of Env L 19 (1996) public registers like those introduced in the Control of Pollution Act 1974 are still at the core of the UK legislative framework. The system has however been expanded and now also covers environmental control systems other than pollution licensing, such as contaminated land and producer responsibility.

The detailed contents of each register are specific to the relevant legislative provisions, although a number of common features can be identified. All public registers are maintained by the relevant regulatory authority, most notably the Environment Agency and local authorities, and must be available for inspection, free of charge, at all reasonable times. In the case of licensing registers such as the Pollution Prevention and Control Public Register and the Water Quality and Pollution Control Public Register, information relating to licence applications, licences, monitoring data, appeals, compliance status and enforcement actions are included in the register (see further: http://www2.environment-agency.gov.uk/epr/info.asp). Much of the information included on the register (such as licence applications and monitoring data) is in fact generated through the application of stringent industry reporting requirements. In the last 20 years, there has also been a move towards the maintenance of pollution inventories which, unlike the public registers are exclusively concerned with pollution emissions from industry. The first such inventory, the ‘Toxics Release Inventory’ was established in the US in 1986. Since 1999, the Environment Agency in the UK has also maintained a Pollution Inventory which provides an annual record of pollution from Agency-regulated major industrial sites.
and sewage treatment works in England and Wales. The drive towards public provision of data on industrial pollution took another major step forwards in February 2005 with the launch of the European Pollutant Emission Register (EPER), for a summary of which see: ‘Europe’s new pollution inventory – a benchmark for industry performance’ (February 2004) ENDS Report 349 at 20. Established under the 1996 EU Directive on Integrated Pollution Prevention and Control, the EPER contained data on the emission of 50 substances from activities covered by the Directive, with its thresholds intending to cover approximately 90% of total emissions. It was run jointly by the European Commission and the European Environment Agency, covered emissions from 2001, and allowed members of the public to search by country, activity, pollutant or facility. Although in many ways, the EPER was not as comprehensive in its data coverage as the Agency’s Pollutant Inventory, it provided new information about certain emission sources in the UK including offshore combustion plants, landfill sites and intensive livestock installations and raised concerns about the environmental performance of businesses in different Member States. From 2007 the EPER has been upgraded and extended into a fully comprehensive European Pollutant Release and Transfer Registry (as established by Regulation 166/2006/EC which incorporated the provisions of the UNECE Protocol on Pollutant Release and Transfer Registry). There has also been additional provision for access to environmental information which falls outside and beyond these statutory registers. The most recent legislative enactment in this area is the Environmental Information Regulations 2004 (SI 2004/3391) implementing Council Directive 2003/4/EC on public access to environmental information.

The United States, in stark contrast to the UK, has a deep rooted tradition of easy and free access to government-held information, including information pertaining to the environment: the principle of access to information was in place prior to the enactment of modern environmental laws. See Laura Schenck, Freedom of Information Statutes: The Unfulfilled Legacy 48 Fed Comm LJ 371, 374 (1995). There are a number of specific federal environmental statutes that call for governmental bodies to provide information to the public Under some such as the Toxic Release Inventory established in 1988 under the Emergency Planning and Community Right-to-Know Act 1986 (EPCRA), contains information on releases of approximately 650 chemicals from industries such as manufacturing, waste treatment and coal mining. The results of certain environmental or public health studies must also be disclosed, such as toxicological profiles under the Comprehensive Environmental
effect to the public’s ‘right to know’.\textsuperscript{99} This latter category, which imposes a ‘proactive duty’ on government and industry to disseminate certain types of information, provides an important supplement to the traditional reactive approach that centred on giving members of the public a right to request certain information held by government. It is also particularly relevant as most closely analogous to our proposal to disclose environmental information in a patent specification. Environmental impact assessments, environmental and eco-labelling and corporate environmental reporting are just three examples of instruments which may require government and industry to be proactive in disclosing certain types of information.

\textsuperscript{99} A detailed appraisal of environmental information provisions in the UK and US is beyond the scope of this paper but see: William A Wilcox, \textit{Access to Environmental Information in the United States and the United Kingdom} 23 Loy. L. A. Int’l & Comp. L. Rev. 121 (2001).
But what justifies the costs inherent in providing access to environmental information? Promoting and improving public access to environmental information is motivated in part by the belief that the environment is a common heritage, and information relating to it should thus be available to all.\(^{100}\) Put another way, current and future generations are understood to have a ‘stake’ in the environment, and are therefore entitled to information about matters which affect that interest.\(^{101}\) As recognised by the Royal Commission on Environmental Pollution (RCEP) in 1984, ‘the public must be considered to have a right, analogous to a beneficial interest, in the condition of the air and water and to be able to obtain information on how far they are being degraded.’\(^{102}\)

Of course, providing environmental information is not an end in itself, but rather a means to enable and facilitate sustainable development and environmental protection objectives.\(^{103}\) There are a range of practical reasons for providing access to environmental information. Firstly, providing access to environmental information is the necessary starting point in the effective pursuit of public participation and access to justice. Ignorance renders rights to participation and access to justice ineffective\(^{104}\) whereas improved access to environmental information supports public participation.

---

100. Kimber above n 90, at 139.


102. RCEP 10th Report., above n 98, at para. 2.51.

103. As described by J Rowan Robinson et al, above n 98, at 20. Further, an appropriate information base for firms and policymakers has been identified as one of the main factors necessary to establish an environmental policy to encourage innovation: see Banks and Heaton, above n 12.

in environmental decision-making.\textsuperscript{105} Because the public are informed by a range of views and opinions, this may lead to substantively ‘better’ decisions being taken. Not only this, but establishing a framework which promotes public involvement can also legitimise and strengthen public support for particular projects.\textsuperscript{106} Related to the role that information has in enhancing participation, is its role in promoting informed debate about environmental risks.\textsuperscript{107} Secrecy can lead to unfounded public disquiet\textsuperscript{108} and if information is difficult to obtain, the public tend to overestimate the health or environmental risks associated with an activity. Allowing the public access to full and complete information may not only lead to more accurate assessments of risk by the

\textsuperscript{105} Participatory mechanisms can incorporate negotiation, deliberation and democratic debate. For a summary see Maria Lee and Carolyn Abbot, \textit{The Usual Suspects? Public Participation Under the Aarhus Convention} 66 Modern L. Rev. 80, at 85-6 (2003).

\textsuperscript{106} Ibid, at 82-8. See also John Dryzek \textit{The Politics of the Earth} (2005); Julia Black, \textit{Proceduralising Regulation: Part I} 20 O.J.L.S. 597 (2000) and \textit{Proceduralising Regulation: Part II} 21 OJLS 33 (2001) and Jenny Steele, \textit{Participation and Deliberation in Environmental Law: Exploring a Problem-Solving Approach} 21 O.J.L.S. 415 (2001). But the promotion of participatory procedures inevitably comes at the expense of other process values such as time and cost. Moreover, it may lead to ‘more cautious decision-making as more parties and more perspectives are taken into account and more care is taken that a decision-maker will not be left open to political or legal challenge: Kimber above n 90, at 143.

\textsuperscript{107} Full access to information can also affect the manner in which risks are addressed by allowing the widest possible range of interpretations of raw data as opposed to relying upon assertions and interpretations of interested parties: see Bell and McGillivray, above n 101, at 320.

\textsuperscript{108} RCEP 10th Report above n 98, at para. 2.52.
public but can also promote public confidence in actions taken by industry and government.  

Secondly, and as far as public empowerment is concerned, access to information is also a necessary pillar in the enforcement of environmental law and in monitoring its effectiveness. Any right of the public to bring actions to protect their environment can only be exercised effectively if relevant information is available. Moreover, the availability of information on the state of the environment enables the public to assess the effectiveness of existing regulations. And thirdly, access to information allows public scrutiny and so promotes accountability. We are not here concerned with government or other public bodies, but with the responsibilities of


110. Citizen suits in the United States, for instance, rely inherently on the availability of certain information (see e.g. Clean Water Act 33 U.S.C. § 1365(a)). In the UK, if tortious (civil) actions for pollution damage are to be successful, information relating to the polluter and the pollution must be readily available.

111. Reports and data relating to, e.g., waste arisings, recycling rates and carbon dioxide emissions can be valuable in informing the public as to whether or not the relevant legislation is achieving its aims and objectives.

112. Informational disclosure ensures that government (national and local), public authorities and other state administrators can be held to account throughout the policy and law making process and the effectiveness accountability is directly related to the availability of information’: Kimber, above n 90, at 41.
industry in environmental protection. The availability of information relating to the environmental impact of industrial activity facilitates accountability and encourages industry to take environmental protection seriously.\(^{113}\)

One can also identify strong principled support for providing access to environmental information; by raising ‘environmental consciousnesses’\(^{114}\), information can lead to changes in behaviour and decision-making. For example, providing information on the energy efficiency of ‘white goods’ informs consumer choice and drives demand for ‘greener’ products whilst increasing the availability of information pertaining to pollution and its impact on the environment influences consumption of goods and services such as air travel. In the same way, forcing reflection on the environmental impact of a claimed invention by introducing an environmental disclosure requirement into the patent process will raise the ‘environmental consciousness’ of those engaged in technological research and development. Our proposal can therefore usefully be conceptualised as performing an important ‘learning’ function which may bring about changes in attitude toward the desirability for environmentally sound design and development.

Whether proactively or reactively, as we noted earlier, requiring that the public be provided with greater access to environmental information is justifiable both as a matter of principle and as a means of providing practical support for the sustainable development and environmental protection agenda. However any practical justification depends on the effectiveness of the system which provides access to the

\(^{113}\) As early as 1984, the Confederation of British Industry (CBI) observed that environmental pressures on industry should be seen ‘helpful stimuli’ rather than an obstruction: RCEP 10th Report above n 98, at para. 6.7.

\(^{114}\) See Kimber, above n 90, at 140.
information. An effective system will, for example, ensure that the target audience is aware of the availability of the information, provide access at a reasonable cost and require that the information is made available in a comprehensible format.

**Costs of Compliance, Enforcement and Other Practical Problems**

The most significant criticism that could be levelled at our proposal is that it would impose disproportionately high costs of compliance on patentees. The costs of disclosing the projected environmental impact of an invention will not, in the majority of cases, be offset by any profits generated by exploiting it. Of inventions for which patent applications are prepared and filed, very few are exploited and fewer still exploited profitably.\(^{115}\) While true, these observations invite criticism of all the costs of making a patent application including those associated with the existing disclosure requirement. The costs of forced disclosure are justified because whatever disadvantages these bring, they are offset by the benefit to the public of learning of the invention.\(^{116}\) During the term of the patent, the extent to which anyone can make use

\(^{115}\) See e.g. Tim Roberts, *Disclosure of origin of genetic resources* 34 CIPA J. 574 (2005), a paper prepared on behalf of CIPA’s Patent Committee. Much pollution regulation can be justified on the grounds that pollution is a physical externality, the cost of which, in the absence of regulation, will not be reflected in the price of the polluting product or process. Regulation can be used to internalise that externality by ensuring that the ‘polluter pays’. We cannot, however, use the polluter pays maxim to support our proposal as, the majority of patented inventions will never get to a stage of development where they might actually cause pollution.

\(^{116}\) More elaborate mandated disclosures make the public communication more unmistakeable which is efficient because the clear public definition of property rights lowers transaction costs and tends to optimise investments: see Landes and Posner, above n 52, at 34.
of this information is limited if all that is disclosed is a clear and complete description of what is claimed.\footnote{117} However, once the patent has expired, anyone is then free to exploit the invention. Furthermore it seems likely that the best available technique for performing a particular invention is likely also to be so for a range of related products or processes. We envisage individuals learning of the environmentally best available techniques from competitors’ patents and implementing these into their own production processes. This would not infringe the relevant patent because there would be no appropriation of protected (claimed) subject-matter.\footnote{118} Implementation of our proposal would thus have the benefit of reducing the amount of duplication of research and development into methods of minimising environmental harm.\footnote{119}

But a mandated environmental disclosure of the kind we advocate would add a significant hurdle on the track to securing a patent. Where a patent is applied for in a number of countries, it would also add to what is often a significant cost of translation.\footnote{120} The negotiations in TRIPS Council relating to the suggestion that the

\begin{footnotesize}
\begin{enumerate}
\item[117.] Though limited, the mandated disclosure of the details of an invention might have some utility to the patentees competitors even during the patent term: ibid, at 299.
\item[118.] Whether this can be done depends on the scope of the monopoly of a particular patent. It is generally the case that ‘the greater patent protection is, the smaller the benefit to competitors from the information contained in the patent grant because the less they can do with it’: Ibid.
\item[119.] To this extent our proposal shares the benefits of the patent system advocated in the ‘prospect theory’ of patent law proposed by Edmund W Kitch, The Nature and Function of the Patent System 20 J. of L. and Econ. 265 (1977).
\item[120.] Undoubtedly one of the most expensive aspects of patenting is translation costs: a problem which is particularly acute in Europe and which has led to the solution put forward in the London Agreement on the application of EPC, Article 65: see http://www.epo.org/patents/law/legislative-initiatives/london-agreement.html. In most cases we think it unlikely that, set against the costs of translating the patent
\end{enumerate}
\end{footnotesize}
origin of genetic resources be disclosed, \(^\text{121}\) have raised the argument that any attendant increase in the costs of securing a patent will discourage patent applicants and so will undermine the patent system’s objective of encouraging investment in research and development. \(^\text{122}\) The same criticism could be made of our proposal. Our counter argument, which we expand upon below, is that the scientific community has a crucial specification as a whole, the added costs of including a translated environmental impact assessment would be significant. Above we sought to draw principled albeit limited support for our proposal from the requirement that applicants for a US patent must disclose, in addition to a description of a claimed invention, the best mode for carrying out the invention. We accept that the costs to applicants of making such a disclosure are minimal given that at the time of making a patent application, the inventor will invariably have given some thought as to how his invention might be put into practice. In contrast it cannot be said that he is likely to have thought about the invention’s environmental impact in anything like the detail that we would demand. Not only this, but there is no obligation, once a US patent application has been filed, to update the disclosure made regarding ‘best mode’ in light of what the applicant or others may learn about putting the invention into practice. This is a significant weakness and we have argued that the utility of an environmental disclosure would be maximised if patentees were required regularly to review, and update as appropriate, the disclosure to take account of advances in technology and increased know-how. Admittedly this would be costly for patentees, but if the obligation to update arose only on renewal then the continuing costs would attach only to those patents profitable enough to be judged by their owners as worth renewing.

\(^{121}\) On which see reports of the work of the TRIPs Council at http://www.wto.org/english/tratop_e/trips_e/trips_e.htm.

\(^{122}\) See e.g. the condemnation of the a proposal that the origin of genetic resources be disclosed in Roberts, above n 115; and in Jon Santamauro, Reducing the Rhetoric: Reconsidering the Relationship of the TRIPs Agreement, CBD and Proposed New Patent Disclosure Requirements Relating to Genetic Resources and Traditional Knowledge 29(3) Eur. Intell. Prop. Rev. 91 (2007).
role to play in adopting a long-term view of the cumulative effects of technology. We seek to effect a shift in the current ‘mindset’ informing research and development.

For this reason we would argue that the test for whether a patent specification discloses the ‘best available technique’ for carrying out the invention so as to minimise its environmental impact (for brevity’s sake what we shall from now on refer to as the ‘BAT-disclosure’) should be assessed objectively. An objective standard of compliance would also prevent the obligation being avoided by way of the ‘corporate shell games resulting from organizational gerrymandering and wilful ignorance’ that have occasionally undermined the utility of US law’s current ‘best mode’ disclosure requirement. 123 Such an objective standard might be objected to because it assumes a determinacy that will not often be possible. 124 It is likely to be highly expensive to challenge compliance with the ‘BAT-disclosure’ requirement, or to defend against a claim of non-compliance. Costs will increase not with the value of the patent but rather with increased paucity of evidence relating to predicted environmental impact of the invention. In short, our proposal, simply understood and applied, can be objected to because it would impose excessively high costs of compliance on patentees.

For this reason we would not demand that a ‘BAT-disclosure’, objectively judged, be a substantive condition of securing a priority date nor a condition of grant. Rather, we envisage that in order to secure a filing date, no more be required than

123. See the dissenting judgment of Circuit Judge Mayer in Glaxo v. Novopharm, 52 F 3d 1043 (Fed Cir. 1995).

124. Hence the description of the UK’s implementation of BATNEEC as an evaluative and judgmental process and see further David Hughes, Tim Jewell, Jason Lowther, Neil Parpworth and Paula de Prez, Environmental Law 501 (4th edn, 2002).
documents that contain something which is or appears to be a ‘BAT-disclosure’.\textsuperscript{125} That being done, an application should be allowed to proceed to grant without any exploration as to whether the condition has been satisfied. The relevant granting authority would thus be absolved from making difficult predictions and forming potentially biased determinations on matters which it is poorly qualified to judge. Nor would we suggest that non-compliance with the ‘BAT-disclosure’ be a ground on which a granted patent could be revoked or otherwise opposed. We would thus avoid the manifest inequities that arise if a patent could be revoked on a ground that has not been subject to examination. More importantly this avoids the possibility of the system being abused by relying on the high costs of testing compliance. If a patent could be revoked for non-compliance with the ‘BAT-disclosure’ requirement, there is a risk that this would encourage aggressive litigation strategies by large and economically powerful companies which could rely on their substantial financial resources to fund lengthy and expensive actions against their competitors. Nor would we want to encourage ‘witch-hunts’ by environmental campaigning groups in which specific industries or individual companies were targeted by subjecting them to multiple revocation actions.\textsuperscript{126} Rather, accepting and seeking to meet the criticism that

\textsuperscript{125} In this respect the BAT-disclosure should be understood simply to be a necessary element of the description of the invention. The submission of documents which contain either something which is or appears to be a description of the invention (or a reference to an earlier relevant application made by the applicant) is currently a necessary condition of obtaining a filing date under the UK Patents Act 1977, s 15(1).

\textsuperscript{126} On the potential downsides of non-compliance with disclosure requirements being grounds for revocation see Santamauro, above n 122, at 95-6 (citing a submission made by the US Government to the TRIPs Council).
our proposal might otherwise impose disproportionately high costs of compliance, we suggest that a finding of non-compliance with the ‘BAT-disclosure’ requirement should provide either a complete defence to a claim of infringement or a defence to a claim for damages. Although providing a lesser incentive, the latter mechanism is arguably preferable since a defence to a claim for damages has the advantage that it would enable the patentee to amend the disclosure and obtain an injunction for the future thereby enhancing the teaching and learning objective of our scheme. But in either case, rather than at any point during the examination process, compliance with the BAT-disclosure should be assessed on the date of the alleged infringement giving rise to the defence.

One advantage of this enforcement mechanism is that it transfers most of the cost of policing compliance onto industry. More significantly, whilst the incentive to comply is invariably present, it increases for higher-value patents: ie those that are

127. This is not a wholly radical suggestion insofar as the UK Patents Act 1977, s 44(3), until repealed by the Competition Act 1998, provided a defence to infringement if the patentee had entered into a contract void for abuse of monopoly: see Fichera v. Flogates [1984] RPC 257. There is also a close analogy with the ‘reverse doctrine of equivalents’ under US patent law, under which if a contribution made by an improvement exceeds the contribution made by the patented invention, the improver can practice the improved invention without infringing. On the reverse doctrine of equivalents and its rationale see: Landes and Posner, above n 52, at 317. Note also s.68 of the UK Patents Act 1977 which is aimed at encouraging patent owners to disclose certain information relating to transfers of ownership and which takes effect by limiting available remedies: see Mölnlycke A.B. v Procter & Gamble [1994] RPC 49, at 109; and Coflexip Stena Offshore Limited's Patent [1977] RPC 179.

128. There are a number of pollution-related provisions which rely, to a great extent, on industry monitoring. For example, the duty of care in the Environmental Protection Act 1990, s 34, places a responsibility on those in the waste chain to ensure that waste is dealt with and disposed of correctly.
more likely to be infringed and are viewed by their owners as worth protecting via litigation. Thus although the costs of complying with the ‘BAT-disclosure’ requirement would still in part be linked to the availability of evidence of environmental harm, there is introduced under this mechanism a link to the value of the patent to which the disclosure relates. This coupled with an objective test of compliance and the demand that the disclosure be kept up-to-date would, we believe, create a very powerful incentive for the owner of a commercially successful patented invention and its competitors to continually search for improved ways of working that invention in terms of minimizing its environmental impact.

This then is the key public benefit arising from our proposal. We do not therefore seek to give the patent system a novel regulatory role that is inconsistent with its existing primary social objective of promoting innovation and encouraging the development of new technologies. Rather, through the mechanism of teaching those skilled in the relevant technical arts, our proposal qualifies that objective so as to take account of the contemporary understanding of the connections between technology, industrial development and the environment.

Our proposal should thus be seen as supporting a traditional anthropocentric ‘reformist’ agenda in which technology is seen both as a source of environmental problems and a means for reducing environmental impacts of human activities. But at the same time, we do seek to effect something of a paradigm shift at the institutional level, and question the wisdom of viewing scientific research and technological development as an essentially amoral processes, driven only by a desire to know because there is something to be known, and to exploit wherever possible. We acknowledge but do not apologise for the increased burden on industry that would

come with the implementation of our proposal. Though we have sought to minimise these, what remaining costs there are of complying with our revised patent disclosure requirements should be seen as but one manifestation of what must become essential and necessary costs of all R&D. Independently of what the demands of the patent system might be, if you are engaging in technological R&D then you must, as part of that process, give serious and effective consideration to the impact on the environment of your work.

Finally, it is undoubtedly true that, as with any measure aimed at environmental protection, there would be little benefit if the United Kingdom, or indeed any other country, were to unilaterally amend its patent law in the way we have suggested.\textsuperscript{130} Such a change must be widespread if not universal if it is to have effect. Although we have sought to minimise the relative costs to patentees of complying with the ‘BAT-disclosure’ requirement, compliance nevertheless does carry some costs and it may be that individuals would choose not to secure patent protection in countries demanding a ‘BAT-disclosure’ if others did not.\textsuperscript{131}

Our proposed amendments could not in any event be done unilaterally and yet be consistent with the numerous international agreements relating to the recognition and enforcement of intellectual property rights. For the UK, the most immediate of these is of course the European Patent Convention which in part is aimed at harmonising the conditions for the grant of a patent amongst the countries of Western

\textsuperscript{130} The UK Government takes the view that, ‘[t]here would be little value in reducing environmental impacts within the UK if the result were merely to displace those impacts overseas’: DEFRA, above n 7, at 43.

\textsuperscript{131} This would create a ‘competitive externality’ whereby low-standard states would enjoy a competitive advantage over higher-standard states.
Europe.\textsuperscript{132} Those provisions of the UK Patents Act that contain the current rules regarding disclosure are amongst those specifically identified as in effect corresponding to the equivalent provisions of the European Patent Convention.\textsuperscript{133}

As a member of the World Trade Organisation, the United Kingdom is required to give effect to the provisions of the TRIPs Agreement, as are the other Member States of the EU and the USA.\textsuperscript{134} This agreement demands that members require applicants disclose a claimed invention in a manner sufficiently clear and

\textsuperscript{132} The purpose of the Convention is reflected in the wording of its Preamble which provides that members entered into the Convention ‘desiring to strengthen co-operation between the states of Europe in respect of the protection of inventions’, and ‘desiring that such protection may be obtained in those States by a single procedure for the grant of patents, and by the establishment of certain standard rules governing patents . . . granted’.

\textsuperscript{133} See Patents Act 1977, s 130(7) which provides: ‘Whereas by a resolution made on the signature of the Community Patent Convention the governments of the member states of the European Economic Community resolved to adjust their laws relating to patents so as (among other things) to bring those laws into conformity with the corresponding provisions of the European Patent Convention, the Community Patent Convention and the Patent Co-Operation Treaty, it is hereby declared that the following provisions of this Act, that is to say, sections 1(1) to (4), 2 to 6, 14(3), (5) and (6), 37(5), 54, 60, 69, 72(1) and (2), 74(4), 82, 83, 100 and 125, are so framed as to have, as nearly as practicable, the same effects in the United Kingdom as the corresponding provisions of the European Patent Convention, the Community Patent Convention and the Patent Co-operation Treaty have in the territories to which those Conventions apply’.

\textsuperscript{134} See \url{http://www.wto.org/english/docs_e/legal_e/legal_e.htm#TRIPs}. 
complete for the invention to be carried out by a person skilled in the art.\textsuperscript{135} The TRIPs agreement does not however lay out an exhaustive code: members are free to implement in their law more extensive protection than specifically required by the Agreement and are free to determine the appropriate method of implementing the provisions of the Agreement within their own legal system.\textsuperscript{136} The Agreement specifically allows members to require, as a condition of the acquisition or maintenance of intellectual property rights compliance with ‘reasonable procedures and formalities’, \textsuperscript{137} and it is at least arguable that amending a national law so as to require applicants make a ‘BAT-disclosure’ subject to the enforcement mechanism that we have outlined above would be consistent with the requirements of the TRIPs Agreement.\textsuperscript{138}

Rather more problematic are the obligations created under the WIPO administered Patent Co-operation Treaty (PCT) and Patent Law Treaty (PLT). The PCT was concluded in 1970, amended in 1979, and modified in 1984 and 2001 and makes it possible to seek patent protection for an invention simultaneously in each of a

\begin{itemize}
  \item Under TRIPs, Article 29:1 members may also require the applicant to indicate the best mode for carrying out the invention known to the inventor at the filing date or, where priority is claimed, at the priority date of the application.
  \item TRIPs, Article 1:1.
  \item TRIPs, Article 62:1. In respect of enforcement, Members are also allowed to provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner: TRIPs, Article 30.
  \item In which respect note Paul J Heald \textit{Mowing the Playing Field: Addressing Information Distortion and Asymmetry in the TRIPS Game} 88 Minn. L. Rev. 249, 281 (2003).
\end{itemize}
large number of countries by filing an ‘international’ patent application.\textsuperscript{139} The PLT
was adopted at Geneva on 1st June 2000, and aims to harmonise and streamline
procedures in respect of patent applications and provides a \textit{maximum} sets of
requirements which the Office of a Contracting Party may apply.\textsuperscript{140} The effect of
these treaties is to set a mandatory maximum that can be demanded of applicants in
terms of the form and content of an application.\textsuperscript{141}

These multilateral treaties, together with numerous bilateral agreements,\textsuperscript{142}
create a thicket of international obligations which whilst an obstacle to the adoption of
our proposal, is not an insurmountable one. It seems to us that the greatest difficulty
will be in the choosing the most appropriate forum in which to put forward and
consider our proposal.\textsuperscript{143} As a measure aimed at shifting production patterns as part of
a broader sustainable consumption and production strategy, the ‘natural home’ of the
proposal is perhaps within an international environmental law framework. The role
that technology can play in pursuing a conservation agenda has been a feature of
international environmental law. For example, the Convention on Biological Diversity
aims to promote access to and transfer of technology, particularly to developing

\begin{enumerate}
\item \textsuperscript{139} See \url{http://www.wipo.int/pct/en/treaty/about.htm}.
\item \textsuperscript{140} See \url{http://www.wipo.int/treaties/en/ip/plt/}.
\item \textsuperscript{141} Note in particular PLT Article 6.
\item \textsuperscript{142} On which see Peter Drahos, \textit{Bilateralism in Intellectual Property Law}.
\url{http://www.maketradefair.com/assets/english/bilateralism.pdf}
\item \textsuperscript{143} Accepting that there is no reason why it couldn’t be put forward in several relevant forums.
\end{enumerate}
countries which provide genetic resources.\textsuperscript{144} However, as a proposal that requires internationally widespread amendment of patent law, the TRIPS Council would be the obvious multilateral forum to take the proposal forward. Alternatively or additionally, the proposal could perhaps be incorporated into the WIPO hosted negotiations aimed at drafting the Substantive Patent Law Treaty.\textsuperscript{145}

The obvious difficulty is that our proposal straddles two areas of law and policy which have not to date been seen as bedfellows.\textsuperscript{146} For this reason, of all the possible forums in which our proposal might be introduced and advanced, it seems to us that the most profitable would be Europe. Since its inception, and with no explicit legal basis until 1986, the EU has been extremely proactive in the area of environmental protection. Over 750 pieces of European legislation relating to the environment are in force, including, as we have seen, legislation which promotes freedom of and access to environmental information. Furthermore, the EU was and continues to be a key player in the international arena, ratifying a number of treaties, conventions and protocols including the Aarhus Convention on information, participation and access to justice.\textsuperscript{147} And of course, the European Union in

\textsuperscript{144} Under Rio Convention, Article 16(5), Contracting parties are asked to ensure that patents and other intellectual property rights should be supportive of, and not run counter to the Convention’s objectives. See further http://www.biodiv.org/convention/default.shtml.

\textsuperscript{145} On which see: http://www.wipo.int/patent-law/en/harmonization.htm.

\textsuperscript{146} The same reason could be advanced for the lack of progress in the TRIPs Council on the proposed amendment of Article 29 of TRIPS to mandate the disclosure of the origin of genetic resources.

cooperation with the EPO is also an active policy maker and legislator in the area of patents as well as other forms of intellectual property. 148 Although the EPC was negotiated outside the legal framework of the European Community and operates independently of it nevertheless, all the Member States of the Community are also EPC contracting states 149 and, to the extent required by the Convention, the national patent laws of the Community Member States follow the corresponding Convention provisions. There has in the past been successful cooperation between the EU and the EPO in the formulation of European Patent law 150 and, as recently observed by the President of the EPO in her opening speech to the 2008 European Patent Forum:

‘Europe has set global standards with its policy on climate protection. The European Patent Office sees this Forum as a contribution towards strengthening Europe's lead as a shaper of opinion. If effective climate protection is a political aim of the EU, then the same must apply to its

148. For an indication of the European Commission’s activities in the area of patent law, see http://ec.europa.eu/internal_market/indprop/patent/index_en.htm.

149. Under EPC, Article 166, the Convention is open to accession by any European state at the invitation of the Administrative Council of the EPO. The European Patent Organisation's members now include all 27 members of the European Union, plus Croatia, Iceland, Liechtenstein, Monaco, Norway, Switzerland and Turkey (http://www.epo.org/about-us/epo/member-states.html).

150. Most notably Directive 98/44/EC on the legal protection of biotechnological inventions has been adopted into the EPC by implementing regulation Rule 23d. If the EU were to take our proposal forward then a similar mechanism could perhaps be used to incorporate an enhanced disclosure requirement into the EPC.
innovation policy and the intellectual property rights that support that policy.'

Whatever the political stage, the importance of engaging with industry and the patent community must not be underplayed. Providing information and ensuring effective consultation and participation are key if our proposal is not to be misunderstood and so generate cynicism and hostility.

**Conclusions**

Our paper centres on the notion that economic and social progress should not come at the expense of further environmental degradation. We argue that the patent system can, with relatively minor modification, potentially lead to shifts in patterns of consumption and production consistent with a commitment to sustainable development. At its broadest, the problem that we have sought to address is how an economy can effect a shift in the delivery of new products and services with lower environmental impacts whilst at the same time maintaining or increasing competitiveness through innovation. Amending the patent system to serve that end provides the very necessary guarantee that environmental issues are taken into account at the earliest stages of product development. This can be done without undermining


152. The proposal to demand disclosure of the origin of genetic resources has e.g. been subject to significant criticism by patent practitioners: see the comments of Roberts, above n 115; and Santamauro, above n 122.
the patent system’s essential function of encouraging the pursuit of socially useful ideas.

Currently, neither the European nor US patent systems provide any greater incentive to invent and use environmentally beneficial technology over that which might harm the environment. In this respect the patent system is not serving the public interest given that the great bulk of product-related environmental impacts are determined by product design. The power exercisable by European patent authorities to refuse a patent on the grounds that exploiting the claimed invention would seriously prejudice the environment, is an ineffective guardian of the interest the public has in the environment. Our proposal to exploit the teaching and learning function of patents so as to meet environmental goals needs to be judged against that background.

Demanding that patent applicants give consideration to, and publicly disclose, information relating to the environmental impact of their invention would make accessible information which can be used to further sustainability and environmental protection objectives. Such a demand can be justified as a manifestation of the ‘stake’ or ‘interest’ that everyone has in the environment. Access to environmental information promotes environmental consciousness, encourages public participation in decision-making and adds support to existing means of encouraging accountability. But most importantly, an enhanced disclosure requirement of the kind we propose here would, we believe, go some way to change the way in which industrial research and development are undertaken: forcing consideration of improved ways to minimise new technology’s impact on the environment.

This benefit will not come for free, and applicants will certainly face higher costs under a patent system amended in the way we propose. But the greater part of these costs will not be in complying with the revised disclosure requirement per se, but
in actually giving concern to environmental matters as part of the research and
development process. Such increases thus need to be understood as costs that must be
borne and accepted by all engaged in technical innovation if there is to be a major shift
in attitudes leading to changed production patterns. And whilst the costs of policing
the revised disclosure demands could be potentially significant, careful construction of
the mechanisms of enforcement can work to reduce the relative costs of these.

The EU has in the past been an active participant in negotiations aimed at
setting common standards of patentability at the international level. It also has a
creditable record in proselytising, on the international stage, the need for effective
protection of the environment. We would hope therefore that we would find a
champion for our proposal in the European Union in cooperation with its member
states and the EPO. Although it is often laudable to give a lead by example, we would
not for the reasons we have discussed above, advocate that strategy in this case.
Rather we would hope that this article acts as a spark to fire discussion initially
amongst the Member States and institutions of the European Union leading to the
formulation of a rational and coherent argument that can then be taken forward onto
the international stage.