FLORIDA POWER CORPORATION
ST. PETERSBURG FLORIDA

March 20, 1968

Regulatory Suppl File Cy.

Mr. Harold L. Price
Director of Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Price:

I am enclosing a copy of our Annual Report for 1967 which I believe you may find interesting. — See Reports File

When Roy Snapp and I visited briefly with you last September, you and I were discussing the role of the municipalities and other small distribution systems in the nuclear plant picture. I am enclosing a copy of an article which appeared in the Public Utilities Fortnightly for November 23, 1967. The article was written by Mr. Donald C. Cook and it covers the subject quite well. The portion entitled "The Proper Role of the Small System", on Pages 26 and 27, explains the point which I was trying to make in your office. I hope that this article proves interesting to you and that it answers some of the questions which you asked of me when we visited with you.

Hope that next time I am in Washington I can drop by your office to say hello and renew acquaintances.

Sincerely,

A. P. Perez
President

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Public Utilities FORTNIGHTLY

Co-ordination and the Small Electric Power System

What is a viable size for an electric utility system under present and foreseeable technical and economic operating conditions? This author has given special attention to the problem of the small electric power system in seeking to co-ordinate its operations with other larger systems.

By DONALD C. COOK

IN recent times the term "co-ordination" has been used in connection with the electric power industry more often and with less understanding than almost any other. It has been the subject of numerous talks, hearings, reports, and—most recently—the Federal Power Commission's proposed Electric Power Reliability Act of 1967. The rôle to be played by the small power system in the co-ordination efforts of the industry has been a particular subject of much discussion, much bad thinking, and not a little controversy.

In the introduction to its 1964 National Power Survey Report, the FPC stated that it was aware of what it called the "many controversial areas of public policy" in power—such as the variations in taxes, financing, and earning requirements of different systems; the suggestion that public power programs are needed as "yardsticks" to supplement regulation of investor-owned systems; and the relationships between large and small systems in power supply arrangements and in competitive situations. However, the commission indicated its belief that the report was not the appropriate medium to reconcile conflicting views on such issues of public policy. It described them as root problems in a democracy and, presumably for this reason, not only did not face them then but has not faced them since.

But these issues have an immediate and important effect on co-ordination among power systems not under common ownership and control. Accordingly, they must be faced if co-ordination is to involve utility systems from each of the different segments of the industry and, particularly so, if the systems involved vary greatly in size.

Development of the Electric Industry

MANY of these so-called root problems of public policy have their origins in the dim

past when the industry was in a much earlier state of development. In some instances they go back to the time when the country was served primarily by small isolated utilities. But with the vast growth of power consumption and the development, in most areas, of substantial power systems—even though not of optimum size—the basic reasons for many of these policies are no longer valid. Unfortunately the rules and mores of a society tend to lag behind—often far behind—its social, technological, and economic development and become wholly unjustifiable constraints on its growth and progress.

The small power system of today provides a ready example. In the early days of the industry, individual communities and, in some cases, even parts of communities, were served by small, isolated plants. Most of these plants were gradually replaced by central generating stations supplying small systems. These, in turn, were later interconnected to form larger systems and, in many cases, came under common ownership. The consolidation of some of these systems culminated in our modern holding companies having one or more subsidiaries, the physical properties of which, taken together, constitute integrated systems.

This evolution in system size provided the basis for obtaining economies of scale and for increased reliability of service. In many instances, however, small systems—including hundreds of small municipal systems—continue to exist as an uneconomic and expensive anachronism.

To put the problem of the small system in proper perspective, we need to consider both their number and their impact on the country's power supply. FPC's 1964 report discloses that, at the end of 1962, there were 3,617 power systems in the United States, exclusive of Alaska and Hawaii. Of this total, 1,300 were engaged in generation and transmission, while 2,317 were engaged only in distribution. Of the total, 3,190, or over 88 per cent, had annual energy requirements of less than 100 million kilowatt-hours. This amounts to approximately the annual output of a 20,000-kilowatt generator operating at a 57 per cent load factor. It is about three-quarters of a day's production for the American Electric Power System and about one-half day's production for the Tennessee Valley Authority.

Further, only 20 power systems—of which two are federal systems—had annual energy requirements in excess of 10 billion kilowatt-hours. This represents a generating capacity, on the same load factor, of about 2 million kilowatts.

The significance of this is more readily appreciated when it is realized that many generating units being installed today are in the 600,000- to 800,000-kilowatt class and that TVA and the AEP System, among others, are committed to several units, each having capacities of the order of 1.1 million kilowatts. One of these latter units, base-loaded at an 85 per cent annual use factor, will produce over 8 billion kilowatt-hours per year. The point, of course, is that while small systems account for the vast majority of power supply entities, they produce only a very small portion of our energy requirements.

How does this relate to co-ordination? Co-ordination can be defined as any joint action taken by two or more power systems, each of which is a separate entity, to achieve desirable and useful objectives which they cannot readily obtain independently. Basically, these objectives fall into two general categories, reliability and economy, both of which are primary goals of a dynamic power industry.

Reliability and Co-ordination

Let us first consider reliability, its relation to co-ordination, and the rôle of the small system. There has been much talk in the last two years about reliability—stimulated particularly by the Northeast power interruption and the subsequent interruption to a portion of the PJM System.

It is interesting that while the FPC's 1964 report discussed the economies of scale at great length, the subject of reliability was barely mentioned. Fortunately it is now receiving its rightful attention by FPC. But, unfortunately, the concept of reliability is being used—and, in my view, misused—as a vehicle for an attempt to secure a disproportionate share of economies of scale for all systems however small, and regardless of the equities. I say *misused* and *regardless*

of the equities because the attempt is being made without regard to whether reliability is, in fact, being advanced or hindered, without regard to whether the contributions made by the small systems are commensurate with the benefits they would receive, and without regard to the basic and relevant issues of public policy involved.

Reliability is neither a new problem nor a new need. Neither is it a new objective of the power industry. Those who are familiar with the industry and its operations are aware of the efforts made over the years to meet ever-higher standards of reliability through improvements in equipment, provisions for back-up facilities, and the extension of interconnections. This search for reliability, while having its roots in a high sense of responsibility to the consumer, was also a response to competitive influences. These have included the need for high-quality service to consumers in order to win a larger share of the energy market and to attract and retain, as customers, industries which, because of their use of highly complex technological processes, were increasingly sensitive to any power interruption.

Factors Bearing on Power System Performance

UNDER these circumstances, one might well ask why the present emphasis on co-ordination to assure reliability. There are two basic reasons. One is the impact on reliability of continuing growth of power demands and the response by the industry to meet these demands with ever-larger generating units, concentrations of generating plant, and extra-high-voltage transmission. The other relates to the large number of separate entities making up the power industry in the United States, coupled with their interdependence as a result of interconnection. Incidentally, this multiplicity of entities is unparalleled in any other country in the world today.

These factors, taken together, have had an ever-increasing impact on overall bulk power system performance; and they have created a need for further and continuing development of organizational mechanisms to assure utmost reliability while permitting the realization of economies of large-scale operations by separate and numerous power systems.

Happily, we can start with the fact that the technology and know-how necessary to assure against cascading and resulting widespread interruptions have all long since been available. The challenge lies, therefore, in implementation of the available concepts through responsible and committed endeavor. This is the very essence of co-ordination for reliability.

WE can wholeheartedly subscribe to the principle of regional co-ordination through group action as a mechanism for achieving maximum bulk power system reliability. But anyone who has had any experience with group negotiations of any kind understands, as a basic principle, that there is a geometric progression of obstacles and limitations as the number of participants increases. The power industry is no exception to this principle. Committee sizes grow, the range and scope of their assignments expand, parochial interests intrude, negotiations become interminable, and results are often negligible. I would suggest, as a second basic principle, that commit-

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tees rapidly lose their effectiveness as the objectives of their members become more varied and diverse. These reasons alone require that regional co-ordination areas be kept to a reasonable size, that the number of participants be kept to the essential minimum, and that *the scope and objective of the endeavor be kept clearly focused on the basic issue of bulk system reliability.*

WITH this in mind, the industry's experts making up the FPC's Advisory Committee on Reliability of Electric Bulk Power Supply—a group drawn from all segments of the industry—recommended that regional co-ordination groups include only those systems whose planning and operations have a direct effect on the reliability of the area's overall bulk power supply. With due deference to the chairman and other members of the FPC, I believe that this recommendation has a much more solid foundation in experience and informed judgment than the contrary premise embodied in FPC's proposed bill.

For the purpose of this article, I have defined small systems not having a major effect on reliability as those producing less than one billion kilowatt-hours annually and the larger systems as those producing in excess of that figure. This definition is intentionally overly conservative—witness that the AEP System is currently producing about 55 billion and the TVA system over 80 billion kilowatt-hours annually. Thus the problem of assuring reliability rests not on all of the 3,617 power systems in the country but, rather, on some 136 larger systems—or less than 5 per cent of the total power supply entities in the United States—which produced more than 90 per cent of the total kilowatt-hours in 1962, the year for which such statistics are given in the FPC's power survey.

Responsibility of the Small System for Reliability

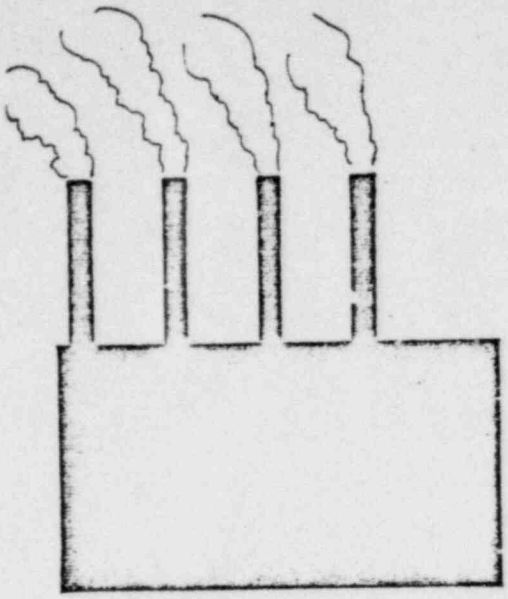
CAN there be any real question as to whether participation in regional co-ordination by these 136 largest systems would not provide a more realistic, more practical, and more workable arrangement than participation by all or any substantial portion of the remaining 3,481 systems? And the approach suggested would make possible highly qualified technical working groups in manageable numbers capable of doing the job at hand with both the skill and speed required by the nature and importance of the matters involved.

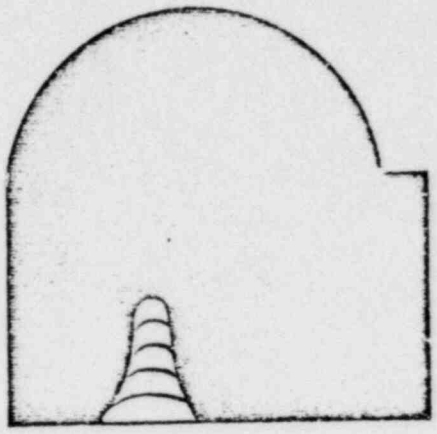
Bulk system reliability and assurance against widespread interruption is not, and cannot be, a responsibility of the small system. The small system has neither the physical facilities nor the technical resources to have any kind of an impact in this area. And to the extent that the small system is dependent upon the service integrity of a large system to which it is connected, *it is really in no different position from any other major customer, group of customers, community, or service area of the large system.* I am not aware of any informed person who believes that the small system, with a demand of a few thousand kilowatts, has a greater interest in, a greater effect on, or greater ability to help solve a problem of reliability, than, say, a single industrial customer with a load of 100,000 kilowatts—of which there are many.

The argument that regional co-ordination activities should include group representation from small systems is similarly without any sound basis in either logic or experience. If the purpose of regional co-ordination is assurance of bulk system reliability, representation should be limited, without regard to institutional status, to those systems which can make a contribution to the achievement of reliability. And this means the systems having or installing the facilities that affect the integrity of the bulk power supply.

Innovation and Progress

I COME now to the second broad objective of power system co-ordination; namely, economy. The record of the power industry in furnishing its product to the consumer at steadily decreasing prices is well-known, although I am not so sure that it is similarly well-known generally. The fact is that the record of the electric utility industry for progressively lowering costs and reducing rates is unique among all segments of our economy. The industry record is all the more outstanding since it has been achieved despite steady increases in all elements making up





its costs, including taxes, labor, fuel, equipment, and capital.

This trend of decreasing price per kilowatt-hour is largely due to the continued technological innovation and progress fostered by the power industry, including, particularly, the use of ever-larger generating units and plants and ever-higher transmission voltages to achieve the economies of scale. The resulting lower costs have permitted lower rates, made possible increased utilization, and provided additional opportunities to build new facilities embodying the most advanced technology and the perpetuation of the cycle of ever-lower costs.

It is important to note here that this innovation and progress have been initiated and pursued primarily by the large power systems at considerable risk and great expense. The resulting long-range economies have not come free. They have all entailed large investments in money, technical skill, and managerial initiative. They have been paid for in varying proportions by the customers and the share owners of the large systems.

ANYONE who has been associated with the development of transmission at extra-high voltages, generation with large conventional units operating at supercritical pressures and high temperatures, and with nuclear units of even larger size, knows that the economies of scale are bought at a price which is never fully reflected in the incremental costs of the newest facility. That price includes, among other things, the existing heavy investment in the transmission that underlies the new high-voltage system and which is necessary to the effective and reliable performance of that system. It also includes the cost of the other existing older facilities and the higher installed generation reserves necessary to meet the unforeseen outage rates of new and untried generation technology. These expenditures have been and will continue to be very large. They are absolutely necessary if long-term economies are to be realized without detracting from overall system reliability.

THE basic stimulus to the large investor-owned power system for lowering the costs of energy to its consumers has largely been the natural result of a free and vigorous economy in which the power industry has played a significant rôle as a major competitor for an increased share of the energy market. The industry's aggressiveness in conceiving and promoting utilization of electricity, including promotion of the all-electric home, in pursuing improvements in design and efficiency, and in achieving capital and operating economies, have all contributed to lower costs, to a continued downward trend in energy

cost, and to uninterrupted growth. The benefits of competition cannot be stressed too much. And I predict that as much competition as there has been, there will be even more of it.

Regulation of the Industry

THE timeworn thesis that government or government-financed agencies provide a "yardstick" for measuring the reasonableness of rates and services of investor-owned systems, has long since been disavowed and discredited by those who are informed and objective. A properly calibrated yardstick with all costs accounted for will show most of the large systems in this country in a very favorable light. And it is simply not in accordance with the facts to suggest, as sometimes it is suggested, that regulatory bodies are incapable of properly regulating the utility industry.

Those of us who have both regulated and been regulated know the vast powers available to regulators and the ease with which they may be exercised. Therefore, we also know this assertion to be a libel of able and hard-working public servants.

In the power industry, as already indicated, size is essential to dynamic growth, technological progress, low costs, and low rates. I have also described the industry's growth from small isolated plants to large integrated systems, and have suggested how this development laid the basis for both economies of scale and advances in reliability.

Nevertheless, taking the industry as a whole we continue to limp along with a multiplicity of small systems interconnected in an effort to achieve some economies but not integrated to achieve reliability. The result necessarily is not the strength that comes from integration but, rather, the weakness that results from interdependence without it.

And this is a situation that need not ever have developed, because the concept of power system integration was incorporated in the Public Utility Holding Company Act of 1935 and was to be achieved through it. The Securities and Exchange Commission, which administers the act, completed the job of breaking up the nonintegrated utility systems under the requirements of § 11. Unfortunately, however, it completely failed to carry out the mandate of § 30. In § 30 Congress directed the commission to make studies of the industry for the purpose of recommending "the type and size of geographically and economically integrated public utility systems, which, having regard for the nature and character of the locality served, can best promote and harmonize the interests of the public, the investor, and the consumer." Further, the act expressly recognizes that the appropriate size of integrated systems is to be determined in light of the current state of the art and contemplates increasingly larger systems as warranted by advancing technology.

HAD these studies and recommendations been made, the industry would have been far along on the road to integration today, and the problem of co-ordination to achieve reliability long since substantially solved.

Is it now too late? I do not think so. I have on other occasions stated the belief that ultimately 12 to 15 fully integrated systems, each under a single management, would eventually be brought into being in this country. This development may be a long time coming—perhaps as long as twenty-five to fifty years—but it could and certainly should occur much sooner. And it will come much sooner if the requirements of § 30 are implemented by some government agency or if the industry is enabled to do the integration job itself.

The systems I envision would each be fully integrated, operated under one management, and *doing the complete job of generation, transmission, and distribution.* This is the road to low costs, high efficiency, and low rates. It is also the road to improved regulation. I know from experience that it is much easier to regulate a small number of large companies than a large number of small ones.

Perpetuating the Small System

I AM neither advocating nor prophesying the abandonment of the pluralistic structure of power supply in the United States. The existence of both federal and state public power systems represents a continuing expression of public

policy. The same is true of the co-operatives, which will no doubt continue to fill in the interstices between the larger integrated systems.

The small municipal system will also continue to exist in substantial numbers. It is one thing to demonstrate that such a system is uneconomic: it is quite another to say that a community cannot conduct an uneconomic operation if it wants to and if the customers are willing to put up with it.

But, while we must fully accept the right of any group of citizens to decide that it wants to continue with its own small power system, I believe—and I believe strongly—that governmental effort and encouragement to perpetuate the continued existence of obsolete and uneconomic small systems by requiring, under the guise of promoting co-ordination, that the larger systems establish some kind of preferred position for the small systems is entirely unsound and unfair. It is an economically unsound allocation of national resources, it is unfair to the larger system's customers and share owners, and it is contrary to the public interest.

These ideas are not new. Indeed, it has long since been recognized that the future holds no place for small, isolated systems generating their own power. But merely because these systems have no future, it does not follow that through forced arrangements made in the name of co-ordination, they should have the right to receive all the economies of size of the larger systems without incurring the larger systems' full costs.

Whenever power pools are developed, whether large or small, it is essential that the benefits and costs be equitably distributed among the participants. And there ought to be a willingness to face the fact that it is simply not possible to pool a system with, say, a 20,000-kilowatt peak with a system having a 2 million-kilowatt peak and maintain any kind of equity. In such instances, to speak of co-ordination is meaningless since all the benefits would inevitably flow one way.

Factors That Need Consideration in Pooling Agreements

THERE must also be recognition that it is the economies of size, including the resulting advantages of pooling, which to a considerable extent have enabled investor-owned systems to hold their own in the face of the below-cost capital, the tax advantages, and the preference status given to the public power systems. To require that a disproportionate share of the economies of size now be gratuitously given to the small public power systems, which can contribute little if anything in return, would further enhance their position at the expense of the larger investor-owned systems.

The result, therefore, instead of maintaining the pluralistic balance in the power industry, would be to alter it significantly to the detriment of the investor-owned segment. This problem is further aggravated by the fact that whereas the investor-owned segment is closely regulated with regard to rates, services, and other matters, the public power systems are, in many important respects, free from regulation.

No full and fair discussion of this subject can omit consideration of the effect of taxes and cost of capital on the economic validity of co-ordination and pooling arrangements between the small government-owned or government-financed system and the large investor-owned system. Federal, state, and local taxes, in general, constitute the largest operating expense of an investor-owned system. On the AEP System last year this amounted to approximately 20 cents out of each dollar of revenue. Municipals and co-operatives pay no federal income taxes, and states and their subdivisions generally impose far higher taxes on investor-owned electric utilities than on other segments of the power industry.

As to the cost of capital, the municipal segments of the industry have the advantages of tax-exempt securities and all-debt financing, while the co-operatives are able to obtain 2 per cent money from the federal government and also finance on an all-debt basis. On the other hand, investor-owned utilities are required, by regulation, to maintain specified levels of equity capital, and their overall cost of capital, determined in the market place, may be three or more times higher.

These facts, because of their direct impact on any evaluation of costs and benefits, are vital considerations in any pooling agreement, particularly where it involves joint or common ownership of facilities.

It is also important to distinguish between the apparent cost of a power supply facility and its end product, the kilowatt-hour, and the real cost to the nation's economy.

This use of public funds at interest rates which do not reflect the market cost of capital and this freedom from taxes for one group of citizens as contrasted with another, necessarily result in a misallocation of our national resources and an inequitable distribution of the tax burden among our citizens. To the extent that the municipal or co-operative system pays no taxes or pays less than its fair share of taxes, or to the extent that it has available to it capital at costs less than those prevailing in the market place, it is particularly inequitable, as a simple matter of fairness, to compel the tax-paying investor-owned system to give up to the municipal or co-operative system a part of the *top increment of benefits* created solely by its efforts.

Such a participation in pooling or co-ordination is particularly unfair to those consumers who not only are paying their own share of the social costs of our society but are also bearing the burden of contributing to the share which should be paid by others.

This is not idle philosophizing. The importance of this concept of taking into consideration full social costs as the basis for the selection and development of power programs has been recognized in many nations, including Sweden, France, and Great Britain. In the case of Great Britain, where power facilities have been entirely nationalized, a gross rate of return (depreciation, interest, and net surplus) of 12.5 per cent* has been established as the rate which adequately reflects the need to regulate the allocation of resources to nationalized industries.

The Proper Rôle of the Small System

What, then, is the proper rôle of the small system in today's power economy?

As earlier stated, I believe the small isolated system with small-scale generation is expensive and wasteful, represents an uneconomic anachronism, and is wasteful of our national resources. I believe, therefore, that governmental efforts to encourage and preserve such systems are unsound and misguided.

The ownership by a small system of a small, even if proportionate, share of a large generating unit or plant on a large system is neither practical nor equitable. This is true not merely because the added complexities created for the larger system more than outweigh the benefits conferred on the smaller but because such ownership will never represent an equitable sharing of overall systems costs. These costs include the embedded costs of older, but still useful, property and the costs accumulated over the years of the expensive pioneering that culminated in the development of the most modern and efficient units available, a share of which would be given

* Ronald S. Edwards (chairman, The Electricity Council) and D. Clark (chief planning engineer, Central Electricity Generating Board), "Planning for Expansion in Electricity Supply," p. 33.

to systems making no contribution to their creation.

And it seems patently unfair and improperly discriminatory to require that such a small system be given all the benefits of the newest and most efficient generating unit while all other customers of the larger system must pay the costs of all existing facilities, including the costs of the less efficient generating units.

THIS has been highlighted in connection with recent efforts by small municipal and co-operative systems to obtain participation in ownership, under regulatory compulsion, in large nuclear plants. It has been contended by some that, because the federal government has spent large amounts in developing the technology of nuclear energy, the larger systems should share the benefits of their use of that technology with these small public power systems. It has also been contended that these benefits can only be shared by compulsory participation in ownership.

It is perhaps pertinent to note that, since these systems as entities paid no taxes, they certainly did not contribute to the cost, and to the extent that their customers paid taxes as citizens rather than as utility customers, so too did the customers of investor-owned systems. But of greater importance, the argument overlooks the fact, first, that all systems have the right to take advantage of the technology which has been developed—indeed, government and government-financed systems are given a *preference* under certain circumstances—and, second, that investor-owned utilities are permitted to earn only a fair return on the capital committed to their enterprises, and any savings resulting from technological progress, however brought about, must be passed on to their customers, including customers which are government-owned and government-financed systems.

Parity of Rights and Obligations

DOES all this mean that the small system can obtain the economies of scale only by becoming a part of a large system? Not at all. There is an obvious, practical, and equitable mechanism available to enable it to share fairly—and without discrimination against other users—in the economies of the larger system, however those economies have been obtained. By purchasing its power requirements from a large system under an agreement monitored by the regulatory agencies, the small system will automatically receive its fair share of all of the economies of scale of the larger systems. And through periodic review the cost of energy to the small system can be made to reflect the continuing technological progress in the power industry.

The electric co-operatives, which were established to do a special job, are obviously here to stay as a permanent part of the power industry of the United States. We have long since recognized and accepted this fact in the AEP System. However, we believe that any fair accommodation between the co-operatives and the investor-owned companies must be based on equality of regulation and parity of rights and obligations.

As to the small municipal systems, many of which, despite their advantage of freedom from taxes and of lower costs of financing, find themselves in increasingly difficult positions, I believe their best solution will be found either in buying power rather than generating it or in joining larger systems, depending on the particular circumstances.

And as for the small investor-owned systems, their future lies in either merging with one another or with larger systems to create the most efficient and economical systems the state of the art permits.

THE suggestion that compulsory co-ordination offers the solution to the ills of the small electric power system is wholly unsound, because the small system has nothing affirmative to bring to the achievement of co-ordination. It is unfair and discriminatory, and it is bad economics and bad engineering.

There are other fair and equitable solutions available. Regulatory bodies would do well to encourage and facilitate them. □