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# Ownership, Commercial Development, Transfer and Use of Publicly Funded Research Results: The United States Legal Regime

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## OWNERSHIP, COMMERCIAL DEVELOPMENT, TRANSFER AND USE OF PUBLICLY FUNDED RESEARCH RESULTS: THE UNITED STATES LEGAL REGIME

by  
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### I. INTRODUCTION

This report summarizes key provisions of the United States legal regime concerning ownership, dissemination and commercialization of the results of publicly funded research as background for a study on the feasibility of improving access by developing countries and economies in transition to environmentally sound technologies (ESTs) developed in other parts of the world.

#### A. History of Current Policy

The current legislative framework for United States government policy toward intellectual property and technology transfer for the results of government-sponsored research has its origins in two 1980 statutes. Prior to that time, Congress had only addressed these issues in specific contexts involving particular agencies or programmes. On these limited forays into the field, Congress typically had encouraged or required federal agencies sponsoring research to make the results widely available to the public through government ownership or assuagement to the public domain.<sup>1</sup> However, in two statutes passed in 1980,<sup>2</sup> Congress endorsed a new vision of how best to put publicly-sponsored research results to practical use. In this new vision, public ownership of research results was equivalent to

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<sup>1</sup> See, e.g., Research and Marketing Act of 1946, Pub. L. No. 79-733, 60 Stat. 1082, 1085 and 1090, codified at 7 U.S.C. § 427i and 1624; Atomic Energy Act of 1954, Pub. L. No. 83-703, 68 Stat. 919, codified at 42 U.S.C. § 2011 et seq., at § 2182; National Aeronautics and Space Act of 1958, Pub. L. No. 85-568, 72 Stat. 435, codified at 42 U.S.C. 2451 et seq., at 2457; Coal Research Act, codified at 30 U.S.C. 666; Arms Control and Disarmament Act of 1961, Pub. L. No. 87-297, title III, § 32, 70 Stat. 634, codified at 22 U.S.C. § 2572; Helium Act Amendments of 1960, § 4, Pub. L. No. 86-777, 74 Stat. 920, codified at 50 U.S.C. § 167b; Saline Water Conversion Act of 1961, § 4b, Pub. L. No. 87-295, 75 Stat. 628, codified at 42 U.S.C. § 1954(b); Water Resources Research Act of 1964, Pub. L. No. 88-379, 78 Stat. 330, codified at 42 U.S.C. § 1961c-3; Appalachian Regional Development Act of 1965, Pub. L. No. 89-4, as amended, 79 Stat. 5, as amended, codified at 40 U.S.C. App. § 302(e); Solid Waste Disposal Act of 1965, Pub. L. No. 89-272, 79 Stat. 997, as amended by the Resources Recovery Act, Pub. L. No. 91-512, codified at 42 U.S.C. § 3253(c); National Traffic & Motor Vehicle Safety Act of 1966, 80 Stat. 721, codified at 15 U.S.C. § 1395(c); Federal Coal Mines Health and Safety Act of 1969, Pub. L. No. 91-173, 83 Stat. 742 § 501(c), codified at 30 U.S.C. § 951(c); Foreign Assistance Act of 1969, 22 U.S.C. 217(b); Federal Non-nuclear Energy Research and Development Act of 1974, Pub. L. No. 93-577, 88 Stat. 1887, codified at 42 U.S.C. § 5908. Cf. National Science Foundation Act of 1950, Pub. L. No. S1-507, 76 Stat. 1253, codified at 42 U.S.C. § 1871(a) (providing for the disposition of rights in inventions "in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed").

<sup>2</sup> Pub. L. No. 96-480, 94 Stat. 2311 (1980) (commonly known as the *Stevenson-Wydler Technology Innovation Act*) and Pub. L. No. 96-517, 94 Stat. 3015 (1980) (commonly known as the *Bayh-Dole Act*).

"dead-hand control",<sup>3</sup> and assignment of research results to the public domain threatened to destroy their attractiveness to the private sector. If the results of federally-sponsored research were to be rescued from oblivion and successfully developed into commercial products, they would have to be patented and offered for appropriation by private firms.

This new strategy was promoted as serving a number of converging goals. It would ensure effective transfer and commercial development of discoveries that would otherwise languish in government and university archives. It would reinvigorate United States industry by giving it a fresh infusion of new ideas that would enhance productivity and create new jobs. It would ensure also that United States-sponsored research discoveries were developed by American firms rather than by foreign competitors who had too often been able to dominate world markets for products based on technologies pioneered in the United States.

The first of the 1980 statutes, the Stevenson-Wydler Technology Innovation Act,<sup>4</sup> made technology transfer an integral part of the research and development responsibilities of federal laboratories and their employees. The Stevenson-Wydler Act explicitly directed federal agencies to "strive where appropriate to transfer federally owned or originated technology to State and local governments and to the private sector", and to set aside funds from their research and development budgets to support technology transfer functions.<sup>5</sup> While some agencies had previously viewed technology transfer as an inherent by-product of making discoveries widely available to anyone who wanted them, it was now designated as a purposive task for agencies to pursue conscientiously and deliberately.

The second statute, commonly known as the Bayh-Dole Act,<sup>6</sup> encouraged small businesses and non-profit organizations to patent the results of government-sponsored research by allowing them to retain patent ownership themselves, provided they were diligent about getting patent applications on file and promoting commercial development of the inventions. At the same time, the Bayh-Dole Act clarified the authority of federal agencies to apply for and hold patents and to license their patents to the private sector on an exclusive or non-exclusive basis. In 1983, President Reagan significantly extended the reach of the new policy by directing the heads of executive departments and agencies to extend the more generous title provisions that the Bayh-Dole Act had provided only for small businesses and nonprofit organizations, to all government contractors, including large businesses, so that now they too could own patents on inventions made in their laboratories with federal funds.<sup>7</sup>

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<sup>3</sup> See Hearings before the Subcommittee on Courts, Civil Liberties, and the Administration of Justice of the Comm. on the Judiciary, House of Representatives, 96th Congress., 2d Session., on *H.R. 6033, H.R. 6934, H.R. 3806, H.R. 2414*, President's Industrial Innovation Programme, April 3, 15, 17, 22, 25, May 8, and June 9, 1980, at 286, citing *United States v. Dubilier Condenser Corp.* (testimony of Howard W. Bremer, Patent Counsel, Wisconsin Alumni Research Foundation).

<sup>4</sup> *Pub. L. 96-480, 94 Stat. 2311* (1980).

<sup>5</sup> 15 U.S.C. §§ 3701, 3710(a),(b). The Stevenson-Wydler Act also created Offices of Research and Technology Applications in the larger laboratories to evaluate new technologies and promote transfer of technologies with commercial potential, *id.* § 11(b), codified at 15 U.S.C. § 3710(b), and created a Centre for the Utilization of Federal Technology in the Department of Commerce to function as a clearinghouse for information on Federal inventions and patents. *Id.* § 11(d), codified at 15 U.S.C. § 3710(d).

<sup>6</sup> *Pub. L. No. 96-517, 94 Stat. 3015* (1980).

<sup>7</sup> Presidential Memorandum to the Heads of Executive Departments and Agencies, Subject: Government Patent Policy, 1983 Pub. Papers 248 (Feb. 18, 1983), 36 Fed. Reg. 16887.

Subsequent legislation has continued to broaden and fortify the emerging policy in favour of private appropriation of research results. Efforts to promote active federal involvement in technology transfer took a major step forward with passage of the Federal Technology Transfer Act of 1986.<sup>8</sup> That Act amended the Stevenson-Wydler Act to authorize government-operated laboratories to enter into cooperative research and development agreements (CRADAs) with industry, to agree in advance to assign patents on inventions made by federal employees to the collaborating firm, and to waive any federal claims to inventions made by the collaborating firm or its employees.<sup>9</sup> It also provided for the sharing of royalties with inventors<sup>10</sup> in federal employ and directed agencies that did not elect to file patent applications or otherwise to promote commercialization of inventions they owned to allow government employee-inventors to retain title.<sup>11</sup> Three years later Congress moved to promote active technology transfer from the national laboratories with the passage of the National Competitiveness Technology Transfer Act of 1989,<sup>12</sup> which amended the Stevenson-Wydler Act to include government-owned, contractor-operated laboratories. The National Technology Transfer and Advancement Act of 1995<sup>13</sup> further expanded the rights of private sector CRADA partners to obtain exclusive licences, provided for the sharing of

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<sup>8</sup> Pub. L. No. 99-502, 100 Stat. 1785.

<sup>9</sup> *Idem* § 2, 100 Stat. 1785-87, codified at 15 U.S.C. § 3710a(a)(1), (b)(2),(3). That Act also established the Federal Laboratory Consortium for Technology Transfer to promote technology transfer activities within the federal laboratories, *id.* § 3, 100 Stat. 1787-89. See also Technology Competitiveness Act, enacted as part of the *Omnibus Trade and Competitiveness Act of 1988*, Pub. L. No. 100-418, Title V, Subtitle B, §§ 5101-5184, 102 Stat. 1107, 1426 (renaming and upgrading the National Bureau of Standards as the National Institute of Standards and Technology with a mission to enhance the competitiveness of American industry and creating the Advanced Technology Programme to assist industry-led, pre-competitive research and development projects to develop new generic technologies); National Technical Information Act of 1988, Pub. L. No. 100-519, Title II, Subtitle B, 102 Stat. 2589, 2594-96 (amending the Stevenson-Wydler Act to permit the National Technical Information Service to take actions to disseminate technical information to the private sector); *National Competitiveness Technology Transfer Act of 1989*, Pub. L. No. 101-189, Division C, Title XXXI, Part C, §§ 3131-3133, 103 Stat. 1352, 1674-79 (amending the Stevenson-Wydler Act to include government-owned, contractor-operated laboratories; to provide for inclusion of provisions establishing technology transfer as a mission for the laboratory and requiring the laboratory to widely disseminate information on technology transfer and cooperative research and development agreements in contracts with non-federal entities for the operation of a government-owned laboratory; and to revoke federal agencies' authority to waive technology transfer funding requirements); *National Defense Authorization Act for Fiscal Year 1991*, Pub. L. No. 101-510, Title VIII, Part C, §§ 827-828, 104 Stat. 1485, 1606-07 (1990) (allowing federal agencies to use partnership intermediaries to conduct collaborative research and establishing a model programme to study the commercial use of collaborative research); *American Technology Preeminence Act of 1991*, Pub. L. No. 102-245, 106 Stat. 7 *National Defense Authorization Act for Fiscal Year 1993*, Pub. L. No. 102-484, Division C, Title XXXI, Subtitle C, § 3135(b), 106 Stat. 2315, 2640-41 (1992) (requiring the Secretary of Energy to establish a programme to facilitate and encourage the transfer of technology to small businesses).

<sup>10</sup> Codified at 15 U.S.C. § 3710c.

<sup>11</sup> Codified at 15 U.S.C. § 3710d. President Reagan promptly followed with an executive order directing the heads of executive departments and agencies to "promote the commercialization of patentable results of federally funded research by granting to all contractors, regardless of size, the title to patents made in whole or in part with Federal funds...." Exec. Order No. 12,591, 52 Fed. Reg. 13,414, *reprinted in 15 U.S.C.A. § 3710 app. at 298-99* (West 1995).

<sup>12</sup> Pub. L. No. 101-189, Division C, Title XXXI, Part C, §§ 3131-3133, 103 Stat. 1352, 1674-79. That Act also provided for inclusion in contracts with non-federal entities for the operation of a government-owned laboratory of provisions establishing technology transfer as a mission for the laboratory and requiring the laboratory to disseminate information on technology transfer and CRADAs, and revoked the authority of federal agencies to waive technology transfer funding requirements.

<sup>13</sup> Pub. L. No. 104-113, § 4.

federal royalty income with laboratory scientists, and clarified the rights of federal employees to own inventions that their agencies chose not to patent.

Through these and other measures, Congress has gradually expanded the private appropriation policy that the Bayh-Dole Act endorsed for research in non-profit organizations and small businesses to cover government-sponsored research in a wide range of settings, including intramural research in government laboratories and collaborative research involving government, university, and private laboratories. While on the extramural side of federally-sponsored research, Congress has urged sponsoring agencies to forbear from asserting patent rights in favour of contractors who might be more effective in getting the underlying technologies developed in the private sector, on the intramural side Congress has urged the same agencies to become more active in patenting their discoveries and licensing them to industry.

### *B. Motivations for Current Policy*

Two primary strategic motivations emerge from a review of legislative provisions governing technology transfer for government-sponsored research. First is a desire to motivate the private sector to pick up where government funding leaves off so that research advances will be developed into useful new technologies. Thus, the findings set forth at the beginning of the Stevenson-Wydler Act state that:

"Many new discoveries and advances in science occur in universities and federal laboratories, while the application of this new knowledge to commercial and useful public purposes depends largely upon actions by business and labour. Cooperation among academia, federal laboratories, labour, and industry, in such forms as technology transfer, personnel exchange, joint research projects, and others, should be renewed, expanded, and strengthened."<sup>14</sup>

The Bayh-Dole Act states that:

"It is the policy and objective of the Congress to use the patent system to promote the utilization of inventions arising from federally supported research or development..."<sup>15</sup>

Second, and closely related to the goal of promoting commercial development to achieve practical applications for new research discoveries, is a palpable desire to leverage United States government spending on research into a competitive advantage in world markets for American firms and workers. Thus the Bayh-Dole Act's opening statement of Congressional policy objectives specifies a targeted aim "to promote the commercialization and public availability of inventions *made in the* United States by United States industry and labour..."<sup>16</sup> The Stevenson-Wydler Act's introductory list of Congressional findings laments that "industrial and technological innovation in the United States may be lagging when

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<sup>14</sup> 15 U.S.C.A. § 3701(3).

<sup>15</sup> 35 U.S.C.A. § 200.

<sup>16</sup> *Idem*, emphasis added.

compared to historical patterns and other industrialized nations”,<sup>17</sup> and claims that technology and industrial innovation promise “creation of new industries and employment opportunities and enhanced competitiveness of United States products in world markets”,<sup>18</sup> and will “reduce trade deficits, stabilize the dollar, increase productivity gains, increase employment, and stabilize prices.”<sup>19</sup>

Specific provisions aim to ensure that the benefits of the new policy remain in the United States rather than accruing to foreign institutions. For example, although as a general rule government contractors may elect to retain title to inventions made with federal funds, the statute recognizes an exception “when the contractor is not located in the United States or does not have a place of business located in the United States or is subject to the control of a foreign government ....”<sup>20</sup> Moreover, although contractors that receive title to inventions are generally permitted to grant exclusive licences, they may not “grant to any person the exclusive right to use or sell any subject invention in the United States unless such person agrees that any products embodying the subject invention or produced through the use of the subject invention will be manufactured substantially in the United States.”<sup>21</sup>

### *C. Principal Features of Current Policy*

The law governing patent rights and technology transfer for inventions made with federal assistance is set forth primarily in Title 35 of the United States Code at §§ 200-212 and in Title 15 of the U.S. Code at §§ 3701-3717. These provisions supply a unified set of legal rules applicable to all federal government agencies. The principle features of this statutory scheme include the promotion of patenting, ownership by research performers, qualified discretion in the deployment of patent rights (with preferences for small firms and American manufacturers), encouragement of collaboration across sectors, and an active role for government in disseminating technical information.

#### 1. Encouragement of patenting

United States policy pervasively promotes the patenting of federally-sponsored inventions wherever they are made, whether in government, university, or private laboratories or in the course of collaborative research across these sectors. The current statutory scheme generally permits anyone involved in the research project who wants the discovery to be patented to prevail over anyone who thinks the discovery should not be patented. Thus for example, if a contractor fails to make a timely election to retain title to the invention, the funding agency may seek a patent,<sup>22</sup> and if neither the agency nor the contractor has an interest in pursuing patent rights, the individual investigator who made the discovery may

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<sup>17</sup> 15 U.S.C.A. § 3701 (5), emphasis added.

<sup>18</sup> 15 U.S.C.A. § 3701 (2).

<sup>19</sup> 15 U.S.C.A. § 3701(6).

<sup>20</sup> 35 U.S.C.A. § 202(a)(i).

<sup>21</sup> 35 U.S.C.A. § 204. This requirement may be waived by the federal agency if the contractor shows that it made reasonable but unsuccessful efforts to find a licensee that would manufacture in the U.S. on similar terms or that domestic manufacture is not commercially feasible. *Id.*

<sup>22</sup> 35 U.S.C. § 202(c)(2).

claim them.<sup>23</sup> Resource constraints prohibit patenting many discoveries that emerge from government-sponsored research. The discoveries that enter the public domain today are those that slip through the net of present policy, whether through oversight or through a deliberate choice to allocate resources to more promising commercial prospects, rather than those that a funding agency selects as suitable for widespread availability to the public.

Several features of the statutory scheme affirmatively promote patenting, including provisions for the initial allocation of ownership rights to institutions that perform research under a contract or grant,<sup>24</sup> the loss of ownership rights by institutions that delay too long in filing patent applications,<sup>25</sup> and directives to non-profit institutions to share royalties with inventors.<sup>26</sup> These features provide financial incentives for researchers to disclose inventions to their institutions and for the institutions to file timely patent applications. The statute also directs federal agencies to share royalties with their employee-inventors for inventions made in the course of intramural research.<sup>27</sup> Funding agencies may pursue patent rights in the United States and any other countries in which contractors have failed to file within reasonable times.<sup>28</sup>

Finally, when neither the institution in which the research is performed nor the funding agency is interested in pursuing patent rights, the statute permits the inventor to file a patent application.<sup>29</sup>

## 2. Ownership by research performers

United States law generally permits the institutions that perform government-sponsored research to retain title to the inventions that they choose to patent. Although from the statutory language it appears that this policy is limited to non-profit organizations and small business firms,<sup>30</sup> the policy has in fact been applied to all government contractors, including large businesses, under the terms of a 1983 Presidential Memorandum to the Heads of Executive Departments and Agencies.<sup>31</sup> The approach outlined in this memorandum was quietly endorsed by Congress in what appeared to be an inconsequential housekeeping provision to a 1984 change in the law.<sup>32</sup> 35 U.S.C.A. § 210(c).

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<sup>23</sup> 35 U.S.C.A. § 202(d); 15 U.S.C. § 3710d.

<sup>24</sup> 35 U.S.C.A. § 202(a).

<sup>25</sup> 35 U.S.C.A. § 202(c)(3).

<sup>26</sup> 35 U.S.C.A. § 202(c)(7)(B).

<sup>27</sup> 15 U.S.C.A. § 3710c.

<sup>28</sup> 35 U.S.C.A. § 202(c)(3).

<sup>29</sup> 35 U.S.C.A. § 203(d); 15 U.S.C.A. § 3710d(a).

<sup>30</sup> 35 U.S.C.A. § 202(a) thus begins "Each nonprofit organization or small business firm may, within a reasonable time after disclosure as required by paragraph (c)(1) of this section, elect to retain title to any subject invention ...."

<sup>31</sup> Presidential Memorandum to the Heads of Executive Departments and Agencies, Subject: Government Patent Policy, *supra* note ("To the extent permitted by law, agency policy with respect to the disposition of any invention made in the performance of a federally-funded research and development contract, grant or cooperative agreement award shall be the same or substantially the same as applied to small business firms and non-profit organizations under Chapter 38 of Title 35 of the United States Code.").

<sup>32</sup> The provisions as codified read:

"Nothing in this chapter is intended to limit the authority of agencies to agree to the disposition of rights in inventions made in the performance of work under funding agreements with persons other than non-profit

The statute recognizes four exceptions to the general rule that a contractor may elect to retain title to an invention. The first exception, mentioned above, arises “when the contractor is not located in the United States or does not have a place of business located in the United States or is subject to the control of a foreign government.”<sup>33</sup> The second exception permits the agency to withhold title from the contractor “in exceptional circumstances when it is determined by the agency that restriction or elimination of the right to retain title to any subject invention will better promote the policy and objectives of this chapter.”<sup>34</sup> Other provisions ensure that this exception is parsimoniously administered. Determinations of exceptional circumstances must be documented in a statement filed with the Secretary of Commerce that includes an analysis justifying the determination.<sup>35</sup> If the Secretary of Commerce believes that the determination is not justified, the Secretary is directed to so advise the head of the agency and the Administrator of the Office of Federal Procurement Policy and to recommend corrective actions.<sup>36</sup> If the Administrator of the Office of Federal Procurement Policy believes the exceptions to the general rule of leaving title in the contractor are being abused, the Administrator may issue regulations describing classes of situations in which agencies should not withhold title.<sup>37</sup> The third exception concerns restrictions imposed to maintain the security of foreign intelligence or counter-intelligence activities,<sup>38</sup> and the fourth concerns government-owned, contractor-operated facilities of the Department of Energy dedicated to naval nuclear propulsion or weapons related programmes.<sup>39</sup>

In all cases, however, the federal agency sponsoring the research retains “a non-exclusive, non-transferable, irrevocable, paid-up licence to practice or have practiced for or on behalf of the United States any subject invention throughout the world.”<sup>40</sup> When the United States is a major customer for the patented technology—as is the case for example, for some technologies for cleaning up radioactive wastes—this retained non-exclusive licence may be a significant limitation on the ownership rights of the contractor. Although the original contractor owns the patent, the Government may choose another contractor to put the technology to use for government purposes without any obligation to the patent owner.

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organizations or small business firms in accordance with the Statement of Government Patent Policy issued on February 18, 1983 ....”

<sup>33</sup> 35 U.S.C.A. § 202(a)(i).

<sup>34</sup> 35 U.S.C.A. § 202(a)(ii). Although the statute makes it difficult for agencies to invoke this authority without circumstances that are truly extraordinary, agencies may sometimes be able to discourage contractors from patenting without making an explicit finding of exceptional circumstances. For example, the National Human Genome Research Institute has issued a statement urging its grantees to make human genomic DNA sequence information freely available in the public domain, warning that it intends to “monitor grantee activity in this area to learn whether or not attempts are being made to patent large blocks of primary human genomic DNA sequence,” and that it will consider making a determination of exceptional circumstances if sequence information generated under grants is not made maximally useful to the research and commercial sectors. National Human Genome Research Institute, Policy on Availability and Patenting of Human Genomic DNA Sequence Produced by NHGRI Pilot Projects (Apr. 9 1996) <[http://www.nhgri.nih.gov/Grant info/Funding/Statements/patenting.html](http://www.nhgri.nih.gov/Grant%20info/Funding/Statements/patenting.html)>.

<sup>35</sup> 35 U.S.C.A. § 202(b)(1).

<sup>36</sup> *Idem*.

<sup>37</sup> 35 U.S.C.A. § 202(b)(2).

<sup>38</sup> 35 U.S.C.A. § 202(a)(iii).

<sup>39</sup> 35 U.S.C.A. § 202(a)(iv).

<sup>40</sup> 35 U.S.C.A. § 202(c)(4).



The statute further authorizes federal agencies to provide in the terms of a funding agreement, for the retention such additional rights as the agency determines are necessary to comply with obligations of the United States under a treaty or similar arrangement.<sup>41</sup> The wording of this provision suggests not only a grant of power, but also a limitation on the power of the funding agency. It permits agencies to retain the right to license or even assign foreign patents as needed to comply with international obligations of the United States. But it requires that such rights be explicitly retained in the terms of the funding agreement, and suggests that something more specific is required in the language of the contract than the standard provision for a “non-exclusive, non-transferable, irrevocable, paid-up licence to practice or have practiced for or on behalf of the United States any subject invention throughout the world.” 37 C.F.R. § 401.5(d). The evident implication is that the funding agency does not otherwise normally retain such a right.

This construction of the statutory language suggests that developing countries might be able to preserve future options to acquire licences from government agencies to use patented environmentally sound technologies emerging from future United States-sponsored research by negotiating for access to such technologies in the terms of treaties with the United States Government. United States agencies would thereafter cite these treaties in research funding agreements and explicitly retain the right to convey licences to foreign governments or firms to use technologies developed under the agreements to comply with the Government’s treaty obligations. In the absence of such explicit agreements however, funding agencies would not seem to have the right to convey such licences under patents arising from previously funded research.

### 3. Deployment of patent rights with preferences for small firms and United States manufacturers

United States. law gives substantial discretion to both contractors and agencies concerning how best to license their patents to achieve commercial development.<sup>42</sup> The principal constraints are that preference be given to small business firms,<sup>43</sup> that preference be given to licensees that agree to manufacture in the U.S.,<sup>44</sup> and that federal agencies may only grant exclusive or partially exclusive licences after public notice and opportunity for filing written objections.<sup>45</sup>

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<sup>41</sup> *Idem*: “The funding agreement may provide for such additional rights; including the right to assign or have assigned foreign patent rights in the subject inventions, as are determined by the agency as necessary for meeting the obligations of the United States under any treaty, international agreement, arrangement of cooperation, memorandum of understanding, or similar arrangement ....”

<sup>42</sup> 35 U.S.C.A. § 207(a) authorizes Federal agencies to “grant nonexclusive, exclusive, or partially exclusive licenses under federally owned patent applications, patents, or other forms of protection obtained, royalty-free or for royalties or other consideration, and on such terms and conditions ... as determined appropriate in the public interest.”

<sup>43</sup> 35 U.S.C.A. § 202(7)(D) (governing licensing by nonprofit organizations); 35 U.S.C.A. § 209(c)(3) (governing exclusive or partially exclusive licensing by Federal agencies). See also 15 U.S.C.A. § 3710a(c)(4)(A) (in deciding what cooperative research and development agreements to enter into laboratory directors should give special consideration to small business firms.).

<sup>44</sup> 35 U.S.C.A. §§ 204, 209(b). See also 15 U.S.C.A. § 3710a(c)(4)(B) (in deciding what cooperative research and development agreements to enter into, laboratory directors should give preference to business units located in the U.S. that agree to manufacture products substantially in the U.S.).

<sup>45</sup> 35 U.S.C.A. § 209(d).

This discretion is contingent upon active efforts to develop the technology and make it available commercially through an appropriate licensee. The funding agency may exercise “march-in rights” to grant licences to responsible applicants if it determines that the contractor is not taking “effective steps to achieve practical application” of the invention, that the contractor or its licensees are not satisfying health or safety needs, that the contractor or its licensees are not satisfying requirements for public use of the invention, or that the contractor or licensee has not agreed to, or is in breach of, an agreement to manufacture substantially in the U.S.<sup>46</sup> In fact, agencies rarely exercise these “march-in” rights, but they could do so in an appropriate case.

#### 4. Encouragement of collaboration across sectors

A number of statutory provisions seek to promote public-private and university-industry collaboration and to remove regulatory barriers that make industry wary of projects involving government-sponsored research. For example, the statute explicitly grants authority to federal agencies to enter into collaborative research and development agreements (CRADAs) with research partners in other agencies, State or local government, private firms, foundations, and non-profit organizations, and to agree in advance to grant patent licences or assignments to collaborating parties.<sup>47</sup> This legislative grant of authority was promptly fortified by an executive order from the President affirmatively directing the heads of executive departments and agencies to “encourage and facilitate” the permitted collaborations “in order to assist in the transfer of technology to the marketplace,” and to disregard limitations on licensing found in earlier versions of the statute or prior institutional patent agreements.<sup>48</sup>

The Secretary of Commerce is also explicitly directed to “propose and encourage cooperative research involving appropriate federal entities, State or local governments, regional organizations, colleges or universities, non-profit organizations or private industry, to promote the common use of resources, to improve training programmes and curricula, to stimulate interest in high technology careers, and to encourage the effective dissemination of technology skills within the wider community.”<sup>49</sup>

Statutory provisions governing the Advanced Technology Programme (ATP) managed by the National Institute of Standards and Technology (NIST) within the Department of Commerce promote collaborative research initiatives across sectors. ATP was established in 1988<sup>50</sup> to provide assistance to business in joint research and development ventures (which might include universities and independent research organizations) aimed at creating and applying pre-competitive, generic technologies, to commercialize significant new scientific discoveries, and to refine manufacturing technologies.<sup>51</sup>

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<sup>46</sup> 35 U.S.C.A. § 203(1).

<sup>47</sup> 15 U.S.C.A. § 3710a.

<sup>48</sup> Exec. Order No. 12591, 52 Fed. Reg. 13414, as amended, Exec. Order No. 12618, 52 Fed. Reg. 48661 (1987).

<sup>49</sup> 15 U.S.C.A. § 3704(c)(12).

<sup>50</sup> ATP was created by passage of the Technology Competitiveness Act as part of the Omnibus Trade and Competitiveness Act of 1988, Pub. L. No. 100-418, §§ 5101-5164, 102 Stat. 1107, 1426-1451 (codified as amended at 15 U.S.C. §§ 271 et seq.).

<sup>51</sup> *Idem* § 5131, 102 Stat. 1439, current version codified at 35 U.S.C. § 278n.

Less obviously to the same effect is the allocation of ownership rights in discoveries made in universities to the universities themselves, rather than to the sponsoring agency. Ownership of patent rights free of government claims makes it easier for universities to find partners in industry to fund additional research within the university, or to take inchoate discoveries out of the laboratory and into the market, by removing uncertainty and potential bureaucratic impediments that might otherwise inhibit private firms from investing in a technology, for fear that the Government would undermine their patent position in potential products.

Statutory provisions promoting collaborations reflect the same preference for U.S. industry as the provisions for licensing patents. Thus, for example, laboratory directors selecting cooperative research and development agreements are told to “give preference to business units located in the United States which agree that products embodying inventions made under the cooperative research and development agreement or produced through the use of such inventions will be manufactured substantially in the United States ....”<sup>52</sup>

The result of this overall strategy is to promote the combining of research funds from multiple sources, while permitting American firms to acquire the value of resulting intellectual property rights, either through direct ownership of patents or through exclusive licences.

#### 5. Active role for government in disseminating technical information

Another important avenue for promoting technology transfer is through government initiatives to disseminate technical information directly to prospective users. In addition to directing agencies involved in research to take an active role in promoting technology transfer,<sup>53</sup> United States law allocates responsibility for information dissemination to the Department of Commerce through the National Technical Information Service (NTIS).<sup>54</sup> The statute directs agencies to transfer information resulting from federally funded research and development to NTIS,<sup>55</sup> and directs NTIS to “establish and maintain a permanent repository of non-classified scientific, technical, and engineering information,”<sup>56</sup> to disseminate bibliographic information,<sup>57</sup> to translate and disseminate unclassified foreign information,<sup>58</sup> and to implement new methods or media for dissemination of information.<sup>59</sup>

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<sup>52</sup> 15 U.S.C.A. § 3710a(c)(4)(B). This provision goes on to state that “in the case of any industrial organization or other person subject to the control of a foreign company or government” the laboratory director shall “take into consideration whether or not such foreign government permits United States agencies, organizations, or other persons to enter into cooperative research and development agreements and licensing agreements.” *Id.*

<sup>53</sup> 15 U.S.C.A. § 3710.

<sup>54</sup> 15 U.S.C.A. §§ 3704b(e), 3710(d).

<sup>55</sup> 15 U.S.C.A. § 3704b-2(a).

<sup>56</sup> 15 U.S.C.A. § 3704b(e)(1).

<sup>57</sup> 15 U.S.C.A. § 3704b(e)(3).

<sup>58</sup> 15 U.S.C.A. § 3704b(e)(4).

<sup>59</sup> 15 U.S.C.A. § 3704b(e)(5).

## **II. SPECIFIC PROVISIONS CONCERNING ENVIRONMENTALLY SOUND TECHNOLOGIES**

In addition to the foregoing provisions of general application to all federally-sponsored research, there are a number of statutory provisions addressed more narrowly to the transfer of environmentally sound technologies. These more specialized provisions are, for the most part, broadly consistent with the general approach described above, although they often show an enhanced concern for promoting exports of United States products and technologies. The study does not attempt to provide an exhaustive catalogue of the statutory provisions governing all such programs.

The United States Congress acted to promote the commercial development of renewable energy technologies in passing the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989.<sup>60</sup> This statute directs the Secretary of Energy to foster collaborative efforts involving the private sector to commercialize renewable energy and energy efficiency technologies.<sup>61</sup> It requires that supported activities “shall be performed in the United States” and that selected projects “shall require the manufacture and reproduction substantially within the United States for commercial sale of any invention or product that may result from the project.”<sup>62</sup> The Secretary is further explicitly directed to consider the export potential of the technology in the selection of projects<sup>63</sup> and to develop a strategy for assisting the private sector “in meeting competition from foreign suppliers of products derived from renewable energy and energy efficiency technologies.”<sup>64</sup>

The goal of promoting the competitive position of United States firms in world markets looms even larger in provisions enacted as part of the Energy Policy Act of 1992.<sup>65</sup> The provisions begin by announcing a goal of promoting exports of renewable energy technologies and services<sup>66</sup> and specifically targeting markets in developing countries.<sup>67</sup> Selection criteria for funded projects include export potential,<sup>68</sup> and awards may be made “only to individuals who are United States nationals or permanent resident aliens, or to non-Federal organizations that are organized under the laws of the United States or the laws of a State of the United States.”<sup>69</sup> To assist in marketing such technologies abroad, the Secretary of Commerce is directed to develop a database of information on the energy technology needs of foreign countries and U.S. technologies available to meet those needs and to make the information available among others to industry and lending agencies.<sup>70</sup>

<sup>60</sup> *Pub. L. No. 101-218, 103 Stat. 1859* (1989), codified at 42 U.S.C.A. §§ 12001 et seq.

<sup>61</sup> 42 U.S.C.A. § 12001(b).

<sup>62</sup> 42 U.S.C.A. § 12005(b)(1)(B).

<sup>63</sup> 42 U.S.C.A. § 12005(c)(1)(C)(v).

<sup>64</sup> 42 U.S.C.A. § 12006(b)(3)(B).

<sup>65</sup> *Pub. L. No. 102-474, 106 Stat. 2956* (1992), codified at 42 U.S.C.A. §§ 13311 et seq.

<sup>66</sup> 42 U.S.C.A. § 13311(3).

<sup>67</sup> 42 U.S.C.A. § 13312(a) directs the Secretary of Energy, through the Agency for International Development, to “establish a programme for the training of individuals from developing countries in the operation and maintenance of renewable energy and energy efficiency technologies” and subsection (b) goes on to specify that the goal of this programme is to train appropriate persons in the use of “renewable energy and energy efficiency equipment *manufactured in the United States.*” 42 U.S.C.A. § 13312(b) (emphasis added).

<sup>68</sup> 42 U.S.C.A. § 13313(b)(4).

<sup>69</sup> 42 U.S.C.A. § 13314(d).

<sup>70</sup> 42 U.S.C.A. § 13315.

The Secretary of Energy is also given the mission, through the Agency for International Development, to establish a renewable energy technology transfer programme<sup>71</sup> to serve a long list of purposes related to competitiveness, including reducing trade deficits, retaining jobs, encouraging the export of American renewable energy technologies, and developing markets for renewable energy technologies in foreign countries. He should ensure also the participation of United States firms and technologies in energy-related projects in foreign countries, ensuring the introduction of American firms and expertise in foreign countries, and assisting United States firms to obtain opportunities to undertake projects in foreign countries.<sup>72</sup> Once again, proposals must involve the participation of United States firms,<sup>73</sup> and in selecting among proposals the Secretary is directed to consider “the degree to which the equipment to be included in the project is designed and manufactured in the United States”<sup>74</sup> and “the ability of the United States firm to compete in the development of additional energy projects using such technology in the host country and in other foreign countries.”<sup>75</sup>

In the same Act, Congress established a “Clean Coal Technology Subgroup” with a mission to expand the export and use of U.S. clean coal technologies.<sup>76</sup> The clean coal provisions of the Act parallel the renewable energy provisions outlined above in many respects. They direct the establishment and dissemination of a database of information on available technologies and potential needs for such technologies, “particularly in developing countries and countries making the transition from non-market to market economies.”<sup>77</sup> They direct also the establishment of a clean coal technology transfer program to increase exports by United States firms and protect American jobs,<sup>78</sup> they set requirements for participation by American firms,<sup>79</sup> and they specify selection criteria that stress the use of American manufactured equipment and prospects for development of additional markets for American firms using American technologies in foreign countries.<sup>80</sup>

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<sup>71</sup> 42 U.S.C.A. § 13316(a).

<sup>72</sup> 42 U.S.C.A. § 13316(b).

<sup>73</sup> 42 U.S.C.A. § 13316(e)(3).

<sup>74</sup> 42 U.S.C.A. § 13316(h)(2)(B). The statute further directs the Secretary to ensure that “the maximum percentage, but in no case less than 50 percent, of the cost of any equipment furnished in connection with a project authorized under this section shall be attributable to the manufactured United States components of such equipment” and “the maximum participation of United States firms.” 42 U.S.C.A. § 13316(j).

<sup>75</sup> 42 U.S.C.A. § 13316(h)(2)(C).

<sup>76</sup> 42 U.S.C.A. § 13361(a).

<sup>77</sup> 42 U.S.C.A. § 13361(e).

<sup>78</sup> 42 U.S.C.A. §§ 13362(a), (b).

<sup>79</sup> 42 U.S.C.A. §§ 13362(e)(1), (3).

<sup>80</sup> 42 U.S.C.A. §§ 13362(h)(2), (j).

### **III. OTHER MODELS**

#### *A. Government ownership*

Although the foregoing discussion describes the predominant model of technology transfer for the results of United States government-sponsored research, United States Code occasionally reveals another model for ownership and dissemination of the results of federally-sponsored research which, while largely overridden by the statutory provisions outlined above, still remains on the books. This other model appears to be followed in certain limited circumstances involving some environmentally sound technologies.

Prior to passage of the Bayh-Dole Act, Congress provided for title to inventions made in the course of non-nuclear energy research to be vested in the United States and for patents on such inventions to be issued to the United States.<sup>81</sup> These rights could be waived by the Secretary of Energy in the interest of promoting commercial utilization, encouraging participation by private firms in the research programme, and fostering competition.<sup>82</sup>

Congress appears to have intended to override this earlier provision with passage of the Bayh-Dole Act, which explicitly states:

"This chapter shall take precedence over any other Act which would require a disposition of rights in subject inventions of small business firms or non-profit organizations contractors [sic] in a manner that is inconsistent with this chapter, including but not necessarily limited to...section 9 of the Federal Non-nuclear Energy Research and Development Act of 1974 ..."<sup>83</sup>

Nonetheless, the earlier provision remains in the code books, and Department of Energy regulations, while acknowledging the Bayh-Dole Act, seem to contemplate that the old provision will continue to apply in at least some circumstances.<sup>84</sup>

Whatever its continuing legal force within the realm of non-nuclear energy research, this provision has been explicitly adopted by Congress in at least two Acts passed since the Bayh-Dole Act. The Water Resources Research Act of 1984<sup>85</sup> explicitly adopts the old title and patent provisions for federal non-nuclear energy research by reference:

"Notwithstanding any other provision of law, the Secretary shall be governed by the provisions set forth above] with respect to patent policy and to the definition of title to and licensing of inventions made or conceived in the course of work performed, or under any contract or grant made, pursuant to this chapter."<sup>86</sup>

<sup>81</sup> 42 U.S.C.A. § 5908(a).

<sup>82</sup> 42 U.S.C.A. § 5908(c).

<sup>83</sup> 35 U.S.C.A. § 210(12). The statute goes on to give what appears to be an erroneous citation of 42 U.S.C. § 5901 for this provision, but the evident intent was to override the provision on patents and inventions codified at 42 U.S.C. § 5908 rather than the Congressional statement of findings codified at 42 U.S.C. § 5901.

<sup>84</sup> 10 C.F.R. §§ 784.1-784.13.

<sup>85</sup> Pub. L. No. 98-242 § 102 et seq., codified at 42 U.S.C.A. § 10301 et seq.

<sup>86</sup> 42 U.S.C.A. § 10308.

The statutory language continues in a strikingly different tone from that found in the provisions applicable to renewable energy and clean coal, emphasizing the importance of accessibility in place of competitiveness:

"Subject to such patent policy, all research or development contracted for, sponsored, co-sponsored, or authorized under authority of this chapter shall be provided in such manner that all information, data, and know-how, regardless of their nature or mediums, resulting from such research and development shall ... be usefully available for practice by the general public."<sup>87</sup>

A similar provision governs proprietary rights in the Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988.<sup>88</sup> The statute provides that:

"All patent rights from inventions developed under the management plan or the research plan implemented pursuant to this Act shall be vested in accordance with section 9 of the Federal Non-nuclear Energy Research and Development Act of 1974."

This provision is particularly interesting in the context of an act that in other respects echoes the emphasis on United States competitiveness found in other statutes governing technology transfer of the results of federally-sponsored research in the post-Bayh-Dole era.

It should be recognized however, that although these acts presumptively allocate title to the Government rather than to the contractor in the first instance, the agency has the authority to vary these rules. Moreover, even if the agency chooses to retain title, licensing of the invention will still be governed by the post-1980 rules concerning technology transfer for inventions owned by the Government, including the required preferences for firms that manufacture in the United States.

### *B. Mandatory Licensing*

The underlying logic of United States policy focuses on the creation of private incentives for innovation, trusting the market to impel private patent holders to market their products as widely as possible. But the way patents improve incentives for innovation is by creating monopolies that can have the effect of increasing the price and reducing the availability of the inventions they cover. In the ordinary case it may be reasonable to expect the patent owner to be willing to license the technology on reasonable terms in order to increase profits. But there may be circumstances in which the patent holder chooses instead to withhold licences from business competitors. The social cost of strategic withholding of patent licences by private patent owners could be quite high in the case of environmentally sound technologies for which there is a strong public interest in widespread access.

Although the primary safeguard against suppression of patented technologies under United States law is the private incentive of patent holders to maximize profits during the patent term, there are some additional safeguards in this law that further minimize this risk.

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<sup>87</sup> *Idem.*

<sup>88</sup> *Pub. L. No. 100-680*, 102 Stat. 4073 (1988), codified at 15 U.S.C.A. § 5101 et seq.

First, the United States government and its contractors have a right to use any patented technology for the Government upon payment of a reasonable royalty.<sup>89</sup> In effect, this provision allows the Government to obtain a compulsory licence, for a price, under any patent that it needs to use for the public good, regardless of who owns the patent and who paid for the research.

Second, as discussed above, further restrictions apply in cases where the Government sponsored the research that yielded the patented invention. The funding agency retains a “non-exclusive, non-transferable, irrevocable, paid-up licence” to use the invention or have others use it on behalf of the United States Government throughout the world.<sup>90</sup> The statute permits the funding agency to retain additional rights to sublicense foreign governments or international organizations to use these discoveries pursuant to international treaties.<sup>91</sup> This can be a significant restraint on the patent owner’s monopoly if the United States Government is a principal customer for the patented technology. Moreover, as discussed above, the Government retains “march-in” rights to grant licences to responsible applicants on reasonable terms if (a) the contractor fails to take effective steps to achieve practical application of the invention, (b) such action is necessary to alleviate health or safety needs, (c) such action is necessary to meet requirements for public use specified by federal regulations, or (d) the contractor or its exclusive licensee has either failed to agree to manufacture substantially in the United States or is in breach of such an agreement.<sup>92</sup>

Third, although highly unusual in the United States, a small number of statutes call for mandatory licensing of some types of patented technologies in cases of compelling public interest. For example, the Clean Air Act of 1970 established a procedure for seeking a district court order requiring the issuance of licences on reasonable terms if the Attorney General certifies to a district court that such a licence is necessary to comply with the act, that there are no alternative methods to accomplish the same purpose, and that the absence of such a licence threatens to lessen competition in commerce.<sup>93</sup> The Atomic Energy Act also includes a provision for administrative issuance of mandatory licences under patents on discoveries that the Atomic Energy Commission deems to be “of primary importance in the production or utilization of special nuclear material or atomic energy” if “the licensing of such invention or discovery under this section is of primary importance to effectuate the policies and purposes of this Act.”<sup>94</sup>

In both of these settings, the statutory provisions and implementing regulations make clear that mandatory licences are a remedy of last resort. Those who seek mandatory licences must first demonstrate that they have been unable after reasonable efforts to obtain a license

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<sup>89</sup> 28 U.S.C.A. § 1498

<sup>90</sup> 35 U.S.C.A. § 202(c)(4)

<sup>91</sup> *Idem.*

<sup>92</sup> 35 U.S.C.A. § 203(1).

<sup>93</sup> 42 U.S.C.A. § 7608.

<sup>94</sup> 42 U.S.C.A. § 2183.



from the owner of the patent on reasonable terms.<sup>95</sup> Even these limited provisions for mandatory licences are extraordinary in the United States patent system, which as a general rule entrusts patent licensing to the realm of private bargaining.

#### **IV. CLINTON ADMINISTRATION ENVIRONMENTAL TECHNOLOGY STRATEGY**

The statutory provisions reviewed above have been enacted by different Congresses over at least two decades, and are the subject of ongoing refinement. Yet for the most part they reflect a consistent strategy, unlikely to change in the near term, of using United States government funding and intellectual property rights to enhance the competitive position of American firms in international markets for new technologies, including environmental technologies. This strategy is entirely consistent with the policy of the Clinton administration as reflected in a 1995 report entitled “Bridge to a Sustainable Future -- National Environmental Technology Strategy.”<sup>96</sup>

This document urges strengthening private incentives for innovation and commercialization of new technologies as a means to achieve the twin goals of improving the environment and economic growth. Toward these ends, it proposes collaborative research and development involving the private sector as well as federal, state and local governments.<sup>97</sup> It emphasizes the importance of exports of environmental technologies as a means of creating new, high-paying jobs.<sup>98</sup> It expresses considerable interest in helping other nations to address environmental concerns, but these other nations are pictured as customers<sup>99</sup> as much as they are pictured as partners.<sup>100</sup>

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<sup>95</sup> 42 U.S.C.A. § 7608; 40 C.F.R. §§ 95.2(b)(4)(v), (viii), 95.3(b), (e) (petitioner seeking mandatory licence to use patented technology necessary for compliance with Clean Air Act must show, and Administrator must find, that a mandatory licence is necessary, that the technology is not otherwise available, and that the petitioner tried and failed to obtain a licence from the patent owner on reasonable terms); 42 U.S.C.A. § 2183(c), (e)(4) (prior to issuance of mandatory licence under Atomic Energy Act for patents affected with the public interest, Commission must find that applicant cannot otherwise obtain a licence from the patent owner on reasonable terms).

<sup>96</sup> National Science and Technology Council, Bridge to a Sustainable Future - National Environmental Technology Strategy (1995) <<http://192.188.119.21/envstrat.txt>>.

<sup>97</sup> *Idem* at 26-30.

<sup>98</sup> *Idem* at 34-39.

<sup>99</sup> *Idem* at 39 (“The Initiative for Environmental Technologies of the United Nations Agency for International Development] will help create markets for environmental technologies and eliminate barriers to the flow of technology through partnerships with the private sector.”).

<sup>100</sup> See *idem* at 50:

“Demand for environmental technologies will increasingly be found outside the United States in countries with growing populations, rapid industrialization, and rising incomes. Thus, the international dimension of the national environmental technology strategy must encourage U.S. partnerships with these nations to adopt sustainable development practices and employ appropriate technologies to meet challenges.”

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## ***V. IMPLICATIONS FOR ACQUISITION OF U.S. ENVIRONMENTALLY SOUND TECHNOLOGIES***

Plainly, United States law welcomes the dissemination of American technologies to foreign countries through the sale of American-manufactured products in foreign markets. Toward this end, statutes governing ownership and dissemination of the results of United States-government-sponsored research typically encourage private contractors to patent their discoveries in the United States and abroad and encourage non-profit institutions and federal agencies to patent their discoveries and license them to American firms. The United States government is so eager to promote technology transfer in this manner that it will sometimes provide funding to help American firms introduce their technologies into foreign markets.

This is not, however, the only avenue available for technology transfer. It may sometimes be possible to implement new technologies locally at less cost by avoiding collaboration with foreign firms. Despite strong encouragement and incentives to patent the results of government-sponsored research, not all such results are patented, and even when a discovery is patented in the United States, it may not be patented throughout the world. In cases where there are no local patent rights covering the technology, it may be possible to obtain the necessary technical information from publications, foreign patent documents, or government agencies such as the NTIS, and put it directly to use.

It may well be however, that for technologies that have been developed to the point of commercial feasibility, the advantages of collaborating with an experienced firm that knows the technology well are considerable. This suggests that the starting point for acquiring United States technologies is to identify the firms that are developing the technologies and pursue collaboration with them. In addition to controlling the relevant patent rights, these firms may offer considerable experience with and understanding of the technology and cost advantages, over other firms that have not yet established enough of a market for the technology to achieve economies of scale.

The choice of strategy may vary from one technology to the next depending on the existence of local patent rights, the cost of the technology, the existence of local expertise for implementing the technology, and the value of technical assistance and experience offered by foreign firms.

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