would be eligible for obtaining a patent.[146] On the other hand, new systems for trading emission reductions would appear to be more than an abstract idea, and it would be necessary to carefully weigh various factors under Section 101. Duffy concludes that the debate will turn from "the question *whether* business methods are patentable to the question *how* broad the scope of patentable subject matter should be for business methods (emphasis in the original)"[147] and that decision-makers should observe "the newly emerging science and engineering of business,"[148] such as carbon trading.

3. Novelty and 'Green' Indication of a Known Substance

In connection with certain renewable energy sectors, it has been observed that the basic or traditional solutions[149] for specific technological problems have long been "off-patent" and typically patented are specific improvements or features.[150] As green technology becomes a new focus of research, existing technologies may find new applications relevant to environmental benefits, raising the question to what extent such new use is patentable.[151]

An invention is deemed novel if it does not form part of the prior art (absolute novelty). For novelty of the new 'green' use of an existing technology, the legal developments on "second medical indication" under European patent law may perhaps provide some insight. According to Article 54(4) of the EPC, claims to the first medical indication normally confer product protection for the use of the respective substance or compound in all therapeutic or medical applications. EPC Article 54(5) further states that a substance or composition for any "specific" use in therapeutic or medical applications can be patented if such use is not found in the prior art.[152] Unlike a claim to the first medical indication, claims to subsequent medical indications are "purpose-limited" to the specific therapeutic or medical treatment disclosed and claimed in the patent.[153]

Might these principles also be relevant to green innovation? The *Science* journal published a study on an enzyme found in soybeans (which normally produces ammonia from nitrogen gas) which can turn carbon monoxide into ethane or propane

146 *Supra* note 135.
147 John F. Duffy, *Why Business Method Patents?* at 1 (forthcoming, on file with author).
148 *Id.*
149 *E.g.*, the first known windmill in history is described by Hero of Alexandria in his work *Pneumatics*, dating back to the 1st century B.C. or the 1st century A.D. *See* James Manwell, Jon McGowan and Anthony Rogers, Wind Energy Explained: Theory, Design and Application (John Wiley & Sons, Ltd. 2009).
150 *Supra* note 19.
151 *Supra* note 9.
152 *Id.*
153 *Id.*

gas fuel.[154] Although this enzyme is already known to scientists because of its economic importance in farming, the technology to extract, grow and store large quantities of the enzyme has developed only recently.[155] If the technique advances much further, cars might be partially powered on their own gas, or even draw fuel from the air itself.[156] Would the fact that the material exists in nature be *per se* novelty-destroying for subsequent inventions? The jurisprudence on second (or subsequent) indications is limited to methods for treatment by surgery, therapy or diagnosis for human and animal body.[157] Perhaps a basis exists for exploring the adoption of a similar approach in the context of green inventions.

4. Non-obviousness: KSR and Green Technology

In the US, it may be difficult for some green inventions to meet the non-obviousness standards after the *KSR* decision.[158] Before *KSR*, the test for non-obviousness was primarily based on *Graham v. John Deere*:[159] *i.e.*, (i) the scope and content of the prior art need to be determined; (ii) differences between the prior art and the claims of the invention need to be verified; (iii) obviousness to the person with ordinary skill in the art is reviewed by considering "teaching, suggestion, or motivation" (the TSM test) at the time of invention; and (iv) secondary considerations such as scepticism of experts, unexpected results, long-felt need, failure of others, commercial success can be taken into account.[160]

The *KSR* decision modified the non-obviousness standard by lifting the level of a person skilled in the art. The Supreme Court clarified that the Federal Circuit's TSM test should be a flexible test because an obviousness determination is not the result of a rigid formula dissociated from consideration of the facts of the case.[161] It further noted that "[t]he question is not whether the combination was obvious to the patentee, but whether the combination was obvious to persons with ordinary skill in the art."[162] Thus, the common sense of persons skilled in the art is the yardstick for determining why some combinations could have been obvious while others would not.[163] Importantly, following *KSR*, the Federal Circuit held in

154 Chi Chung Lee, Yilin Hu and Markus W. Ribbe, *Vanadium Nitrogenase Reduces CO*, 329 Science 642 (Aug. 6, 2010).
155 Eric Bland, *Gasoline From Thin Air?*, Discovery News, Aug. 5, 2010.
156 *Id.*
157 *Supra* note 120 at art. 53(c).
158 KSR International Co. v. Teleflex Inc., et al., 550 U.S. 398 (2007).
159 William T. Graham, et al. v. John Deere Co. of Kansas City, et al., 383 U.S. 1 (1966).
160 *Id. See also* Randall R. Rader, Chief Judge, U.S. Court of Appeals for the Federal Circuit, *Obviousness after KSR: Cases and Analysis* (on file with author).
161 *Supra* note 158.
162 *Id.*
163 *Id.* at 1739.