

Sources, Air Pollution text

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DEPARTMENT OF AGRICULTURAL ECONOMICS

July 26, 1962

Miss Molly Day
2151 Berkeley Way
Berkeley 4, California

Dear Molly:

This will be "stream-of-consciousness" style, in order to get off something quickly. I expect you to send back comments and questions, perhaps indicating phases you want expanded. I will list important points in no particular order.

1. We agree we are not dealing in absolutes. Polluting air is as natural as breathing. Our object is to establish an optimum rate of pollution; to minimize needless pollution; to segregate pollution; to analyze pollution into components which can be conceived, measured, and thence controlled separately.

2. We are not so conceited as to believe that the values of ourselves as individuals, or our general group of society, should control the whole, so we do not seek to impose our values on others. That is, if society prefers air pollution to the costs of controlling same, we let them have pollution. At the same time we recognize that our values should be weighted more than most, because we know more about the subject and the harm pollution can do. Also, we recognize that the organization of society is imperfect, so the failure to combat pollution does not always reflect the will of the majority, and should not be taken as evidence of it.

3. The economist's instinctive way of reducing congestion of any kind is to put a price on the use of the congested facility. If air is the congested facility, one step in reducing congestion optimally is to put a price on the use of air. Thus pollution is not 100% prohibited, which would be absurd; rather, pollution is constrained. Only that pollution is undertaken which is worth the price that society exacts for the use of its limited air. The decision to pollute, or not, remains with the individual. If he can get rid of his waste cheaply, he will. Use of the air will be reserved for those polluters who have no cheap alternatives to polluting the air.

Immediately we hear cries about widows, orphans, and hardship cases, but let's take care of them some other way, rather than giving them special license to ruin the atmosphere.

Society raises the price of pollution until it is reduced to a level such that the social cost of pollution is about equal to the price.

Not absolute prohibition of polluting air; make it expensive - let polluter ^{bear} social cost - not as punishment, but as optimal constraint, and means of compensating society for his gains at expense of others.

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3 (cont.) The use of such a scheme presupposes measurement: measurement of pollutants released from various processes; and measurement of the damage to the human organism; and to the human psyche. The first is the job of the engineers; second of the doctors; third of the economists. Then we have to figure a way to get the lawyers to let us do it. Fortunately, as Mr. Dooley says, the Supreme Court follows the election returns.

4. Let me emphasize that the finer we analyze the question into components, the cheaper we can solve the problem. You remember Lamb's Essay on Roast Pig, in which it is finally discovered that you don't have to burn down a house to roast a pig. For lack of analysis, communities not wanting pollution simply zone out factories altogether. Likewise, our ancestors used to leave half their land fallow each year -- now, we add a few dollars worth of nitrogen and grow continuous corn, and we went through a long intermediate stage of rotating corn with legumes.

Thus with pollution. We don't need to zone out the factory if we can isolate the thing that makes the factory noxious, and just zone that out. Next step, we can admit some pollution, just so it is held within bounds. Next step, we identify individual pollutants and apply different penalties to each, in accord with its individual harmfulness, in the particular environment where it is released.

5. We need a legal manifesto of some sort to the effect that air is common property, part of the public domain if you will, to be administered and guarded by public agencies to maximize the general welfare. That has already been done with water in many states, especially western states, where the state constitutions declare that the waters of the state are the property of the state. In respect to water that is partly a legal fiction, partly not. In respect to air, which does not run in defined courses, there should be no ambiguity in the concept at all.

Once it is legally established that air is common property, that is the legal basis for almost any necessary action to conserve the air.

It is possible to distinguish between air, the gas, and air-space. The law distinguishes water from watercourses with little difficulty. It is possible for the watercourse to be private and the water public simultaneously.

6. Some of our policies would have far-reaching results, even though we recognize that air-conservation is not paramount over many other social values. In Los Angeles, it is clear that private autos are not bearing the full social costs they impose in the form of air pollution. The costs imposed are a function of mileage

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travelled in the area, inter alia. An optimal constraint on air pollution would be some index of poor carburetion multiplied times mileage. The charge would cut down use of private autos a good deal (it would also improve carburetion.) That, in turn, would affect the whole pattern of land use in L.A.

In general, it would concentrate it. That is a point worth stressing, as it is generally assumed that concentration is to be blamed for smog. There are two sides to that, as L.A. shows. Deconcentration increases auto use and aggregate air pollution.

There are compelling arguments of other sorts for reducing urban sprawl -- "slurbing," is I believe the latest Californianism -- so that as air conservationists we have many allies. Furthermore, in this case we can claim truly that the measure taken to alleviate air pollution has other benefits as well.

That is worth considerable thought. It is often assumed that the status quo is rosy, so that any adjustments made to accommodate the needs of air pollution are net social costs. There is, however, plenty wrong in this imperfect world besides air pollution, and there are plenty of instances where we can alleviate pollution without any social cost, or with additional benefits. If that is so, we are well advised to emphasize the fact, and to emphasize those policies that are of this happy nature.

7. At an early stage in air pollution, a solution seems to be dispersion of sources, so that no one is injured very much. We are getting beyond that stage. A solution now lies in concentration and segregation of sources, consigning some areas to heavy smog in order to preserve the rest.

In a perfect land market, something like natural zoning would result, and tend to achieve this end. Land nearby a smog source would be cheap. The best candidate to benefit from this cheapness would be another smog source, who is going to enshroud himself in any event. Of course there is nothing in the market to induce smog-producers to locate downwind from residences, but at least we know that it makes sense to crowd them together.

I don't see how the market could select the zone for this cluster of nuisances, because the market doesn't take into account spillover costs and, as I said, wouldn't constrain nuisances to locate downwind from us. So it makes sense for the community (the larger community, perhaps a smog-control District) to designate a smog zone, with good air drainage to the sea or desert.

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The zoners displace the market mechanism, but they should not throw economics out the window. A smog zone in mid-Mojave, or on the Channel Islands, would impose transportation costs on society greater than the benefits of smog-control. The zoners, if they decide optimally, would get rid of most of our smog, at some cost in increased transportation, but they would try to optimize, balancing gains and losses to maximize net gains.

To that end, they need measurements. Perhaps that is the contribution of our commission, to suggest means of measuring the dollar value of smog melioration.

3. How can we measure the value of cleansing the air? Probably the nearest analogy is flood protection. A service is provided, there is nothing to sell, so how value it? The best method is to note that the benefit is restricted to certain lands, and measure the enhancement of their value. There is a difference, in respect to equity questions, in that flood control improves on Nature, while smog control constrains man from worsening Nature. But as to measurement, enhancement of land values is the best approach. It measures the net benefits -- gross benefits net of the increased costs of taking advantage of them.

This is not a perfect measuring device, simply the best we have. It must be applied judiciously. For example, it cannot be projected in simple fashion. That is, suppose we cleaned up $\frac{1}{4}$ of Los Angeles, wealthy people would shift toward that area and land values would rise a great deal. Say it is by 80%. We cannot conclude that if we continue, and clean up all of L.A., that all values will rise 80%. We will have exhausted those with (a) most money, and (b) most smog-aversion, on the first $\frac{1}{4}$. The second $\frac{1}{4}$ might be enhanced 40%, the 3d $\frac{1}{4}$ 10%, the last quarter none at all.

There are arguments of public health, and charity, that might push us on to clean up the last $\frac{1}{4}$ anyway. But here we must avoid the danger of becoming air fundamentalists. What values are we sacrificing to scrub the last $\frac{1}{4}$ -section spotless? Perhaps good schools; medical care; funds for churches, widows and orphans. Economists sometimes sound heartless, but when you analyze the maudlin arguments, you find they are double-edged and can be used on either side of the case. The economist is as maudlin as anyone else; he simply tries to be quantitative about it.

Another peril in the land value measurement is the land cycle, unfortunately one of the most extreme known to man. Perhaps the

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amplitude is so great because the frequency is so low, so that a whole generation can grow up with no first hand experience of the last one. In any event, land prices involve conjectures of the future, which in turn reflect mob psychology, conventional unwisdom, etc.

So-o-o, we might conclude it a paying proposition to clean up Orange Cty., because land there is so dear that a 30% enhancement (which we expect) will repay the cost of smog control. But then, after we invest in smog control, the bottom drops out of the land market and our 30% enhancement, referred to a base that has dropped by 50%, is equivalent to a 15% enhancement on the base we figured on. Until we get the land cycle mess cleared up, this problem plagues all measurements based on land values.

Another angle here is that our tax laws -- local and federal both -- make it profitable to individuals to hold land out of use for many years. Enhancement of values, during the period of rise, increases the profitability of such speculation (due to the capital-gains loophole), so successful smog control can generally be expected to worsen the problem of land speculation. And it hardly makes sense to count as a benefit the increased value of land that is not used. Some adjustment would have to be made for that.

If we paid for smog control by levying an ad valorem tax on the benefitted lands, we would not have that problem. But we don't, so we do. I suppose the best adjustment here is to count just the value of used land at 100%, and some lesser fraction of the unused, depending on when we anticipate it will be used, and how intensively.

9. There are vested interests in air pollution. We might as well get to know our enemy, and how he is going to fight us. Producers of soft coal, for example. One approach to fighting pollution would be a heavy tax to discourage soft-coal production, for example. Rather a shotgun technique, for in some areas use of soft coal probably poses no problems, but, to mix metaphors in midstream, if we do decide the best way to roast this pig is to burn the house, the house-owners will complain.

10. At least half the problem is that most people place a low value on clean air. Clean air is a luxury, compared with other more urgent needs, to the impoverished. Solutions: (a) general increase of incomes and living standards; (b), change of values, substituting preference for clean air to preference for beer -- here we may legitimately assume the role of propagandists and evangelists (or educators), uplifting and informing (and reforming?)

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the scale of preferences of our fellow men. We may even get to the point where we feel that our grasp of the problem, and of life in general, is so far above theirs that we can and should (c) compel them to clean the air. There are dangers in that line, but perhaps it is realistic to recognize that 60% or so are politically inert, so that the opinions of 40% or less dominate the 60% anyway. That being how democracy works, we can work within that framework of minority control without feeling that we are undermining the foundations of our way of life.

Furthermore, we can substitute one minority for another. Indeed, our implicit objective is to displace some of the ward heelers and tribal ritualists by men more imbued with the spirit and know-how of modern science. Considering the limitations of mass men, and the alternatives we see today, I do not object; but let us remember that "scientists," too, can be medicine men, and not take ourselves too seriously, nor yet tolerate the luxury of intellectual arrogance.

Returning to solution (b), our commission's function is less one of evangelism or exhortation than of making-aware. We can legitimately claim that our economic system is biased in the direction of saleable commodities. They are the ones that get advertised. We are made aware of how much more pleasant life would be with Sugar-smacks and Copper-tone; but not with clean air. On this basis, an advertising campaign (we would call it "education," of course) financed by the government could be justified. Not evangelistic. Just making-aware, creating a desire by apprising of a possibility.

Let's not overstate that point, either. The Army Engineers have sold us more flood control, which is non-saleable, than is economically justifiable, via the logrolling process, and careful cultivation of client groups. So the proper generalization is not, with Galbraith, that public functions are neglected for private ones. The valid generalization is more on the lines that newer functions are neglected for older ones, with entrenched interest groups behind them; and that prosaic needs are neglected for glamorous ones, with greater publicity value. If we can decide, objectively, that smog control has been relatively neglected, because a newer and less glamorous problem, then we could in good conscience recommend a publicity campaign for it.

Now there is good reason to think that air pollution is less glamorous, for the reason that it, like water pollution, has to do with waste-disposal. Waste disposal generally is the most

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despised of human functions, both individual and social. Who collects garbage, cleans latrines, etc., but the pariahs of society. "Scavengers" -- ugh, there's something unclean about the word. Junk men, trash collectors -- they just don't rate. Even when dressed up as "sanitary engineers," they are the butt of considerable scorn; not, to be sure, from thoughtful people, but from the other ___% of humanity.

There is unpleasantness involved, too, in imposing restraints on people. Man loves to appropriate natural resources, he needs no encouragement to do that, and he is likely to get lots of praise from his fellow men for it, as well. But to clean them up after use, instead of just dumping them back into the common pool, that requires regulation, control, inspection, snooping, prying, judging, penalizing -- all negative values, in our ethos.

So pollution ^{abatement} is very likely neglected relative to the glamour functions, and deserves a big boost, from conscious public effort.

✓ 11. Returning to the estimate of benefits from air-cleansing, I note that C.U. estimates costs of pollution in terms of illnesses it aggravates. Such objective-type studies are useful; but they do not give a true picture of pollution costs in dollars, i.e. in the same coin we use to measure abatement costs. For several reasons. (a), without pollution, more people could move into the area, and more capital be invested; (b), the diseases stressed by the researchers probably are not at all the factors emphasized by the people of the area, some of whom are much more affected by the odor, dirty laundry, or low social prestige than they are by the threat of cancer. Objective studies are useful, still, for they make people more aware of the cancer threat, and thus change their values, presumably for the better. But let's not overlook their true scale of preferences, as indicated by their actual behavior.

To the extent that the costs of hospitalization and treatment are borne by society, rather than the afflicted individual, society can legitimately put a high value on minimizing sickness, regardless of individual preferences. This is a move toward paternalism, but perhaps it wouldn't hurt us to move a little further that way, at least in respect to public health.

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12. Who should pay for pollution abatement? Proximately, obviously the pollutor. He is not rendering us a service, merely abstaining from injuring us, when he ceases polluting.

However, just as some taxes are shifted, so will this cost be. If the pollutor is a factory much desired by the community, supporting other values in the community by payrolls, nothing hinders the community from absorbing this cost for the factory. Many communities absorb many costs for many factories.

Some factories will shut down permanently -- those that were marginal anyway. There is no net damage, for there was little value there to destroy anyway. Maudlin shrieks will ascend to the Hill and reverberate thru the halls of Congress, but if we choose to subsidize these plants, let's get it out in the open, do it directly with money and not by letting them louse up the atmosphere.

Some industries will shrink. That is to be expected, and is as it should be. Heavy pollutors have in effect been subsidized. Resources will simply shift from these uses to cleaner ones, which will expand. If this is not to the general net benefit, then we'd better not fight pollution at all, we're on the wrong track.

13. There is a general presumption that "natural" conditions, the status quo ante hominem, are to be taken as a base of reference. In voting on the formation of irrigation districts, school districts, mosquito abatement districts, and the like, the law often requires a 2/3 majority -- likewise with bond issues. The thought is partly that the majority should not impose a change on the minority -- unless it is a 2/3 majority!

✓ This requirement is a thorn in the flesh of all who strive for local betterment, but with air conservation, perhaps we can put the thorn on the other foot. Let us, that is, let a 1/3 "majority" be sufficient to form an air conservation district, on the grounds that air pollution is "unnatural," it is something that the majority should not be allowed to impose on the minority (unless it is a 2/3 majority!) A novel idea, perhaps, but don't underestimate the weight which the law places on "natural" conditions. Worth a tumble.

Fact is, a minority of one can block some things in court. Sometimes he just has a damage claim; sometimes an absolute veto, in many instances that make less sense than vetoing air pollution. The courts love nothing better than to veto things. Just give them a statute that permits it and they'll gavel down all manner of projects.

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The California Water Code, for example, states that no point of diversion shall be changed if anyone is injured -- and it means it. Any injured party can enjoin any movement of a diversion point. I think it is a poor provision in the water code, but it illustrates to what lengths the law will go in protecting minorities against majorities.

14. In Washington, the group did not rise to my suggestion that allergens be included in our field, but I intend to try again. Perhaps one needs to live in the Midwest to appreciate the importance of the problem. Hay fever and asthma can be quite disabling. Contrary to our usual picture of air pollution, this problem gets worse as you move into the country. Doctors advise sufferers to avoid trips out of the city!

The problem has received enough social recognition so that weed control laws are quite common.

15. By this time you are wondering "Where is that cost-benefit approach". Let me state that "cost-benefit analysis" is just a nice label for economics applied to evaluating any course of action. If there is anything distinctive about the mystery, it is that those practitioners of the ghostly art who have chosen this label tend to include those who include more benefits in their purview than the directly salable output of a project. There is a narrower concept of economics, beloved of conservative engineers, known as "financial feasibility," which puts exclusive emphasis on salable output of a project.

My emphasis on enhancement of land values as a measure of benefits puts us clearly in the "benefit-cost" camp. But some of our campmates do all kinds of wierd antics, so let's not put on their uniform, even if we do have to share their campsite.

16. Returning to the water analogy, we are going to encounter many similar problems. When we discourage use of air for garbage disposal, our first inclination will be to require a license for it. Then we will accede to the pressure to acknowledge a vested interest in those who have been polluting air. THAT IS A FATAL MISTAKE. That is the basic problem in water law -- the doctrine of prescriptive right has been applied. Those who began wasting water decades ago establish a right to continue doing so.

This is not inevitable. It doesn't have to work out that way. We stumbled into it because there was no organized spokesman for the public interest. If the AAAS had organized a Water Conservation Commission long ago (and why shouldn't it do so now?) it might have spearheaded legislation to protect the public interest. The sad fact of politics is that Norman Cousins' question, Who Speaks for Man?, must be answered "No one." AAAS as a political

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force might change that. Perhaps it is presumptuous to speak for man, but no more so than to use Man's legislatures to plead ex parte this or that special interest, and a lot more constructive.

17. In my letter of June 5 I mentioned "air-pollution easements" as a useful tool. Easements for various purposes have been widely discussed in recent years. Recreation easements along scenic streams, for example, might be publicly bought, rather than buy the fee and retire land from private use. The easement would simply prohibit unsightly uses that conflict with recreation.

Landownership is a "bundle of rights." Sometimes the rights are controlled separately. Mineral rights, e.g., are often reserved by sellers. Medieval society was a complex of such rights: to glean, common pasture, grazing stubble, etc. There is a danger of rigidity in such arrangements. We will have to sit hard on the lawyers to preclude it. But if we begin by looking at history and alerting ourselves to dangers, we can indeed forestall them.

So we could by legislation permit landowners to sell smog easements, permitting their neighbors to soil their air, for a price.

This would also get into a question of eminent domain. Otherwise a polluter could never assemble enough easements, some holdout would always hold him up. So the easement is no substitute for conscious public planning of land uses, just an adjunct.

18. How much should we charge for pollution? It depends on where it is done. I have mentioned upwind and downwind locations. Another angle is density of population. Given a symmetrical wind rose, charges should fall moving outwards from the population center. What, you say, encourage factories in the suburbs? Unfortunately, my recommendation must be premised on economic rationality having been applied to land planning generally, an unrealistic assumption. As a land economist I'll keep on fighting for the whole package, but I won't try to sell it to the A.C.C. We could realistically expect, even so, that the smog zones we recommend would not be located very centrally, as de facto smog zones are today.

19. Part of our problem is the migratory and expansive bias of our institutions. Americans do not stay put and solve problems; we run away from them. That is the frontier tradition. We dirty up a city, then leave it for the peasants and immigrants

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and move on.

Air conservation, like conservation in general, will never get far in this context. So, while I can't sell the whole package, I can fairly emphasize that the decentralist bias in our utility rates, transportation rates, tax structures, etc. etc., is a root cause of society's failure to combat air pollution, and should be combatted. The old notions of ruining one environment and moving on must be recognized as obsolete.

The current movement toward urban renewal is obviously therefore closely allied with air conservation.

20. Technical enforcement problems. I think it is safe to say society has shown its willingness to overcome them. If it had turned out that a handful of oil refineries were responsible for smog, we might have heard a great deal about the enforcement problem. But now that it seems 3 million motorists are at fault, society plunges ahead without trepidation to constrain them. Likewise we do not hesitate to enforce anti-litterbugging laws against millions of motorists; but a handful of billboard advertisers are permitted to desecrate the roadsides far more effectively than any litterbugger, or masses thereof.

The moral? Enforcement problems are a red herring. Willingness to enforce is the key. And there is some suggestion that it is not the willingness of the multitudes, but of a small number of those who know how to manipulate the apparatus of power, that counts. I hope I am wrong.

21. Looking back to #8, one of many points glossed over there is that land values only reflect privately collected economic rents. There are also taxes to consider. That is, by improving an area we not only increase private values, but public: tax collections increase. That increase should be included in benefits.

22. On the strategy of accepting the "benefit-cost analysis" label. Like so many seemingly objective labels, this one has connotations which to many are more important than the denotation. To many, "benefit-cost analysis" means juggling with figures to overstate the benefits of public works, or to rationalize subsidizing irrigation benefits from power revenues, etc. We might on balance be better off to dodge the label.

23. There are simply enormous net social advantages in the close congregation of people, wares, and activities in central places. These are reflected in extremely high downtown land values. If we

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measure the damage of air pollution by the damage to land values, we automatically ban polluters from downtown, and relegate them to areas where the land they devalue wasn't worth much anyway. Let me emphasize that land value is a measure of human values -- not something to be contrasted with them. Downtown land is valuable because it helps people accomplish what they want.

24. In evaluating man's planetary activities, let's give the devil his due. He dumps more CO_2 in the air, but he also is an agriculturalist, and makes two blades of grass grow where one grew before. He cuts down stagnant virgin forests and replaces them with crops which probably photosynthesize more, and release more oxygen per acre, than Nature did. So man may simply speed up natural cycles, and get more use out of our limited oxygen supply, than Nature did. Isn't it possible that when he increases the carbon in the air, he makes it easier for plants to take it out? It is even conceivable that the increased crops we must grow to feed an increasing population absolutely require that we "pollute" the air more with CO_2 .

I don't know -- but can anyone prove the idea is wrong? Perhaps we need a little research along these lines. Perhaps there is a natural balance between the amount of human life, and the amount of vegetable life required to support it, that tends to guarantee an atmospheric balance as well.

25. Noise. That is a disturbance of the air, and should be part of our topic. Many municipalities have noise-control ordinances. The problems are generally quite similar to chemical pollution. Acoustics is a big business. Let's get with it!

26.

26. Exploitation. Let's not be used. Who would want to use us? Tobacco companies, for one, seeking alternative scapegoats for increasing lung cancer. Let us then be gentle as doves, but wise as serpents.

27. Must we wait for a smog cure before applying control measures? Latest word I hear is that hoped-for after-burners, etc., have not worked out. The beauty of using the price system, as outlined earlier, exacting payments from air polluters, is that it begins the curative process immediately, before the great breakthrough produces a gadget to solve the problem. And insofar as it does not cure smog, it at least gives us comfort in the thought that those who produce it are compensating the rest of us by paying heavy prices for abusing our air supply.

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Enough! But let us regard this as a dialogue. Challenge me, question me, modify me, amend me, support me, attack me ... and after a few exchanges we should have some basic issues pretty well spelled out.

Sincerely,

Mason Gaffney

January 8, 1963

TO: Members, Air Conservation Commission

FROM: Mason Gaffney

SUBJECT: Economic aspects, and proposed agenda for Berkeley meeting

At the close of our Washington meetings, the subject turned to economics and policy, and I was instructed by the Chairman and the Commission to bring together a panel of economists and other social scientists to expose the Commission to a wider spectrum of analytical techniques and policy positions than heretofore represented.

Preliminary to that assignment, I am submitting herewith a set of propositions on Air Conservation which, as I followed our deliberations, seem to represent the sense of the meeting. There is a bias in selection of those topics that seemed most important to me, and perhaps also some wishful thinking in taking silence for consent. Corrections and amendments will be welcomed. Subject to such revision, I would hope we could take these propositions as background, and move on toward, if not to, operational conclusions at our next meetings.

Then, there is a second set of propositions, carefully segregated from the first, which represent additional suggestions of my own.

I would propose to distribute this memorandum, together with responses evoked from Commissioners, to our next set of panelists, to help them know about where we have arrived, and whither drift.

PROPOSITIONS ON AIR CONSERVATION.

A. Points of substantial consensus

1. The "linear" approach is generally preferable to the "threshold" approach. The linear approach recognizes the existence of a continuum of possibilities, e.g., of increasing intensity of pollution, as well as differences in degree of human impairment resulting. It makes sense for remedial action to increase roughly commensurately with the problem needing remedy, rather than in a discontinuous lump after some threshold is reached.

(Note. In the terminology of economics, the "linear" approach is usually called "marginalism," and is most familiar in the principles of diminishing returns, and supply-and-demand. The "threshold" approach pops up in many forms. "Anti-marginalism," or "Lesterism," is perhaps the strongest, but "institutionalism" is generally non-marginalistic. Even among marginalists there is wide recognition of indivisibilities, inelasticities, and the need for all-or-nothing black and white decisions in some

circumstances. "Institutionalists" do not necessarily insist on all-or-nothing decisions, but emphasize the inadequacy of the market mechanism to comprehend all the important values in a situation, and the need to amend it not just with regulation, but with regulation unfettered by too many quantitative and automatic rules, with scope for human warmth and discretion, and considerable deference to tradition and legal precedent. Generally, the policy implications of marginalism tend to lead toward the market mechanism, with quantification by price, and incentives created by price or by incentive taxes with gradualistic properties. Anti-marginalism leads more towards regulations of an all-or-nothing nature, and/or vesting regulatory commissions with discretion.)

2. There is a large number of possible preventive and corrective measures for air pollution, and wide ranges of possible intensities of application of each. There is a number of different kinds of benefits from pollution control. We disavow any fundamentalistic obsession with one limited concept of damages, or controls, but prefer to explore the entire console of options, and their permutations, to reach an optimum optimorum. That entails marrying technological information with techniques of economic analysis, within such institutional constraints as we regard as so much more important than air conservation that we do not wish to treat them as variables in our analysis.

Economic techniques involve essentially striking an optimal balance among different control measures; between control measures generally and biological acceptance of or adaptation to pollution generally; and among different kinds of biological acceptance or adaptation. Among Commission members there appears to be a majority preference for source control over biological adaptation (including ambient air control), but both viewpoints have supporters, and it will be a question of finding a compromise formula with some degree of concession to all viewpoints. In finding a compromise, Commissioners are cognizant of the need to suppress their subjective and professional preferences and find a point to balance the preferences of all citizens.

3. Commissioners are prepared to contemplate strong and radical public action, if need be, but prefer that it achieve its ends with a minimum of arbitrary public control and a maximum of individual discretion in complying with the spirit of air pollution control.

4. Some policy proposals that have not yet been laughed out of court are the following:

a. Taxation

(i) Some variety of air-pollution tax, on the theory of reducing the use of a congested facility (air) by

putting a price on its use. Such a tax would be based on some measure of pollutants discharged at the source. The tax would be weighted according to location of the source (a concession to the "ambient-air-standard" school); the hurtfulness of specific pollutants; timing of releases in relation to peak-loads of air congestion, wind-direction, etc.; the rate of reactivity of pollutants when airborne; etc.

(ii) Indirect air-use taxation, e.g., on gasoline, soft-coal, fuel oil, or tobacco.

b. Locational controls and constraints

(i) Segregation of polluters, by zoning, layout of transportation, etc. It is recognized that such action would affect the distribution of land values and incomes among different individuals and regions, and that some redistributive mechanism, to compensate the losers from the gains of the winners, would be a necessary concomitant. The redistributive mechanism would almost certainly be a tax mechanism, but just what tax mechanism remains moot.

(ii) Controlling or influencing over-all population density. This includes provision of air corridors, tending to reduce density, but other measures favored by some Commissioners presuppose increased density. Those measures are increased use of public transportation (other than Diesel buses, which Heaven forbid!); larger scale and smaller number of combustion plants and activities, permitted by shorter distribution lines; and, conceivably, control of ambient air itself over limited areas where density warrants it. Generally, the basic conflict of these two viewpoints has not yet been made explicit, and will need to be resolved.

(Note: perhaps the resolution lies in judicious distribution and sizing of air corridors so as to permit increased density of population in the lands served and made livable by the corridors. The air corridor or greenbelt or open space philosophy only becomes incompatible with the compact settlement philosophy when either is permitted to become fundamentalistic.)

c. Promotion of mass and discouragement of individualistic transportation. (Note: one school of economists, the marginal-cost pricing species of the genus welfare-economist, has long advocated taxes on increasing cost activities, like individualized transportation, to subsidize decreasing cost activities like mass transportation.) Again, let not mass transportation be equated with the Diesel bus.

d. Promoting the substitution of electric for other forms of power, on the model of Portland, Oregon, with combustion activity if any taking place remote from population centers. If we do not wish to subsidize electric power, we might still cease using power distribution as a tax-collecting mechanism, as is done in some areas. Recent developments in high-voltage transmission seem to make this alternative even more worth consideration than it probably already was anyway.

7. The primary economic cost of air pollution is direct damage to the human organism and spirit. Other damages, e.g., to vegetation, paint, or laundry, are of interest as crude monitoring devices, and perhaps as triggers for political organization and action in the absence of a coherent public health lobby.

(Note: There is a narrower concept of "economics" which would limit its concern to the vegetation, paint, and laundry. But economic evaluation of tangible commodities depends ultimately, after all, on how they affect human feelings. So conditions that affect human feelings and well-being directly, without going through the form of commodities, or the market, have an economic content, just as do commodities. For operational decision-making purposes, it is necessary to sacrifice so many commodities to gain given enhancements of air quality, and so the improvement may be measured in terms of commodities, or the dollar. That does not mean that the latter are more "economic," but only that they have qualities that make them more convenient units of measurement. The concept of economics as more "materialistic" than other disciplines is 180° out of phase. Economics measures matter only by its impact on human emotion.)

8. We have made little or no progress in quantifying, in dollar terms, for decision-making purposes, the dollar value of the direct human damage of air pollution. That should receive high priority in future research.

We can distinguish two kinds of human damage: (a) that of which people are generally aware, which can be measured (crudely) by observation of human behavior in the market (premiums demanded or given for smog-free locations, wage-premiums required to work in polluted air; voluntary individual expenditures on indoor air-filters, precipitators, etc.); (b) that of which laymen are less fully aware than public health specialists -- subtle, long-term damage to vigor or longevity. With respect to (b), paternalistic action is warranted beyond what market indicators would justify. Probably the least offensive form of paternalism is education, which looks forward to raising the electorate to a level of awareness at which its decisions can command more respect. But there is a public interest in the health of individuals, the counterpart of our public welfare system and military service requirements, which warrants a measure of public imposition of good health on unwilling individuals, educated or not.

B. The following are points on which I am not aware of any consensus, but which I would personally like to emphasize.

1. The anxieties voiced by industrialists, that regulation may be unreasonable and unfair, are not entirely without foundation, as evidenced by the single-minded dedication to the cause manifested by some crusading natural scientists. It is important that we purge ourselves of any such tendencies, and the appearance of them.

When we have learned to communicate with industry people in terms they find familiar, they will have more confidence in our reasonableness and appear less skittish.

At the same time, the fact that regulation is reasonable does not mean that it will not hurt anyone. It is hard to conceal the deep irreconcilability between the aims of air conservation and those of the petroleum and automobile industries. But let us not alienate anymore people than we have to, nor create side-issues which the enemy can use to shield himself behind the interests of others.

2. For intra-state action, and where an airshed is definable, the San Francisco Bay Area Air Pollution Control District, with all its faults, constitutes a good model to emulate.

3. As to Federal action, the possibility of avoiding it hinges partly on the definability of "airsheds." If airsheds are definable, then airshed authorities or compacts or districts are conceivable. Even in such event, experience with watersheds holds forth little hope for effective interstate action below the Federal level. But where airsheds are indefinable, which I take to be the more common situation, air pollution control seems properly a Federal matter, along with aviation, broadcasting, and weather forecasting. It is fortunate that we have some states large enough to contain intramural airsheds, to preclude Federal monopoly in the field, for progress is served by having a number of independent experimental laboratories. Federal control need not be so imperinistic as to stifle state control, where that is feasible. But neither should we stifle Federal action in the name of a sacred cow called local government, where this is clearly inappropriate to the task at hand.

4. Research on air pollution has been biased in the negative, viz. what harm can we pin on pollution? The answer is "plenty," I am sure, but objectivity demands that we seek all effects, the good along with the bad. A few thoughts have been voiced along that line, but I have the feeling they are interpreted as heckling and not pursued seriously. We may run the risk of emulating the statistician who proved the reality of e.s.p. by rejecting all negative results as obviously representing underprivileged persons who lacked clairvoyance.

5. As we move from the laboratory into the field of political action, pursuant to our charge to bring science to bear on public policy, we find it less and less possible to abstract single issues and problems from others. Political action involves the simultaneous solution of many equations. Anyone who speaks of confining our attention to a single subject, and eschewing "ideological" issues, is kidding himself, or his listeners, or both, being often himself in the grip of an ideology so powerful he doesn't recognize it as anything but fact. Human culture is

interdependent. The baroque, romantic, Impressionistic and other broad cultural movements manifest themselves contemporaneously in music, painting, literature, politics, and landscaping. Water pollution control sets precedents that will affect air pollution control, which in turn will set precedents that may influence thinking on administration of grazing permits on the public domain, oil import quotas, and so on. Putting it generally, intellectual movements transcend technological divisions -- a tribute to the dominance of mind over matter, and a refutation of technological determinism. And so we are not going to be able to bring science to bear on one tiny segment of public policy in a sterile laboratory, without reference to other aspects of public policy. Nor should we. Bringing science to bear on public policy intelligently is going to entail not just knowing a good deal about science generally, but about public policy generally; policy recommendations must be based not just on technological facts, but on analogous human experience.

6. It was with considerable pain that I observed the group react favorably to a proposal to recognize rights of prior appropriation in air pollution. I would repeat my warnings against use of the concept. There is something fatally specious about prior appropriation which has led to its acceptance in many fields. Among other faults, it tends to defeat regulation by creating an incentive to do the thing which is to be limited, to build up a history of growing cotton, wasting water, importing oil, polluting air, or whatever it is that is to be prorated by historical activity. In industry, it makes a wonderful club for the entrenched oligopolist to fend off new competitors.

If we must condone prior appropriation, I urge that the license to pollute air be limited strictly to the life of the polluting facility -- the economic life, much shorter than the physical life -- and certainly not be made appurtenant to the site in perpetuity.

7. I would like to subscribe to the excellent written statement submitted to us by Harold W. Kennedy.

8. If we ever succeed in quantifying costs and benefits in air pollution, the question will arise, what to do with them? There is a school recommending maximization of benefits minus costs; and another that would maximize benefits/costs. Within any given area, the first criterion is certainly correct, and the second, which would lead us to a lower level of pollution control, is a red herring.

9. In addition to methods previously suggested for using market behavior as a means of measuring the value of pollution-abatement, I would suggest study of the private demand for indoor

humidifiers, air filters, precipitators, et hoc genus omne. The value of public water supply can be judged quite accurately by observing how much individuals will pay for private wells and pumping power before public water arrives; the analogy with public air-clearing is quite close.

10. I am taking the liberty of circulating a study of mine, "Diseconomies Inherent in Western water law," which develops several alternative methods of estimating the value of water. It gives an idea of the variety of different methods an economist would use to evaluate an artificial improvement of the environment. See pp. 5-16.

The study also brings out several weaknesses of the doctrine of prior appropriation, whose prospective use in air conservatism I have deplored. See pp. 31-32, 38-43.

C. The following is a list of social science sub-specialities from which I will seek to draw speakers.

1. Location theory, regional science and planning, geography.
2. Institutional economies; legal-economic relations; political science.
3. Administration of public resources: waters, lands, minerals, airwaves, etc.
4. Welfare economics; benefit-cost analysis; marginal-cost pricing.
5. Public health economics.

Propositions on air pollution. Framework for discussion

A. Points of substantial consensus?

1. 'Linear' approach, ^{to} superior to 'threshold' approach. { In terminology of ec., "linear" approach is "marginalism"; ^{most familiar in princ. of diminishing returns, & s.d.} "threshold" or discrete integer approach pops up under many names: anti-marginalism, Leterism, Institutionalism, indivisibility, ^{inelasticity}, and ^{the discrete approach}. Marginalism tends to ^{generally leads to pricing} the price mechanism; ^{the other approaches to regulations of an either-or nature.} ^{large number} There is a wide range of possible prevention & corrective measures, and a wide range of ^{possible} intensity of application of each. We should explore the whole console of options, and their permutations, to reach an optimum optimum. That entails combining technological info. w. techniques of ec. anal.
2. within the framework of ~~our~~ constraints of those instns we cannot or do not want to alter. Ec. techniques involve, essentially, finding the optimal balance points between extension of the different control measures; and (bun)
3. Some promising possible policies worth further consideration

next page.

a. Taxation

1. Some variety of air-^{pollution} tax, based on some measure of pollutants ~~emitted~~ ^{discharged at the source.} The tax shd. be weighted according to location ^{of the source (a concession to the ambient air standard school);} and of course the hurtfulness of specific pollutants; ^{their rate of reacting; the timing of releases; slow reacting pollutants, that are widely dispersed before hurting us.}
2. Indirect air-use taxes, e.g. on gasoline, soft coal, or fuel oil.

3. ~~Land~~ Taxes.

b. Locational controls and constraints

1. Segregation of polluters by ~~first~~ zoning, ^{differentiated} ^{xpty, largest, etc.} ^{transmission changes} ^{this calls for some redistribution mechanism to compensate losers from gains of winners. hard been suggested.}
2. ~~Controlling~~ ^{Controlling} popn. density, by various means.

This includes provision of air corridors (greenbelts, parks, etc.) but in general contemplates overall increase of density to permit of higher use of public transportation; higher larger scale of combustion plants enabled by cheaper distribution; and even ^{possibly} control

2 $\frac{1}{2}$. ~~But~~ ^{& radical} strong public action, ~~may be desirable~~. if ~~recy.~~ is not ~~too~~ ^{shrunk}; but shd. be ~~able~~ accomplish its ends w. min. of arbitrary interference w. indiv. discretion, & a max. of indiv. option ~~to~~ as to means to avoid air pollution.

9) ~~It~~ a prime problem of our group is communication.

between controls generally and ^{biological} human adaptation to pollution generally; ^{and between different kinds of biological adaptations.} Economics is essentially a device for rendering

commensurable the values & observations of disparate disciplines and interests, & finding an ^{optimal} basis for compromise. ~~It~~ It abhors all

absolutes but the optimum optimum, - & is even willing to ~~sacrifice~~ ^{what as sacrifice} that for a tolerable improvement over the status quo & ^{esp. as it is subject to change w. new info. & conditions.}

Commensurability is also a means of communication. The dollar is a universal language. ~~It~~ It is that bcs. it is not what poetry & hi-flown

metaphor ~~often~~ make it, an inhuman mechanistic dictator, but a yardstick symbol of human wants & aspirations, aversion & prejudice.

To be sure, there are those who ~~confuse~~ ^{make} the ~~creature~~ ^{creature} a

~~symbol~~ & confuse the symbol w. the thing; any good principle has its abuses. Again, if the yardstick reveals man to be a monster,

our blame shd. not fall on the yardstick.

- of ambient air over some area, e.g. (an ^{extension of the} air-conditioned shopping center idea)
- c. ^{Promoting} ~~Removing~~ public transportation (but not Diesel buses!)
 - d. Removing discriminatory taxes from ^{otherwise promoting} electric pow. generation & distribution to the end of 4% amt of energy consumed in this form.
 - e. Direct regulations of sources, in threshold terms, probably of sources.
 - f. Maximizing the option of individuals, so those w. hypersensitivity can avoid it. This ties in w. locational segregation.
 - g. Subsidized therapy ^{and/or relocation} for a very small number of those w. highest sensitivity to pollutants, to the degree that that is cheaper than further abatement.

- Sub. 8 ^{3/4} More info. is needed. That shd. not be ~~taken as~~ permitted to sub. for substantive recommendations, but still bears emphasizing. Support for research shd. encourage kinds of research most likely to aid the public air management program. (P Research in concepts, methods (Comm))
- 5 The primary ^{economy} cost of air pollution is direct damage to human orgn. & spirit. Other damages - e.g. to vegetation, paint, or laundry - are of interest ^{primarily} as ^{crude} monitoring devices. and ~~if~~ triggers for political organization.
- 6 ^{a high} ~~The highest~~ priority is joint ~~economic~~ ^{economically} interdisciplinary research shd. go to quantifying ^{for operational and decision purposes} the ~~economic value~~ direct human damage from air pollution. That entails "putting a dollar value on a human life," and should not be evaded simply bec. it's so subject to misunderstanding. ^{That also reqs human cost on table} weigh a risk to life in the balance w. other ~~human~~ ^{human} considerations human concern every time we drive a car or eat a canned pear.
- We can legitimately insist on 2 kinds of human damage.
- a. That of which people are generally aware, which can be measured (crudely) by observation of human behavior in the

& even semantics is necessary. "Get the Facts" is a misleading motto. Research needs to make sense of known facts, & direct the search for a few key future facts needed for action.

8

market: ~~the real estate~~ premiums ^{paid or demanded for} ~~for~~ smog-free locations; for discounts for ^{labor to work in} smog-bound occupations, etc.

b. Damages of which people are not ^{as fully} aware as public health specialists — subtle, long term damage to vigor or longevity. Here, paternalistic action is justified beyond what market indicators would warrant. But we cannot go very far beyond, because before yrs. of subjective evaluation will become the basis of action. This is a hard boundary to find, but worth seeking.

Questions of distributive equity are not negligible, but are generally in such a ^{parlous} ~~confused~~ state anyway that we can begin by determining what works best, and ^{plan later to} ~~then~~ make what concessions we must to "equity" to win our program. ~~It is not~~ too out of line. A good initial rule is, if we got what we deserved, none of us would get much.

H / 8 Policy must be accommodated to the current state of knowledge. That may be done by couching policies in terms of results, rather than specific assumed causes. In local building codes, for an analogy, ^{a movement is strongly afoot to forestall} many problems of code obsolescence would be forestalled by adoption of "performance" standards, under which new materials are automatically acceptable when they meet performance criteria. The main obstacle is the vested interest ~~of~~ in obsolete materials & ^{crafts} ~~methods~~. Moral: never let policy get started which contemplates permanent commitment to any given material, device, or skill — even including our skills. Cite Kennedy, p. 24

Need flexibility to accommodate future changes in knowledge.

9 When regulation is reasonable, & couched in the language ^{& flexible in the good sense.} meaningful to industrialists, many of their anxieties will be resolved & their opposition give way to support. Caplan as e.g.

On the other hand, reasonable ~~requ.~~ will hurt some industries deeply — and should. Petroleum, e.g., & autos. That is an issue that might as well be faced head-on, as it cannot be dodged w/o sacrificing & then we are changed to conserve.

So over my life
& Kennedy's for
more topics.

11. Where interstate problems airsheds, ^{or diffused air,} are involved, there is no precedent of any effective ^{control} interth. device available below the Federal level.

If airsheds were truly definable as watersheds wd. not find much encouragement in valley authorities etc. But they aren't. So I lean to comprehensive Fed. authority, on line of where an "airshed" is roughly definable, ^{CAA & FCA.}

10 For intra state action, the Bay Area Air Polln Control Dist. is a good model to emulate

12 Research has been biased in the negative - what damage does air pollution do. To redress the balance, some research shd be given to the other side, so we can proceed w. clear consciences to act vs. the net damage of air polln.

13 To be effective we must ally with many other groups and movements - holding our nose where necessary, & even submitting to some exploitation, but at same time some likely prospects. } giving some direction to the whole, & maintaining its orientation to the general public interest.

a. Urban renewal movement

b. Urban planning "

c. MC pricing school of economists. Vickrey

d. P.H.S. - obviously

e. C.U. & C.R. & Cons. Corps. Movement.

f. Ag. Ext. - vs. urban sprawl

g. ^{Residential} P.E. groups, ^{local & national} House & Home, Arch. Forum, ULI, Landscape Arch.

h. Misc. junks, ^{& crusaders} seeking causes

i. Assorted civic betterment groups

j. Health Cultists

k. Ambitious & skillful politicians seeking issues

l. Physical Fitness Program, ^{completely w.} & military overtones.

m. ^{Outdoor} Conservation Orgns - Sierra Club, Ike Walton, etc.

n. & Govts. seeking revenues

o. A.M.A. - the medical one.

p. Indian. needing clean air

g. College seeking research topics

a

r. Above all, individs. seeking breath. Unfortunately "the bastards aren't organised," but they do vote periodically, & a govt. agency spearheading their interest shd. be a good votegetter.

My position, on issues raised.

1. Wd. be a mistake to try solve problem in a vacuum, pretend isolation from others. That wd. be to try to deny the interdependence of ^{all phases} human culture & institutions. By a fresh approach to a new topic we may ^{bring new light to} help solve some age old social problems, like the reconciliation of the claims of individual & society, that is well & good. But we are not going to avoid those problems by retreating w/o formulating our change, to bring science to bear on public policy.
2. Social control shd. be designed to achieve optimal results w. knowledge currently available, ~~It need not~~ shd. at any time, beginning immediately. ~~It shd. also~~ The objection to beginning immediately is the implicit assumption that controls will be rigidly phrased in terms of current knowledge, & obsolesce w/o being changed. The objection must be met by framing concepts for social control with built-in flexibility. Economic concepts are useful for that purpose end. Control legisln shd. also support research, ^{& commit itself to periodic} ~~needed to improve~~ reconsideration in light of the results.
3. If any concept of prior appropn of ~~the~~ ^{license} to pollute air is granted admitted, it shd. be strictly limited in time to the economic life (much shorter than physical life) of the specific polluting facility - not the whole plant, and certainly not the site. I wd. ^{advise v.} ~~oppose~~ even that concession, bcs. of my ^{genl.} observations of how any loophole of that sort gets enlarged, & specifically of the unbelievable incredible mess that prior appropn has made of our water allocation. It is also worth emphasizing how handy

b

a ^{bludgeon} ~~tool~~ prior approval makes for entrenched oligopolies
desiring to discourage entry of new competitors.

4. Subscribe to Harold W. Kennedy statement
5. Max B-C, not B/c, for any given area.