

THE REGIONAL DEVELOPMENT IMPLICATIONS OF SETTLEMENT PLANS: NEW TOWNS VERSUS LONG DISTANCE COMMUTES*

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Settlement Options and Production Costs

Policy makers starting negotiations with a resource extraction company over their respective contributions to regional infrastructure are faced with a variety of problems. This paper considers the problem of settlement planning and examines the differences between implementing a new town plan and a long distance commute option, when both are deemed to be feasible by the company and the government. At the start of negotiations, the company will not know its exact cost schedules and the government planners will know even less about the contemplated venture. At this time, premature decisions may be made that inadvertently set the characteristics of the contemplated settlement options. Non-rational factors, such as the desire to build a town for its own sake, may become involved in the decision-making process in ways that limit the scope of deliberations.

Since hard information is usually unavailable, the government's initial reaction to a resource extraction proposal will be based on assumptions and on lessons from past experience. To help identify the relevant differences between the new town and the long distance commute options the analysis here considers the effect that the two

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settlement options are likely to have on cost schedules. Interviews with accountants specializing in resource ventures lead to the conclusion that companies try to maximize profits, and that their cost functions first show increasing returns to scale and then decreasing returns. Scale economies are due to high start-up costs, minimum thresholds for particular operations, and the possibility of factor specialization. Diseconomies eventually set in as less profitable mine shafts or more distant locations have to be reached, as congestion reduces efficiency, and as administration costs rise. Resource extraction companies appear to have textbook cost schedules, and, if they did not, then the lack of knowledge would favour the acceptance of these assumptions as a starting point for the analysis.

The long distance commute option increases the company's operating costs by requiring expenditures on transportation. Costs are increased by extra payments to employees for time spent in commuting and as compensation for their separation from families. The new town option lowers operating costs but usually requires higher start-up costs. The higher up-front commitments may also affect the company's borrowing ability and interest rates and, thereby, place restrictions on the scale of its operations. The settlement options' differential effects on operating and fixed costs form the basis for the hypothesis suggesting that the two settlement options will have different effects on company behaviour and will, therefore, have different effects on regional development.

The choice of settlement option also affects cost schedules indirectly. A number of studies have related worker productivity to the quality of their towns. While it is not possible to say *a priori* which of the two settlement options is best, specific conditions may indicate that one of the options offers a better living environment, the potential for more diverse social contacts, more choice in locally available goods and services, and the possibility of developing better community services and recreation facilities. One of the two settlement options may have a better chance of reducing the "company town" stigma. One may be more successful than the other in reducing the residents' sense of isolation and in helping them maintain their independence from the company. One may be better in terms of its ability to reduce costs by reducing labour turnover rates and absenteeism and improving worker morale. While the factors determining the relative quality of the settlement options are important, they will not be considered in this paper. The analysis considers only the case in which both options are viable and can be developed to yield settlements of approximately equal quality. The environmental attributes are held constant in order to facilitate the analysis and to reveal the inherent differences between the new town and the long distance commute option that cannot be

overcome by means of program development or design. The attempt is made here to identify the regional development implications due to the effect that settlement options have on the company's cost schedules and risk exposure. Relaxing the environmental quality assumptions leads to fairly obvious adjustments to the conclusions.

Factors Affecting the Viability of the Two Settlement Options

If government subsidies do not skew the decision, the company will rank its settlement options according to their likely effect on profits, risk exposure, and ease of changing output and employment levels. Under certain conditions both settlement options will be feasible, and the company's choice will depend upon the inducements and restrictions created by public policy. The factors determining the viability of the two options are briefly discussed in order to define the environment within which the analytic problem is addressed. The factors concern:

- the expected life of the operation,
- the expected size of the workforce,
- the nature of the existing towns of the region,
- the distance from the extraction site to the existing towns, and
- the nature of the extraction technology and its employment implications.

A short-term operation will not justify a new town for obvious reasons. A small operation will usually not support a new town; start-up costs of town building are high but tend to decline with increased population size. The environmental factors are also relevant and work against the new town option for small operations. The "company town" stigma affects worker morale in small new towns, and the residents' sense of isolation will add to their frustration at having few local services, at being forced to shop in a non-competitive commercial sector, at having virtually no other employment opportunities, at facing long rides to health, medical, and the more sophisticated recreational facilities. Existing towns offer ready-made social networks, the presence of other employers, established and competing commercial and service sectors, and a social and political atmosphere created by the presence of people who are not totally dependent on the will of the main resource company.

The commute option will usually be favoured by the company needing a small workforce. Its compensation to the existing towns for the crowding of their facilities and reliance on their services will be small. The company's need to become involved in its employees' housing is reduced when the existing towns have vacancies and when local

people can be hired. While the size of the contemplated operation is a crucial factor determining the viability of a new town, the threshold that makes the new town feasible depends also on the nature of the existing towns and on their distance from the extraction site: a 100-kilometre commute from Vancouver, Edmonton, or Yellowknife may be much more attractive than a 50-kilometre commute from a small and remote northern town. This relationship is illustrated by the Granisle Copper Company's decision to develop the new town of Granisle, British Columbia, with a 1971 population of 973, rather than initiate a 50-kilometre commute from Houston, the nearest existing town, with 2,232 people.

The character of the existing towns from which the commute would be launched is also an important consideration. If local residents can be hired, then the commute option will save housing costs and reduce labour turnover rates. The ease of integrating new employees into the existing towns is also a factor: cultural differences between the in-migrant workforce and the existing population can make the commute option unworkable. The commute plan will be more attractive when the existing towns serve similar resource extractors. The morale of the new employees and that of the local residents is improved by increases in employment opportunities. The increase in the number of firms may help diversify and stabilize the existing towns' economy and increase their residents' sense of security.

From the company's viewpoint, the difference between the settlement options is due to their effect on profits, risk exposure, and ability to adjust output levels and input factors in response to changing conditions. For the government, the relevant differences between the two options may be due to their effect on employment levels, job opportunities for local people, stability of employment levels, and the risk associated with their regional infrastructure investment. The fact that the company and the government planners are likely to view the settlement plans differently and assign different values to the implications may help them in the negotiations over their relative contributions to infrastructure development.

Regional Development Implications

The discussion can start by assuming that the only relevant difference between the two settlement options is due to the commute increasing the company's operating costs. This assumption will be relaxed later to include differences in fixed costs. The commute option increases operating costs and rotates the total cost schedule counterclockwise as depicted in Figure 1. The two schedules shown in Figure 1 are identical in all other regards. The diagonal line represents total revenues; its

slope is set by the price of the extracted resource. The comparison of the two schedules and their profit maximizing output levels shows that:

1. The profit maximizing output is lower with the commute option, q_2 , than it is with the new town plan, q_1 . More resources will be expended during a given time period with the new town option than with the alternative settlement plan.
2. The range of output levels, which allow the company to recover total costs, is larger with the new town plan than it is with the commute option.
3. The commute option reduces the maximum profit from P_1 to P_2 , and the reduction is larger than the amount spent on the commute. The extra loss is due to the commute costs lowering the profit maximizing output level. The social benefit is, therefore, greater with the new town option, *ceteris paribus*.
4. The magnitude of these consequences increases with the size of the commute costs. They would be smaller should scale economies reduce commute costs.

The fixed costs will, of course, depend on the settlement option selected. The company will usually have to spend more on a new town than it would if its employees could be housed in expanded existing towns. Despite the lower costs, questions regarding the company's contribution toward the expansion of the existing towns will invariably be raised and will require resolution. The attempt to identify the differences in the profit maximizing output and employment levels associated with the two settlement options can help the government planners determine the approximate size of the contribution the company can be expected to make towards the existing communities. The expansion of the type of analysis presented here can help the government planners estimate the reservation prices that the company associates with the settlement options.

The profit maximizing company will be indifferent between the two settlement options if the difference in their start-up cost is equal to the capitalized commute cost. The company may offer a "contribution" to the existing towns based on the cost of building a new town less the capitalized cost that would be incurred should the contemplated new town employees have to be engaged in a commute. Such a calculation will understate the amount the company could contribute to the existing towns while remaining indifferent between the two settlement options. After selecting the commute option, the profit maximizing company would reduce output and hire fewer employees. It would, therefore, be reducing its commute costs, and the effect of

this reduction should be considered when developing the settlement plans and negotiating their financing formulas. Furthermore, the commute option increases the cost of labour, and this, in turn, would induce the company to further reduce employment levels by substituting more capital intense extraction processes where possible. Lastly, the reduced up-front cost lowers the company's liability should the venture fail and thereby reduces the risk premium imbedded in its borrowing costs. The lower price of capital will also induce the company to reduce labour inputs and choose more capital intense extraction processes.

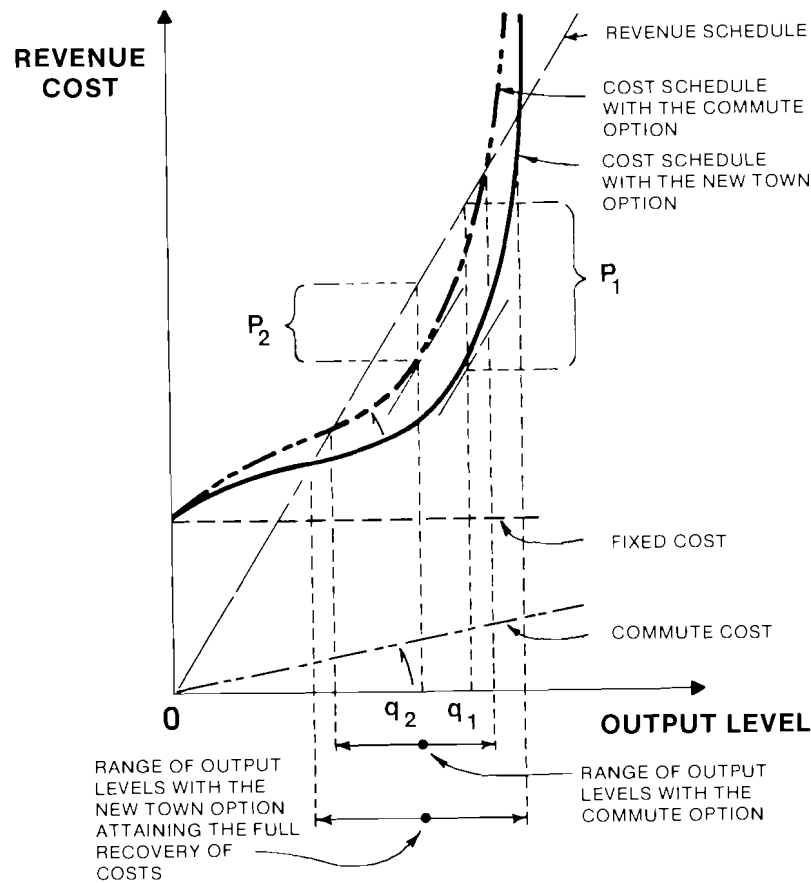


Figure 1

COMPARISON OF COST SCHEDULES FOR THE COMMUTE AND THE NEW TOWN OPTIONS ASSUMING EQUAL FIXED COSTS

Two conclusions follow. *First*, the effect of the settlement plans on production decisions should be considered in the negotiations determining cost sharing formulas; as many production plans as settlement options should be considered in the valuations. The *second* conclusion suggests that the settlement options, by affecting production decisions, do not contribute equally to the growth and stability of the region. The substitution effect of the settlement choice affects the number and the characteristics of the employment opportunities developed for the region. In some cases, the capital intense processes involve exotic technologies and require a more skilled workforce that may lead to the in-migration of stable and permanent employees. In other cases, the more capital intense processes involve open pit operations that tend to attract less skilled, more mobile, single people who may live in conflict with the family-oriented residents of the existing communities. The choice of extraction technology affects the relative desirability of the two settlement options in ways that cannot be determined without considering specific circumstances.

The choice of settlement option will affect the stability of employment in the region and its residents' sense of security. The trade-off between the higher fixed cost associated with the new town option against the higher operating cost of the long distance commute will determine how the company reacts to price changes and other adverse unforeseen consequences. Figure 2 helps to illustrate the differences by showing the effect of a price drop on the company's ability to cover its total costs. The two cost schedules from Figure 1 have been adjusted to yield equal profits should the expected price prevail. The difference in the intersection of the schedules with the origin reflects the amortized value of the difference in start-up costs. The higher operating costs due to the commute are offset by a reduction in the fixed costs associated with this option, and the company should remain indifferent between the two options depicted in Figure 2 while all other conditions remain equal.

A drop in the resource price will rotate the total revenue schedule clockwise and show that the company can sustain a lower price, P_{m_2} , with the commute than it can with the new town option, P_{m_1} . This is due to the commute involving relatively higher operating costs that can be reduced by reducing output. The higher fixed cost associated with the new town plan reduces the company's flexibility in responding to adverse, unforeseen circumstances; a company insuring its employees' houses, for example, may gain little by laying off permanent employees. While the commute option gives the company a greater margin of safety and makes it more resilient, it does so at the expense of employment stability in the region.

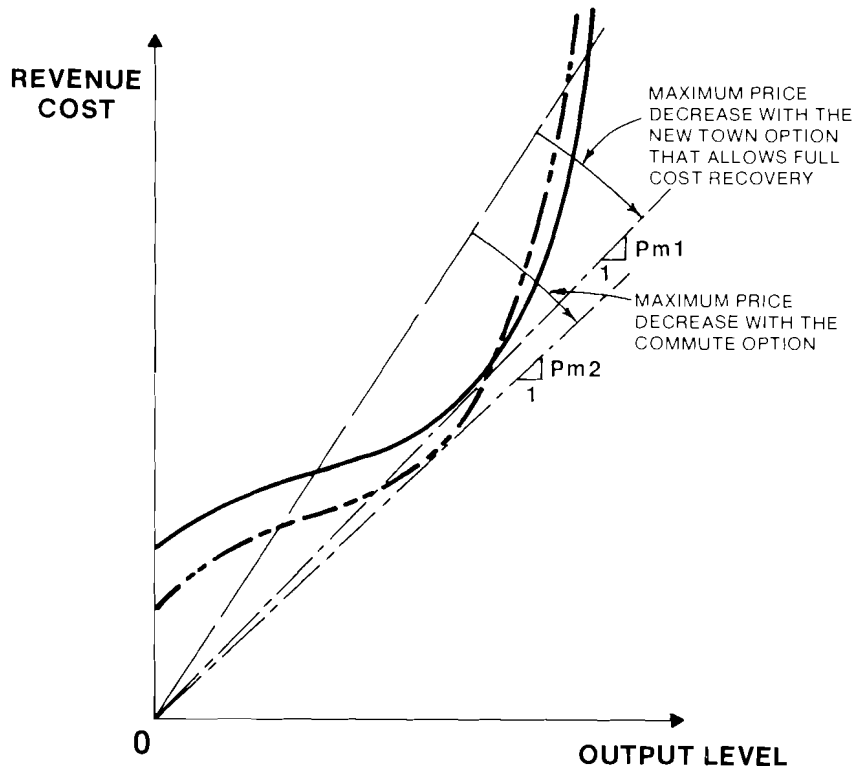


Figure 2
 MAXIMUM PRICE DECREASES THAT ALLOW THE COMPANY TO RECOVER TOTAL COSTS

While the commute option allows the company more flexibility and helps it sustain lower prices, it increases the chance that the venture itself will fail when the company can no longer cover its operating costs. Figure 3 shows that the venture with the new town option can remain viable at prices even lower than those needed to cover the operating costs of the commute option. This means that the venture using the new town option has a better chance of remaining viable in the face of adverse circumstances. This conclusion is of greater importance to the government investing in the region's infrastructure than it is to the company interested primarily in its own survival.

To summarize, settlement and production plans are interrelated and have regional development implications. The new town option leads to higher and more stable employment levels than would an equally profitable long distance commute plan. The commute option gives the resource extractor more leeway in varying its output and lets the company recover costs at lower resource prices. The new town option favours regional development through its effect on employ-

ment growth and stability. The new town can sustain more adverse circumstances than can the operation relying on a long distance commute. The company's and government's risk exposures differ, and the difference is affected by the choice of settlement options.

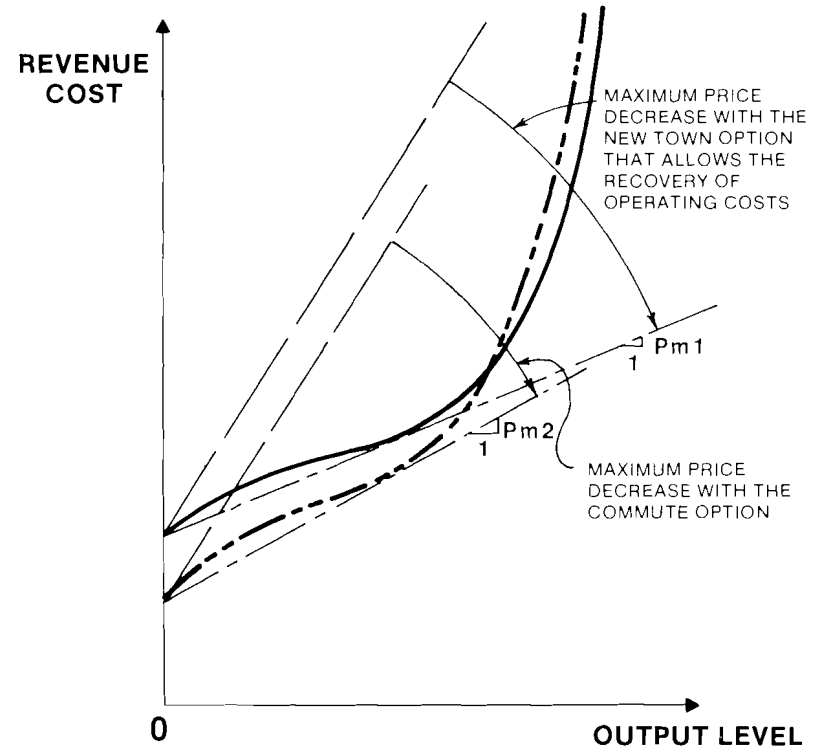


Figure 3
 MAXIMUM PRICE DECREASES THAT ALLOW THE RECOVERY OF OPERATING COSTS

Policy Implications

The choice of a settlement option will affect production decisions and the company's reaction to price changes and other adverse unforeseen consequences. The two options considered in this paper will be valued differently by the government, interested in the region's employment growth and stability, and the company, primarily interested in profit maximization. The government's investment in regional infrastructure commits it to the region and makes it want to help the venture survive even if the initial company has to abandon the project. The differences in the complementary objectives of the two key actors creates the potential for both to gain through their joint involvement in

infrastructures and townsite development. The differences create the basis for the belief that a non-zero-sum game can be developed through negotiations that enlarge the problem's boundaries.

The difference in risk perception coupled with the greater ability of the public sector to pool risk can provide the basis for increasing the government's contributions to the construction of new towns. They provide a basis for the government to favour the new town option over long distance commutes when all other factors are equal. The rationale for a policy favouring the new town settlement option can also be based on the recognition that resource companies face financial constraints and have to pay risk premiums on borrowed funds. These constraints and costs can reduce their ability to adequately develop their new towns at the start of operations. This, in turn, affects the companies' and government's risk exposure by reducing the quality of the towns, their attractiveness to prospective employees, the stability of their start-up workforces, and the prospects for developing their local service sectors. The companies' financial constraints that may lead them to reduce expenditures on the start-up town will have environmental consequences that affect labour turnover and absenteeism rates, worker morale, and productivity. Reduced outlays can increase long-run operating costs. The resource companies' need to reduce up-front costs may make them favour the commute plan even when the option is seen not to maximize long-run profits.

Planning for Risk and Uncertainty

The presence of risk and uncertainty colours most resource ventures. Company and government planners have to deal with uncertainty due to their lack of knowledge in many important areas: prices may change in the future, contracts may have to be renegotiated, other countries may exploit new finds with less expensive labour, advances in technology may reduce the need for the extracted material. Of course, the future can also bring beneficial changes: new demands may be created to raise the price of the extracted resource. In such cases, the uncertainty may have created costs by exposing the company to regret and lost opportunities.

Risk also permeates the planning and development process in less unfathomable ways: the resource may have been incorrectly assessed; the processing plant may, as has happened, be built on the wrong site; labour turnover rates may not be as good or as bad as expected; construction and labour costs may be higher and unions more demanding than expected; governments may be less forthcoming in their cooperation, timing of service delivery, and commitment to the venture should it face opposition. The risk and uncertainty due to inadequate

exploration, planning, and coordination efforts can be easily reduced and their presence poses no conceptual problem. Uncertainty due to unknown future prices will, however, affect settlement decisions. A high level of uncertainty regarding the long-term viability of the venture will make the company and the government seek ways to reduce front-end costs and commit less to the region and the settlement. The presence of uncertainty regarding the future demand for the resource may favour the long distance commute option over the new town plan.

Most large companies assess the general viability of a contemplated resource extraction venture by considering the quality of the resource, the expected extraction costs, and the chance of securing binding contracts that specify price and quantity. Government officials will also consider the general political and economic development value of its regional infrastructure investment. If the early considerations lead to a "go ahead" decision, then work moves into a second phase and planners are called in. After the important "go ahead" decision, planning is usually based on the premise that the venture will succeed. Risk is left behind. This approach compartmentalizes the psychological effects of risk and limits the time the possible effects of risk and uncertainty have to be weighed and kept in the mind of the project planners. The "go ahead" decision frees the planning process, reduces anxiety, and shifts the mood from one of caution to one of optimism and enthusiasm; it frees the entrepreneurial spirit and channels anxiety into excitement. The decision to assume the success of the venture and to ignore the remaining uncertainty encourages decision makers to proceed with bold ventures in the bold manner that best assures success.

Risk and uncertainty are high in resource extraction ventures and are managed in ways that do not always predetermine the choice of settlement plans. The aversion to the increased risk exposure created by the building of a new town will, in some cases, be weighed against the decision makers' personal desire to see a new town built in their company or government's name. In short, risk is an important factor that can be camouflaged early in the planning process. While ignoring the risk may free the technical planners, the presence of risk and uncertainty stays, and the people responsible for funding the venture know that unforeseen future events can turn the expectation of a bonanza into a bankrupt project. As the planners proceed boldly, the financiers hold back and release their funds only with the inducement of a risk premium. The premiums will vary in size and will depend on the variability of the possible outcomes, the nature of the environment, and the amount of funds being committed at the outset. The more the company invests in the start-up venture, the more it exposes

itself to risk and the greater the premium that has to be paid on borrowed funds. If decisions on settlements are left until after the go ahead decisions, then the effect of the risk premiums will be felt; they will have reduced the money available to develop the settlement option and this will lead the company to cut back on expenditures affecting the quality of the town start-up or the long distance commute arrangements. Risk premiums can, therefore, induce behaviour that increases the risk associated with the venture.

The government, considering risk differently, can further its own goals by becoming involved in the planning of the resource venture and by ensuring that services are delivered fully and on time. It can reduce uncertainty by establishing clear policies regarding development approval processes. It can reduce the company's risk exposure by becoming involved in the planning and financing of settlements. The government's involvement in settlement planning and development is a natural extension of its involvement in developing the region's infrastructure. Its involvement in financing the selected settlement option can help reduce the risk associated with its infrastructure investment and can help the region's growth and development prospects.

Future Choices

In many situations, the resource company will see itself as having no choice as to settlement options. The extraction site may be far from existing towns. A large workforce may be needed, and the in-migrants may not integrate well with the existing population. A new town may be the only viable option, and its costs will be considered when deciding to proceed with the extraction venture. In other cases, the commute option will be the only reasonable choice, and the planning phase will focus on the needs of the existing communities and the means by which they can be expanded. When both settlement options are feasible, the government and company planners will evaluate their effects on productivity and on the region's development potential.

The factors affecting the choice of settlement pattern will change with time, with the cost of commuting, with changes in communication technology, and with the ability to reduce the hardship of life at remote sites. As extraction technology becomes more sophisticated and more capital intense, more skilled and highly paid workers will be needed. The commute portion of the labour cost will be reduced and the quality of the site installations improved. The old image of men exposed to the snow-swept tundra may be replaced by gourmet dinners within sophisticated entertainment capsules.

While long-term trends may favour the long distance commute option, cases will still present themselves in which both options are feasible and their relative attractiveness depends on their effect on cost schedules and the government's regional development objectives. In such cases, the evaluation will consider the environmental factors listed earlier. It will consider the effects the settlement options are likely to have on the company's output and employment decisions, on the stability and the growth of local employment opportunities, on employee morale, on their sense of security, and on their ability to cope with the isolation of the remote region. The evaluation will consider the risk exposure of the company and recognize that the risk profile differs for the government. The difference favours the new town option, with its lower operating costs, and provides one of the rationales for more extensive public sector involvement in the planning, developing, and financing of new towns.

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