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# An Efficient Contracting Approach to Rural Electric Cooperatives and the Development of Upper Midwest (U.S.) Wind Resources

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## Abstract

Many factors support the likelihood of major wind power deployment in the Upper Midwest of the U.S. over the next two decades. This paper specifically considers the dilemma faced by the existing rural electric co-ops (RECs), to whom wind development poses simultaneously a threat and an opportunity. We argue that the threat can be ameliorated through more appropriate tariff strategies, and that there is an efficient-contracting rationale for RECs to take the lead in future development of the wind resource.

**Keywords:** wind power, renewable energy, cooperatives, efficient contracting

## 1. Introduction

The Upper Midwest (chiefly the Dakotas, Iowa, and Minnesota) is the U.S. region with the greatest potential for electrical generation from on-shore wind (Note 1). Rapid growth is projected for this industry over the next two decades, in part as a result of the improving economics of wind generation, and in part as a result of legislative mandates (renewable electricity standards) that stipulate escalating percentages of electricity from renewable sources (Note 2).

Coincidentally, the Upper Midwest is also host to a greater density of cooperative business enterprises than anywhere else in the country. The region includes large agricultural cooperatives (nine of the nation's ten largest) and a robust, eclectic group of smaller cooperatives (Note 3). In the power sector the region includes several dozen rural electric cooperatives, as well as the generation and transmission cooperatives that serve them.

Several studies have shown that the form of ownership matters when it comes to wind energy development: in particular, the regional economic consequences of locally-owned wind farms may be several times that of industrial plants established by outside investors (Note 4). Whether the region's coming boom has lasting development consequences will depend on the degree of local participation and investment.

The evidence suggests that to date RECs have tended to perceive wind power-as well as public policies aimed at its promotion-as a threat rather than as an opportunity. The National Rural Electric Cooperatives Association (NRECA) has in some concrete ways thrown its weight behind a "go-slow" approach, even while fighting a public relations battle against this perception. We analyze in this paper the nature of the advantages that RECs enjoy relative to other developers, as well as the threat the wind development poses to RECs, particularly in the context of competitive electricity market restructuring.

The paper is organized as follows: section 2 provides a brief historical overview of the role cooperatives have played in the Upper Midwest, particularly in the development of rural electrification; section 3 discusses the threat that liberalization/restructuring of the electricity sector, and how this threat has influenced REC attitudes toward wind development; section 4 employs an efficient-contracting perspective (following Hansmann, 1996) to discuss the theoretical cost advantages and disadvantages RECs face as potential wind developers, relative to utilities and independent power producers; section 5 reviews some practical considerations; section 6 concludes.

## 2. A Cooperative Context

The north-central region of the U.S. has historically been home to the most significant cooperative movement in North America. Both producer and consumer cooperatives were common mechanisms for mutual aid and self-help during the period of rapid European settlement in the region in the late nineteenth century (Note 5).

Kercher et al. (1941) traces the origins of most modern cooperatives in the region to the wave of Finnish immigrants into Northern Michigan, Minnesota, and Wisconsin in the early 20th century. The remoteness of the region and the isolation of the settlements often plagued these communities with uncompetitive markets for provisions. Cooperatives were formed as a collective instrument of material self-help, then, but also with an ideological dimension “to usher in a more equitable social order” (Kercher, p. 16). The movement grew quickly throughout the north-central states. In the mid-1930’s, 70% of the cooperatives identified by the U.S. Bureau of Labor Statistics were located in the region.

The first REC is believed to have been established in Granite Falls, Minnesota in 1914 (Voorhis, 1941). By 1923, 31 electric cooperatives had been incorporated in nine states (Ellis, 1966). While the movement was well underway already, it was given a boost when President Roosevelt established the Rural Electric Administration (REA) by executive order in 1935. Congress passed the Rural Electrification Act in 1936, establishing a loan program within the REA to create a national rural electrification program.

In 1935, with fewer than ten percent of farms in the United States enjoying access to electric power, the REA, the Farm Bureau and other major farm organizations began to encourage farmers to form cooperatives to obtain electrical power (Note 6). A report to the REA that same year by a special committee of investor-owned utility (IOU) executives concluded “there are very few farms requiring electricity for major farm operations that are not now served” (Ellis, 1966). Such opinions notwithstanding, however, over the next 20 years rural electrification-organized and delivered by RECs-extended its reach to more than 90% of U.S. farms (Gardner, 2002).

In most instances, the new distribution cooperatives depended initially on IOUs for their wholesale power supply. In an effort to protect their membership, distribution cooperatives federated with one another to create their own capacity through second-tier generation and transmission co-ops (G & Ts). Over the years, the lure of economies of scale, reliability considerations, and the desire for independence from the price-setting behavior of the for-profit sector in the industry has led G&T systems to consolidate and create third tier systems-federations of G&T co-ops that are themselves federations of distribution cooperatives. Through these arrangements, distribution coops contract indirectly with third-level systems for their power, though at this remove the transaction begins to resemble trade in commodities, and to lose its distinctive cooperative character.

Second- and third-tier co-ops focused first on the management of large contracts for government hydro-power (through for example the Tennessee Valley Authority, the Western Area Power Administration or other federal power management administrations), and later-as federal projects became fully subscribed and loads continued to grow-on cooperative generation ventures. Increasingly, over time, the co-ops have signed on as junior partners with IOUs in the development of new generation capacity, typically from coal.

### **3. Strategic Considerations: The Threat of Wind in the Context of Deregulation**

From the 1930s until the late 1970s the electricity industry in the U.S. developed largely on the basis of regulated, vertically integrated monopolies, each with an exclusive geographic footprint. The RECs emerged to fill the interstices between the areas which the investor-owned utilities (IOUs) chose to develop and serve. Exclusivity was by design in the case of the IOUs, as the economies of scale in power generation, transmission, and distribution, was thought to render competition economically inefficient. In the case of the RECs, exclusivity was initially by default-due to lack of interest on behalf of for-profit IOUs-but later came to be a kind of shield, protecting against IOU encroachment, or the running of “spite lines” to the more profitable customers in an REC’s service area.

The emergence of relatively efficient small-scale generating technologies that used clean, renewable, non-imported fuels, even in the midst of spiking global energy prices, led to a significant regime change in the late 1970s: the Public Utilities Regulatory Policy Act (PURPA) of 1978 included a key provision obliging utilities, for the first time, to receive and pay for electric power produced by “qualifying facilities” (QFs, Note 7). The Energy Policy Act of 1992 formally set the stage for widespread competition in the generation of electricity, not limited to QFs, and has spawned a flurry of activity to restructure the industry. In some cases the IOUs have been forced to sell off generating capacity to independents, and remake themselves into regulated transmission and/or distribution firms. Competitive spot- and day-ahead wholesale markets have become commonplace (Note 8).

Subjecting to competition only one stage of production in a vertically integrated monopoly has proven complex. A great deal of regulatory effort has been devoted to the conditions and terms of open access, since competition in generation is meaningless without access for the independent power producers to the existing transmission and distribution networks. But while open access makes competitive generation markets possible, it inevitably

threatens to strand certain investments, made under the old regulatory regime. Those may take the form of investments in generators which have been rendered uncompetitive by new technologies (but that still must be paid for), or investment in transmission lines, over which the owners now must accept the regulators' terms of access and compensation, or even investment in distribution infrastructure to serve an existing customer, which is suddenly stranded by the customer's decision to generate power behind the meter.

In this brave new restructured world there is uncertainty not only over which assets will be rendered worthless by a new entrant, but also over which entity will be saddled with the costs of providing services that benefit the entire grid. Load balancing, transmission maintenance and upgrade, conservation and demand management, among other ancillary activities, are services essential to the well-being of the system, whose cost could be thrust upon some hapless distribution cooperative without a means to recover them. "Restructuring" is a high-stakes game that requires agility of the players. The existing RECs, with their long-term contracts for power and their fixed investment in infrastructure, fear that they may not be positioned to win, or even to place.

An important threat to the RECs from the restructuring process in general, and from wind power in particular, involves the obligation to interconnect QFs under PURPA (Note 9). Interconnection entails direct costs, of course, but more importantly it threatens to strand some of the investments of the REC. In the case of a customer interconnecting on-site power, this might strand (in proportion to the customer's power use) the REC's investment in a second tier G&T co-op, or other long-term power contract. For the most part, small RECs can apply for a waiver from FERC rules 888 and 889 (which require public utilities to publish open-access, non-discriminatory transmission tariffs), but in cases where the REC does provide some transmission service it might find itself under FERC jurisdiction, obliged to accommodate even wholesale generators who demand interconnection (Note 10). At any rate, the RECs are not exempt from connecting individual behind-the-meter QFs, which can themselves strand other REC investments. The RECs are correct to concern themselves over stranded costs that wind development might impose on them, to the extent that this development is undertaken by others.

The interconnection requirement brings the need for an appropriately sophisticated tariff policy sharply into focus. RECs typically have very simple rate structures: most commonly, REC distribution tariffs include a small fixed charge—just enough to cover meter reading and billing—and a constant energy charge per kilowatt hour (kWh) consumed. Average fixed costs are recovered by setting the rate per kWh slightly above the average cost of service for customers in the particular rate class. But while such a tariff structure excels at simplicity and ease of implementation, it doesn't serve at all well when the consumer demand is highly variable. Almost all behind-the-meter customer applications of wind will still require some level of service, and such an arrangement will require the load serving entity to bear real costs that guaranty system adequacy to meet the customer's maximum load at system peak. Such costs cannot be recovered by the standard tariff, since the quantity of kWhs demanded will presumably be reduced by the installation of the turbine. Other members of the co-op would simply have to absorb a larger portion of the fixed costs. The nightmare scenario for RECs is that a vicious circle be put into motion, whereby each customer that opts out imposes costs on remaining members, and thus increases the incentive for them to opt out as well.

While among the 1000 or so RECs there are naturally some important differences, the official stance of the national umbrella group NRECA could be fairly characterized as extremely cautious (NRECA, 2001; NRECA, 2003). NRECA's wariness goes beyond cautioning members not to leap before they look, and approaches something very like a policy of opposition to wind-friendly legislative and regulatory developments. Morrison (2006), for example, expresses NRECA's firm opposition to a federal Renewable Portfolio Standard. The title of the article is summarily dismissive: "Mandated RPS Ignores Economic, Political Reality".

The position taken in NRECA and APPA (2005)—a legal skirmish relating to federal rule-making procedures—is more obscure than the organization's stance on major federal energy legislation, but perhaps more revealing. Herein, NRECA asks for a rehearing before the Federal Energy Regulatory Commission on FERC's final ruling (Order 661, June 16, 2005) on terms of interconnection of wind energy:

The final rule has departed from [the] carefully crafted and balanced approach ... without reasoned basis or adequate record support. The final result unduly discriminates and creates preferences in favor of wind developers, owners and operators, *shifting the costs of maintaining system reliability onto customers and competing generating sources.* [p. 2; emphasis added]

Here we see quite explicitly the threat NRECA perceives wind power, and it is precisely the matter of cost-shifting discussed above. It is not wind perse that threatens the existing cost allocation mechanisms, but

rather the integration of new generating sources (which happen to be wind) as a result of competitive restructuring of the power markets.

NRECA faces a dilemma: on the one hand, the organization has opposed wind-friendly legislation, out of legitimate concern for how independent power producers might end up stranding the fixed investment that RECs have already made; on the other hand, for reasons discussed below, RECs have some natural advantages over independent power producers or utility wind developers. Perhaps out of reluctance to send mixed messages, NRECA has emphasized the threat wind poses to RECs rather than the opportunities.

#### **4. Theoretical Considerations: Are RECs ‘Efficient’ Institutions for Wind Development?**

Hansmann (1996) provides a comprehensive framework for considering the efficient assignment of ownership among different stakeholders in a firm (e.g. lenders, input providers, customers, employees). This framework is useful for shedding light on some of the institutional advantages that rural electric cooperatives enjoy, relative to other forms of organization undertaking wind development.

Viewing an enterprise as a “nexus of contracts”, Hansmann argues that the economically efficient assignment of ownership is that which minimizes the net costs of market contracting (i.e. contracts for goods and services with non-owning patrons) and management. Market contracting may be costly for a number of reasons: i) monopoly or monopsony power in goods or factor markets may lead to high pricing, limiting the scope for mutually beneficial exchange; ii) ex-post “lock-in” may lead to inefficiently low levels of initial investment (in the case of an input supplier) or sales (in the case of locked-in consumers); iii) information asymmetries, for example with respect to the quality of an input or output, may lead to sub-optimal trade (Note 11). “All things equal, the costs will be minimized if ownership is assigned to the class of patrons for whom the problems of market contracting—that is, the costs of market imperfections—are most severe” (Hansmann, 1996, p. 21).

But all things are not equal: Hansmann also identifies a series of factors relating to “cost of management”, which likewise depend on the assignment of formal ownership rights. Most importantly among these are two: i) the cost of monitoring management, to ensure that it pursues (or at least doesn’t oppose) the owners’ interests; ii) the cost of bearing the risk associated with an uncertain stream of residuals (Note 12).

Viewed as a matter of efficient contracting, REC “ownership” of the local wind development has several advantages to recommend it. Some of these are relative to a model of wind development by independent power producers (perhaps newly capitalized for the occasion), and others are relative to a model of integrated utility wind development.

First, REC wind development eliminates the time-consuming and antagonistic power purchase agreement negotiations process to which all independent developers are subject (Note 13). The distribution company is a monopsonist in the matter of interconnection of new generators, and anecdotal evidence certainly suggests that PPA negotiations are a strong disincentive to independent developers. Charitably viewed, these negotiations might be seen as a means of price discrimination, whereby the developers are pushed down to their reservation prices, and the economic rents are captured by the utility. In fact those rents will be at least partially dissipated through the cost of supporting negotiating teams on both sides. And since there are economies of scale in negotiating costs—a 100 MW project is much less costly to negotiate than five 20 MW projects—this dynamic favors large, corporate wind parks over smaller, locally-owned projects. Thus both in efficiency terms and local economic development terms this reasoning supports the case for REC-developed wind.

RECs also have considerable industry-specific legal and engineering expertise in-house, or at least in established long-term contracting relationships. There are surely cost advantages to having these relationships in place from the outset, since legal and engineering services are classic examples characterized by asymmetric information (and therefore problematic for market contracting). Assuming that comparable talent is even available to an independent developer, there are still likely to be a host of relevant questions—where and when additions to capacity might most profitably be added, for example—that will be less costly for the existing distribution company to know than for an independent developer to ascertain.

In the case of RECs there is no antagonism between owners and customers, since formally they are one and the same. Consequently, there is no regulatory oversight on rates, in most jurisdictions. Relative to investor-owned utilities this implies a lower social cost, since rate cases need not pass through lengthy public utilities commission hearings, and the attendant legal fees may be avoided. The introduction of large portfolios of wind over the coming years will heighten regulatory conflict about which costs are legitimate for investor-owned utilities, and so the legal costs of utility-developed wind may be expected to grow.

The costs of management (as Hansmann uses the term) vary between RECs and investor-owned utilities, as a function of the ownership assignment. Here also there are some identifiable cost advantages enjoyed by RECs.

In either case, monitoring of management involves a major free-rider problem, whether it is on the part of equity investors in the case of IOUs or the case of customers in the case of RECs. In the abstract it isn't clear for which enterprise the problem is worse. Investor-owned utilities do tend to be much larger than RECs, and the greater geographic distance between shareholders and management will certainly raise the cost of monitoring. But there are also likely to be some among a utility's investors with a sufficient stake to justify investment in information gathering. For either the average customer or the average investor, however, it is unlikely there will be enough at stake to justify careful monitoring of the professional management decisions of the firm.

Utilities operating in a rate-of-return regulatory framework, however, do not have clear incentives to minimize costs, and to the extent that expenses are passed on to consumers, investors have no particular incentive to concern themselves over excessive management perquisites. By virtue of greater geographic distance from ownership (relative to RECs), it is easier for utility management to hide any gold-plating they undertake; by virtue of rate-of-return regulation it is less likely that owners will object.

Wind farms are classic high fixed-cost, low marginal-cost projects, and as such, the cost of capital will be a critical determinant of net present value. Arguably the most important question here is how well RECs minimize the management costs associated with moral hazard and finance, relative to independent power producers or regulated utilities. In the next section we consider some of the particular policies (taxes and subsidies) that affect capital costs differentially, while the focus here is on the fundamental consequences of ownership assignment for moral hazard, and hence for the cost of capital.

The presumptive advantage of an independent power producer or an investor-owned utility is that formal control vests in the provider of capital, who then has incentive to make sure that capital is not misappropriated by management. A single proprietor with his own capital at stake, for example, faces no moral hazard. A small group of independent investor/developers with only their own capital at stake perhaps delegates some operational authority, but not at any great remove; in this case the moral hazard should add little to the risk investors face. Because investors are presumed to defend their own interests, bank finance may also be available on reasonable terms. A utility employs the capital of shareholders and creditors (banks and bond holders) and delegates the control to professional management. Agency costs for external finance are reduced to the extent that shareholders provide the public good of monitoring management. Rate of return regulation also provides some security that should lower the cost of capital. Finally we come to RECs, without equity participants at all. The question is this: Will the resulting threat posed by moral hazard significantly raise their cost of capital (relative to entities with equity holders), or even ration them out of the credit market altogether?

There are several reasons why this effect is probably minimal in the particular case of RECs contemplating wind development. In the first place, debt markets went through a fairly dramatic transformation in the 1980s, so that "junk bond" finance is now well established, even for businesses with much riskier profiles than RECs. In addition, a wind farm is a highly visible, easily monitored investment with little scope for moral hazard in its operation (Note 14). The turbine and tower also represent tangible, relatively liquid collateral that is effectively impossible to abscond with. Finally, the REC is able to leverage a very stable cash flow from sale of electricity, and may even raise rates in the event of financial difficulties. Thus even without considering the various subsidized credit schemes for which RECs are eligible, it seems very unlikely that lack of equity finance will greatly raise the cost of capital these cooperatives face.

## 5. Practical Considerations

In addition to the theoretical case for REC involvement in wind, there are a number of other concrete advantages and disadvantages relative to other developers.

**Financing:** Through the Rural Utilities Service (RUS) of the U.S. Department of Agriculture, the successor to the REA, co-ops have access to favorable loan rates and guarantees. For renewable generation the terms of RUS finance are even more advantageous. If the REC opts for private debt placement, it can advantageously issue tax-free municipal bonds. The last two federal energy bills have also been laced with grant funds and other incentives that RECs are well positioned to exploit.

**All requirement contracts:** G&Ts typically sell power to the distribution co-ops under long-term (25-35 years, commonly) exclusive or all-requirements contracts that expressly limit the RECs ability to purchase from other sources or to generate its own power. Historically, all-requirements contracts between second-and third-tier

G&Ts and their member cooperatives were required by the Rural Electrification Administration, serving as a form of collateral against the REA's below-market financing.

Tax incentives: Federal tax and energy policies work against the co-ops in some direct ways. The single-most important federal incentive for wind development in the U.S. is a production tax credit (PTC). In many cases the PTC credit amounts to over a third of the revenue stream associated with a wind project. This feature of the tax code, along with an accelerated depreciation allowance, privileges for-profit, corporate structures over other ownership models. Distribution co-ops simply lack the tax appetite to capture these lucrative subsidies. On the other hand, co-ops are not subject to corporate profit taxes.

## 6. Conclusion

The existing rural electric co-ops have behaved much like the load-serving IOUs: they have been reluctant to purchase wind, wary and unenthusiastic about legislation encouraging wind, and cautious about developing wind farms on their own. Their caution with respect to purchasing wind and to encouraging independent generation is understandable: the brave new world of deregulated electricity markets poses a real threat of stranding existing REC investments, and the load-serving entities are least agile of the players in this particular game—certainly when compared to the high-powered strategic and lobbying muscle of certain energy trading companies. To endure and to thrive in a world where they are obliged to connect wind power, the RECs will at a minimum need to develop rate structures that adequately account for the risks and externalities of QFs and behind-the-meter installations.

Concern over the lack of cooperative wind development is not simply misplaced nostalgia or romanticism. The economic benefits of local ownership are increasingly well documented. There are also excellent reasons to believe that the social costs of contracting for various wind development services will be lower for RECs than for independent and utility wind developers. An analysis of optimal ownership structure in the industry (following Hansmann, 1996) argues for some distinct advantages for the existing RECs, relative to both IOUs and independent developers.

Existing long-term contractual obligations do present an important obstacle to wind development within a distribution co-op. For reasons unrelated to wind power, such long-term all-requirements contracts have also become less favorable over time to distribution cooperatives, both from the benefit and the cost side: not only are other sources of financing more generally available now, but the financial risks associated with new environmental regulation—which will legally be passed through onto all-requirements-contracted members—are greater now than ever before. With the additional emergence of competitive wholesale spot markets we are likely to see a smaller role for all-requirements contracts in the future, and a correspondingly greater flexibility for RECs to develop wind power on their own.

RECs are potentially in a strong position to lead on wind power adoption: relative to other contenders they have enviable resources and organization. But they face a dilemma: policies that make wind adoption easier and more economical also make it more likely that the RECs will find themselves forced to buy more power from more QFs, and without some reform of electricity tariffs and market architecture as a whole, such a development would threaten to strand REC investments and shift costs to remaining REC members. Individual state legislatures have recently raised the stakes for the RECs by passing aggressive, mandatory renewable portfolio standards. Now more than ever the balance seems shifted in favor of concerted wind development on the part of RECs, at least in part to fend off the negative consequences of having the wind developed for them by others.

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## Notes

- Note 1. See for example the National Renewable Energy Laboratory (NREL) windmaps, available on-line through <http://www.windpoweringamerica.gov> (Last accessed February, 2013).
- Note 2. Minnesota's RES, passed in the spring of 2007, stipulates that 25% of electricity demand must be met from eligible renewable resources by the year 2025, which represents roughly a 10-fold increase in capacity, relative to the date of adoption. Bailey and Morris (2006) argue that nearly all of the increase will come from increases in wind power capacity.
- Note 3. In Minnesota, for example, there were 841 cooperatives and 185 credit unions in 2001 - numbers that lead nationally. See Folsom (2003) for greater detail. Included in his number are 43 rural electric cooperatives (RECs) that distribute power in rural areas, and three generation and transmission (G&T) cooperatives that provide their services to the RECs.
- Note 4. See for example U.S. General Accounting Office (2004).
- Note 5. The "cooperative coopers" of Minneapolis is perhaps, the most notable attempt at create producer cooperatives in the region. In the 1880s, barrel cooperatives employed hundreds and inspired a cooperative store, a painter's cooperative, a cigar making cooperative, and a cooperative laundry and led to the formation of a short-lived cooperative colony. See Leiken (1999).
- Note 6. Seven of the first ten REA loans went to cooperatives. The IOUs were not particularly distressed by this competition, but neither did they make life easy for the cooperatives: "Inexpensive electricity delivered by rural co-ops presented no competitive threat to investor-owned utilities since they had shown they were unwilling to extend service to rural America, including the High Plains" (Rhodes & Wheeler, 1996, p. 312). Nevertheless, as electric distribution cooperatives formed, the IOUs expanded selective efforts to distribute power to rural areas, sometimes in ways that undermined the cooperatives' efforts: "The companies were by no means providing area coverage. Instead they waited to learn where farmers were signing up people for a co-op, then sent their crews into those areas to build lines in the most thickly settled sections, neatly cutting the heart out of the proposed co-ops" (Ellis, 1966, p. 45).
- Note 7. QFs are primarily non-utility generators using renewable energy technologies. PURPA instructs utilities to pay "avoided costs" to the QFs for all power purchases. While the principle is simple (all costs which the QFs' electricity production enabled the utility to avoid-from energy costs to ancillary services costs to reduced



congestion costs-should be fully remitted by the utilities to the QFs), in practice it has been the subject of enormous regulatory effort to define.

Note 8. The prices which emerge from these markets are expected to play an increasingly important role as references prices for the bilateral markets.

Note 9. The difficulties one small QF had in providing wind power in a REC service area is illustrative of the controversy. See Szczepanski (2006).

Note 10. See the BVEA case study: NRECA (2003; p. 48-51).

Note 11. An agricultural marketing board, for example, illustrates how ownership rights might efficiently be assigned to producers (farmers), to overcome the efficiency problems created by an uncompetitive local market for farm products. The ownership of a franchisor by its franchisees illustrates an assignment of rights conducive to overcoming lock-in. A farmer/producer cooperative for provision of agricultural fertilizers represents an assignment of rights intended to deal with an information asymmetry-namely, the difficulty that the buyer has in identifying the chemical composition of the product.

Note 12. Assigning ownership to those who provide the capital (as in a typical for-profit enterprise), for example, may eliminate some of the moral hazard otherwise present in a financial transaction, and thus lower costs relative to some other assignment. Likewise, assigning the residuals to the providers of capital eliminates the costs of inflation risk, which might otherwise raise the cost of market contracting for capital, since debt is generally denominated in nominal terms.

Note 13. A merger between the distribution and the development functions eliminates these costly transactions outright. The merger could be accomplished by assigning ownership rights to either party, but here it will be much more practical for the existing members to own the new function. The case for one function owning another arises when there is a compelling moral hazard problem that is resolved by one assignment of ownership but not the other. For example in the case of an agricultural producers co-op, having the co-op own the farms (as opposed to vice versa) would give rise to a moral hazard problem with respect to the hard-to-monitor effort of workers on the farms. There is no comparable effort-monitoring problem in the case of wind development.

Note 14. A loan covenant could easily stipulate periodic third-party maintenance, for example. In other respects, this investment is essentially an automaton: there is no issue of "effort-level" in its operation that would give rise to a moral hazard.