

# ACCOMMODATING HUMAN UNSETTLEMENT

by

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The United Nations Conference on Human Settlements *Habitat* 1976 occurred in the penultimate year of my 1927 conceptioning of and all-out commitment to a fifty-year gestation period of economic initiatives, philosophic formulations, artefact inventions, their physical realisations, practical proving, progressive development and integration with general evolutionary events, all planned to culminate in the 1977 birth of a new World-around industry: that of an air-deliverable, air-serviceable and air-removable dwelling machine and environment controlling mass manufacturing and renting industry, which would employ humanity's maximumly informed and performing sciences and technologies and most advanced production techniques, to comprehensively and adequately accommodate all human living and development needs with the dwelling machines also serving as effective harvesters and conservers of all local income energies of the vegetation, sun and wind as well as of the energies in human and food wastes—and most importantly of all, to serve as spontaneous, comprehensively effective, self-teaching devices of both the young and the old children therein dwelling.<sup>1</sup>

All of the Dymaxion artefacts which I have developed have come into socio-economic use only in emergencies when all customary means of solving problems were either physically inadequate or prohibitively expensive and there were no alternatives but to use my more efficient high performance developments, reducing materials, energy, labour and overhead input costs.

When I commenced my project in 1927 at the age of 32, I was moneyless, jobless with a dependant wife and new born daughter. Despite the self-discipline of never asking anyone to listen to me, nothing could be in more marked contrast to my then unknown unlistened to sociological state than the 150 world-around audiences who have asked me to address them in each of the last five years, or the US Senate Foreign Policy Committee's invitation to me to speak to them on world political trends,<sup>2</sup> nor the plurality of invitations that I received to speak at the United Nations Vancouver Habitat Conference in 1976. This interest seems powerfully to suggest the relevance of my fifty-year program and the extent to which it has developed.

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For space reasons it has been necessary here to omit some of the background material to Professor Fuller's discussion, but his paper gives important insights into the work and thought of a person perhaps best described, by Ezra Pound, as a bringer of happiness and a friend of the universe.

G. B. D.

## HABITAT AND HUMAN SETTLEMENT

I was invited to Habitat under four prime auspices; as the special guest of Habitat itself, as a member of Barbara Ward's pre-Habitat Vancouver Symposium, as President of the World Society for Ekistics and as a guest of Vancouver's Habitat Committee. I also went as leader of the combined World Game students and Earth Metabolic students *Now House* project.

On the day the Habitat conference opened, front page photographs in newspapers around the world showed the acrylic skin of my USA 275-foot diameter, geodesic dome of Montreal's Expo 67 being completely burnt out. First reports that the dome had burned to the ground were untrue; the steel structure was undamaged. Since the invisible acrylic skin had been mounted inside the spherical structure, the structural appearance had not been changed. No one was inside and no one was hurt. Within ten days, even before Habitat closed, Montreal announced its intention to rehabilitate the dome.<sup>3</sup>

It almost seemed as though the non-structural skin of the great unharmed geodesic dome had been set afire by some mystical evolutionary wisdom to remind the world of geodesics' very high structural performance, accomplished with only three per cent of the weight of any given material necessary to produce equivalent structural and functional capabilities by any other known alternate engineering systems. Apparently, the one hundred thousand geodesic domes built around the world in the last thirty years have proven their economic value, reliability and economy to such an extent that this fire brought no charges of inadequacy of geodesic dome principles. The Expo 67 dome event and the progressively increasing magnitude of human numbers interested in listening to me—as the protagonist of a design science revolution by which to accommodate physically the now evident evolutionary insistence on world-around *unsettlement of humanity*—seemed in marked contrast to related aspects of Habitat and its technological focus almost exclusively upon nationalistically emphasised, local, immobile, and 'one-off' tailoring of *human settlements*.

At the opening press conference of the Barbara Ward Group at Habitat I reported that in April 1976 the Club of Rome had issued a public reversal of its 1972 *Limits to Growth* concept. There had been so many contradictions of the Club's 1972 pronouncement on the limits to growth that they had reconsidered their position. I said that I felt that the Club of Rome's first statement was funded by interests that were continuing to do what money had done in the past, that is, to rationalize selfishness. Assuming the political concept of fundamental inadequacy of life support for all humans on our planet, selfishness had been able to say 'I have those for whom I'm responsible and because there is not enough life support for all, I am obliged to do various things that are utterly and completely selfish'. I felt that the Club of Rome's *Limits to Growth* pronouncement represented the last attempt on the part of organised capitalists' selfishness to justify to the world public why their wealth would be unable to do anything about the third world. The initial Smithsonian announcement of the *Limits to Growth* was based on work done by an MIT professor of computer sciences who was given his input data by other MIT specialists.<sup>5</sup> I and many others, were able to make well documented and fortunately effective public announcements that the Club of Rome's *Limits to Growth* pronouncement was a sadly ignorant statement. For instance, its authors cited only the very small remaining percentages of the world's unmined metal ore reserves, and were manifestly unaware that the metals on our Earth are continually being melted out of their last use and being recirculated in amounts greatly exceeding the tonnage of metals being newly mined and added into the cumulative circulatory system approximately 3 to 1, while the interim gains in technological 'know-how' take care of ever greater numbers of humans per each pound of recirculating metal or other chemical substance into which technology invests its ever improving know-how, with the result that it is now engineeringly feasible to take care of all humanity at an unprecedentedly high standard of living without mining any more metals. In my view the Club of Rome's ignorance was occasioned by the over specialisation of scientists. I told the Habitat press conference that I thought the Club of

Rome had manifested extraordinary courage and integrity in changing their public position, when they announced in Philadelphia that they had found on reinspection that their data was inadequate, ergo, their resulting conclusions were wrong. Later that week I received an invitation to lunch with Mr Peccei, President of the Club of Rome, when he personally verified their new position. I applauded his integrity.

#### THE INFLUENCE OF FINANCE ON DEVELOPMENT

Though it produced almost no world-around newspaper reportage, the Vancouver conference was an historical watershed event.<sup>6</sup> The old established building world was conspicuous by its absence, though there were many other powerful lobbies present such as those of the Sierra Club, Audubon Society, World Population Institute and other foundations concerned with environmental subjects. It became clear that the great banks, confronted with escalating building costs which had passed the point of no return had withdrawn all support of real estate exploiters and of obsolete building technology in general. The 'big money' of the world which has gone entirely transnational had found that whereas 'you can't take it with you' into the next world, you also can't take it with you *around* the world: ownership has now become onerous. Big money has left all the sovereignly locked-in, local-property-game-players 'holding the unmovable bags' of 'real estate'. Machinery becomes obsolete almost overnight, is unattractive as a continuing property and must be written off the books in five years. But machinery can be melted and reworked, to ever higher earning effectiveness only by ever improving know-how. 'Know-how' has become the 'apple' of transnational capitalism's eye.

As a consequence of the great 1929 crash, the monopolistic control of America's prime industrial establishments was broken. During the gradual recovery of the corporations under the aegis of the New Deal, the directors and executives of the corporations found that whether they were going to keep their jobs now, for the first time, depended entirely on the voting by stockholders to re-elect the directors and their managements, which depended entirely on whether the corporation management made profits. It was exactly at this time in history that the metals of World War I, which had been mined in such enormous profusion, began increasingly to reappear in the form of scrap. Suddenly the unforeseen recirculation of scrap began to break up the control of metal prices by the mine owners, who objected to this new development. However the new self-perpetuating managements realised that remelted metal was as pure as new metal, and more desirable because it cost less. They could make as much money by recirculation as they could by new production.

What they next found was that every time they developed a more desirable product, the sales increased. This made the wheels go round even faster so that management began to look for know-how to improve products. This brought about a completely new volition on the part of capitalism of our world. The post-1933 search for new know-how is why you see in the Sunday newspapers page after page of advertisements of great corporations looking for highly specialised, scientific and technical men with the experience generated know-how to produce new, improved and more desirable products.

All the great American corporations of yesterday have now moved out of America and their prime operations have become transnational and conglomerate and are essentially concerned with the game of selling their corporation's very complete, technical, managerial and vast credit handling and money making know-how. For this reason they are not interested in the older kind of properties. This set of unpredicted changes of volition explained the lack of concern of transnational conglomerate capitalism and their lack of opposition to the United Nations' Vancouver Conference's pre-occupation with human settlements; which they regarded as 'peanuts'.

The new capitalism is only mildly interested in trailers or mobile homes which are simply weather boxed platforms on which are mounted beautyrest mattresses, shower baths,

washing machines, television, radio, air conditioning, lighting, cooking, refrigerating, bottled gas, tableware, toiletries, wardrobes and so forth. Mobile homes take the shape of a shoebox because they have to go through highway or railroad bridges. It is like living in the narrow shoebox shape of a railroad car.

Such mobile homes provide a place to live near jobs without having to buy a fixed home or a fixed piece of land. Because they are assemblies of mass production items their costs are low, but nowhere nearly as low as they could be if uncompromisingly designed for rental and easy maintenance rather than for sale and early replacement.

The new transnational capitalism's grand strategies are primarily formulated by international lawyers in their endeavours to vault legal barriers and avoid taxes. From 1800 to 1929, world economics were mastered by 'Finance Capitalism' of the J. P. Morgan brand. From 1932 to 1952, we had 'Federally Socialised Corporate Management Capitalism'. Since 1952 we have had 'Lawyer Desocialised and Strategied Supranational Managerial Capitalism'. The grand strategy of the lawyer-managed supra-national capitalism is to keep governmental power widely deployed, ergo 'conquered'. Much of their media *news* has been a smoke screen diverting attention from what they were doing. For instance, while world news was spot-lighted on the Korean and Vietnam wars, the great USA corporations and banks were conglomerating and moving out of America into a world theatre of operations. In 25 successive annual appropriations of Foreign Aid, totalling 100 billion dollars, 'riders' required that where a USA corporation was present in the country being aided, the aid funds had to be spent through those USA corporations. In this manner, the building of the supra-national corporations' foreign manufacturing plants took all the gold out of America. When all the 'gold' was gone, the USA dollar was cut loose from gold, which lowered its world purchasing equity to a quarter of its pre 'floated' value. This multiplied the supra-national corporations' gold backed relative monetary equity four-fold its previous value.

The world news media is controlled by transnational capitalism through advertising, its main source of income. The great corporations control that advertising. The amount of advertising placed in the media and the rates paid for it is predicated upon the size of the audience reached. Media management finds that the public appetite is for bad news. Whatever the psychological explanation may be the fact is that the media looks mainly for malignant news, rarely for benign news.

#### RECOMMENDATIONS FROM VANCOUVER

Though they will probably be disregarded by many nations and probably much of the world press, four noteworthy recommendations emerged from the various meetings of Barbara Ward's invited group at the Habitat Symposium, from the Non-Governmental Organisations at the Habitat Forum and from the official delegates at the UN Habitat Conference itself.<sup>7</sup> The four, and the conditions to which there was a response were as follows:

First, all around the world there are large squatter settlements, as for instance in Puerto Rico, Caracas and Bombay. These squatter settlements, which may increase by as many as a million people a year, are referred to formally as 'self-help' groups because they improvise something to sleep under that sheds off the rain, whether it's three ply, corrugated paperboard or rusty corrugated iron. They are invariably on land that by law 'belongs' to somebody else. The squatters are continually approached by racketeers who tell them, secretly, that the police are going to evict them, but if the squatters will pay the racketeers, arrangements can be made for them to remain. In this way the racketeers skim off all the money the squatters earn.

In order to cope with this phenomenon, the UN Vancouver Congress passed a very extraordinarily wise and humanly considerate resolution. In travelling around the world and visiting such squatter settlements, I have observed their beautiful community life. People in

trouble co-operate in a thoughtful and loving way. Their way of life is so beautiful that I have always said that if I ever have to retire, it will be into one of those squatter's settlements. It was also observed by the majority of the UN delegates that the people coming to squat are very ingenious in the way they employ the limited available materials to provide shelter. Therefore, one of the first resolutions passed at the Vancouver conference and one also forged by the Barbara Ward Symposium recommended that all nations decree that all the land which these squatters occupy be made public lands, on which the people are allowed to remain. It was part of the same motion that the squatters be given much better materials with which to accomplish their environmental controlling.

The second resolution of note passed at Vancouver would remove the profit motive of real estate agents who persuade farmers to give them an option on their land and then borrow government guaranteed funds to put in sewers, water and streets, thereby escalating land prices. The meeting recommended that all the nations individually arrange that whatever the increase in the value of land at the time of sale, it shall be taxed at a hundred per cent.

The third resolution that I want to draw attention to was the Barbara Ward Symposium recommendation that there should be a world moratorium on the further development of atomic energy.

The fourth resolution was one which Barbara Ward had herself conceived and introduced. It recommended that all around the world, by 1985, it be made physically and practically possible for all human beings to have fresh, safe, potable drinking, bathing and washing water. Around the world there are as yet many places where people are dying or suffering because of infected water. It is highly feasible within the present technology to make pure, safe water available to everybody anywhere.

#### THE WORLD GAME DOMES AND THE *NOW HOUSE*

A mushroom group of foldable and moveable geodesic domes and modernised Indian tepees at Vancouver's Jericho Beach conference site demonstrated a young world's ability and inspiration to do something positive about its own future.

The World Game staff, from the Universities of Pennsylvania and Yale, called their exhibit the *Now House* because everything they had on display could be purchased *now* from industrial mass production sources.<sup>8</sup> All the labour of their production occurred under the controlled environment conditioning of factories: no rain, cold, heat, snow, ice and wind. The World Gamers exhibited four 14 foot 5/8 sphere polyester fibreglass geodesic domes with alternate translucent or opaque fibreglass hexagon or pentagon panels. These domes had no more need for old building technology than has the opening of an umbrella—a mobile, environment-controlling artefact. The World Gamers brought their exhibit from Philadelphia to Vancouver in one camper truck pulling one trailer.

The World Gamers first dug circular trenches slightly larger in diameter than the domes' circular bases. As they trenched they threw the earth into the enclosed circle and levelled it to form an elevated base for each dome. On top of the earth they laid overlapping corrugated aluminum panels which were surmounted first by aluminised foamboard to reradiate heat and next by plywood and again by indoor-outdoor carpeting. This made a very comfortable, springy and dry floor. They anchored the domes so that they could not blow away, for each one weighed only 225 pounds.

Three of the domes were positioned in a triangular pattern with ten feet between them. A high pole was mounted at the centre of the triangular area which in turn supported a water-tight translucent canopy. The large triangular area between the domes and below the canopy was covered with the indoor-outdoor carpeting. The fourth dome stood mildly apart and could have been connected by a canopy but was not.

Ten of the World Gamers lived very comfortably and happily in the *Now House* installation. In the kitchen-bathing dome compact, economic but adequate shelving was

provided on which to mount the kitchen equipment. They had a toilet which converted human waste into high-grade fertiliser. The heat necessary for this odourless process was provided alternately by electricity from the windmill hookup and by heat from the solar panel water heating device. The toilet system produced fertiliser as a rich, dry, manured, loam-like substance which needed to be taken out of the system only once a year.

The windmill was equipped with a synchronous inverter, embodying new advanced efficiency, electronic circuitry for converting the direct current produced by the windmill into 110 volt alternating current required by most electrical equipment, making it possible to feed their alternating current directly into the public power lines. When windpower generated electricity is fed into batteries and an electric charge is later taken from the batteries for final light or power use, approximately half the energy is lost.

Feeding the unscheduled wind energy harvest directly into the power grid avoids this transfer loss. This innovation has now been accepted by the public utilities in twenty of the fifty United States. The utility companies pay the local windmill owner at wholesale rates for the energy he puts into the system and charge him at retail rates for the energy he takes out. This increases the economic advantage of both the private windmill owner and the public utilities. It is a fundamental energy 'income gain' by humanity over and above dollar considerations. It is found that somewhere within a one hundred mile radius, the wind is always blowing, that is, within a two hundred mile diameter circle of 31 000 square miles. With the proliferation of such local windmills, the public utilities can progressively retire significant amounts of stand-by generating capacity, while also reducing their fossil fuel burning.

Arrayed between two of the three domes under the translucent canopy were banks of tomatoes and other food vegetation in hydroponic tanks, with noticeable growth accomplished during the short two-week period of the installation. The domes could be rotatingly rearranged with the translucent side south to impound enormous amounts of sun radiation. With the translucent panels north they remained cool and let in only the north light so desirable to artists.

The domes that were exhibited were priced at \$750 each and the cost of the total package, including \$17 000 worth of equipment amounted to \$20 000. Approximately 1000 people a day visited the *Now House* and seemed genuinely enthusiastic. Their comments and the World Gamers' experience of the operation of the complex were invaluable in consideration of future improvements.

At Habitat, as elsewhere, I pointed out that the general principle of aiming for an ever higher performance with ever less inputs of energy, time and weights of material per given level of accomplished functioning, produced sumtotally a trend toward doing so much with so little that we have now arrived at a condition where performance is approximately invisible. Form is no longer following function. Functions have become formless. World humanity's *reality* of 1900 consisted of everything people could smell, see, touch and hear. Now, three quarters of a century later, 99.9 per cent of all humanity's practical everyday, worked-with realities are only instrumentally (non-sensorially) apprehendable and employable by humans. Therefore I emphasised to the Habitat audiences that they should disregard their conditioned reflexes which spontaneously look only for immediately visible manifestations of new improved ways of living.

In 1928, at the start of my fifty-year program, the structural mast of the 1928 Dymaxion House contained all its service mechanics, as did also the first full scale prototype produced at Beech Aircraft, Wichita, Kansas, in 1944–45.<sup>9</sup> Following general news publication of the latter, over 37 000 orders for the house were received by mail, many with cheques, all of which had to be returned because there was then no industry to manufacture or install these air-deliverable dwelling machines. Many distributors applied for sale franchises, but the electricians and plumbers who are everywhere exclusively licensed to connect houses to the

water and electricity mains said that in order to survive they would have to take apart all the Dymaxion Houses' pre-assembled plumbing and electricity manifolds and re-assemble them. This would have tripled the costs and have been as illogical as would be local electricians and plumbers taking each purchased automobile apart in the owner's frontyard and reassembling it before finally permitting its use.

To avoid this nonsensical and wasteful situation, in 1947 after twenty years of my fifty year program had passed, the grand strategy was changed to one of concentration on the improvement of the shell structures themselves. Thus was I led to design the geodesic dome. And now at the completion of my fifty year campaign the No. 2 *Now House* is becoming publicly available as the air-deliverable, only-rentable, world-around dwelling machine, right on its fiftieth birthday.

#### CHANGING CONCEPTIONS OF GLOBAL SCALE

World War I was so called because the stage on which it was acted was an historically unprecedented and entirely new world-around involvement. All the world's metal ore lands were involved in the production of new inanimate energy powered production machinery. When World War I was over the copper in the electric generators and motors did not rot as did the pre-World War I farm produce, nor did the copper return to the mines. The electric generators hooked up to the waterfalls kept producing electricity and the overland wires kept distributing that electricity to mass production factories and people's homes. Energy is the essence of wealth, wealth being the organised capability to support life.

When World War I was over, all the metal producing capability and energy generation persisted, with an enormous wealth gain by humanity. This high producing capability went not only into automobiles, but into farm machinery. It reduced the 90 per cent of humanity necessary on the farms to six per cent. Those not needed on the farms migrated to the cities, for food could now reach them anywhere. The new technology and its mass production under controlled environmental conditions made the old building craft technology operating under non-controlled environmental conditions, fundamentally obsolete; but society's preoccupation with accepted ways of earning its living obscured the fact. World War II took humanity's technology into the sky, deep into the ocean and eventually into outer space. These latter arts required an enormous step-up in doing more with less in order to make all logistics flyable, rocketable or electro-magnetically transmittable.

Subsequent to World War II it was found that all metals involved in the general technology of humanity were being consistently melted out of their old use forms on average every 22 years to become re-employed with an interim gained know-how to accomplish a far higher performance per pound, erg and hour technology for many times the numbers of humans served on the previous round. Japan became one of the world's greatest industrial countries employing only recirculating metal scrap.

In pre-automobile American cities and factory towns only the rich moved house, on fall and spring moving days, to bigger or smaller homes, as their changing means dictated. With the advent of the automobile, workmen could travel to better paid employment and factories could be located on new out-of-town sites. In 1950 the average American family moved town every six years. In 1975 the average American family was moving out of town every three years. When World War I began, the average American walked 1100 miles a year and rode 300 miles in a vehicle of some type. In 1976, the average American still walks 1100 miles each year but travels 20 000 miles by vehicle. And while there were no aircraft in 1900, by 1976 airport traffic was greater than that by rail when the century began. Humans with legs to move are freeing themselves from rooted dwelling patterns of earlier eras. Human settlements were inherent to agrarian and mill town ages: now human *unsettlement* is occurring.

That is why Vancouver's Habitat was an historical watershed. It marked the end of human

settlement, in exclusively local geography and in major poverty. It was the beginning of the era of local geographical unsettlement and transition into the historically unprecedented and utterly unexpected condition of all humans— successfully-at-home-in-universe.

#### PAYING FOR THE HOMES WE NEED

At the time of the 1929 crash and following depression and the beginning of the New Deal in 1933, the United States government took over the underwriting of the obsolete building industry.<sup>10</sup> Cutting loose from the historical earned savings, purchasing capability and instituting purchasing capability based on future earnings of the people, the US government instituted 20, 30 and 40 years mortgages that need, in effect, never be reduced so long as the periodically renegotiated interest was being paid. Had the buildings been as efficient and effective as air-space technology could render them, they would have paid for themselves in five years or better, as does all good machinery. What the government financed was the continuation and multiplication of inefficiency, manifest today in the fact that out of every 100 units of energy consumed in the US only five units of effective life supporting physical work is realised, that is, our 'system' has an overall techno-economic efficiency of only five per cent. People can only have incomes through employment but 70 per cent of all the jobs in the USA are invented and produce no life support whatever. The last quarter century's vast transformation of cities all around the world to skyscraper clusters has produced space within which no life support is produced, only to accomodate job and money making. All the money making drives towards omni-automation and complete unemployment. Politics keeps inventing the jobs.

Post-1933 housing finance has shown that when the price of the median house goes above three times the median annual family income the family cannot demonstrate creditable house purchasing capability. A general condition of such inability has now been reached. Since the median family's life expectancy is 70 years and since the age of the median family's earners is 35 years, they have 35 years of life ahead but only 25 years before mandatory retirement, ergo, no more future earning years to hypothecate for home 'buying' on the instalment plan which (theoretically) leads towards ultimate but rarely realised 'owning'. To continue underwriting the inefficiencies of miniature castle building of the building and real estate enterprise system, their governments would now have to give the housing to the median class and 'forget about the lower half of humanity as unhouseable'. Furthermore, examination of private individual homes shows that they are only superficially individual, for the hydraulic wash away of the earth surrounding their foundations discloses the private houses to be only fancy terminal boxes mounted on the ends of pipes with the whole community functionally a unit mechanical organism.

Not only has the progressive unsettlement of humanity completely upset all historical expectancy, but as with the individual median family's inability ever again to buy its home so, too, have we exhausted the possibility of our nation's people and its businesses paying for further government underwriting of our obsolete building industry. We still have an obsolete building industry: we must try a completely new approach and our Vancouver experience indicates one that may be appropriate.

#### SETTLEMENTS ON THE NORTH FACE

Those who are world travellers are familiar with the scene at the airport baggage delivery turntables: along come well-strapped bundles of tubes and blue nylon which are picked up by young people and strapped on their backs. These packs open out into very small homes, but homes they are, and very satisfactory to youth in a world where there are so many satisfactory technological complementations of such world-around living in the form of electrified and plumbed campsites and hostels.

At our Vancouver site, in addition to the four Turtle domes there were two smaller North

Face domes. The name 'North Face' derives from the north face of Mount Everest, for these domes were developed by successful Everest climbers for their high altitude, advanced base, dwelling devices—designed for environmental conditions far more formidable than those with which humans anywhere had ever before swiftly and effectively coped. The North Face domes are oval in plan and are geodesic. They are made with the highest tensile strength aircraft aluminium struts and have inner and outer skins of nylon with a double skin floor. They disassemble and roll into a pack two feet long by eight inches in diameter and weigh only eight pounds. An eight-pound home compounded with a sleeping bag permits human beings to be very intimate with nature under most hostile conditions.

Despite that they were going to have to move out of town and then out of state within only five years and would have preferred to be allowed to rent acceptably built and furnished homes in acceptable localities, those humans necessitous of getting to and holding their jobs while providing their families with favourable living, learning, playing and growing conditions have been forced to buy the acceptable homes by the speculative builders, at figures that would require a minimum of 30 to 40 years to pay off. Humanity in the non-socialist world is now being propagandised, coerced and often even forced to purchase all the immobile home properties, which gave rise to condominium or co-operative offices, apartment houses and owned single family dwellings. Yet the great industrial corporations have found such immobility to be untenable, and having now become transnational, they are concerned only with investments in service industries which rent rather than sell telephones, computers, cars, world hotelling, etc. and sell only armaments.

Eventual and perhaps even imminent, world disarmament will release the vast weapons industries for the production of air-deliverable dwelling machines. With general disarmament and the release to life promoting account of the fabulous production capacity of the world's industrial complexes will come the one day air delivery of whole cities wherein the operating energy efficiencies will be significantly multiplied and the social conditions provided by the omni-visible central community and the completely private, deployed dwelling areas; or the air delivery of single family dwelling machines to the remotest of sites; or of whole clusters of single family dwelling machines to near or far sites.

Before 1985 we will have abandoned the concept of having to earn a living. We will have given life long scholarships to everyone. We will have converted all the big city buildings to apartments and have eliminated 70 per cent of local commuting while vastly increasing long distance travel.

#### MORE WITH LESS: THE HOPEFUL FUTURE

In Vancouver in June 1976, the young world in its own right opened a new chapter for human society by itself becoming committed realistically to doing more with less. Before the end of the century we will find all of humanity doing so much more with so much less that it will be enjoying a higher, legitimately richer and ethically more decent standard of living than has ever been experienced by any humans before us. With economic, physical and environmental success for all will come completely new economic accounting. We now have the metals comprehensively recirculating, and the know-how to accomplish all these tasks within the limits of already mined metals.

Since all political systems are predicated upon the misconception of fundamental inadequacy of human life support on our planet, their premise will have been proven invalid. We know how to live entirely within the scope of our daily star emanating radiation and gravity, energies income, ergo within a ten year world program we can provide all humanity with an amount of energy annually equal to that enjoyed exclusively by North Americans in 1972, while concurrently phasing out all use of fossil fuels. Nor need we longer have recourse to burning up our spaceship Earth's capital inventory of atoms.

The time-energy cosmic accounting and maximum efficiency alternative technologies as

exclusively employed by scenario universe and spoken of by us as 'nature' will be instituted in all human affairs and will be integratively operated by world-around satellite interlinked computers. With the computers' integrative examination of the physical and metaphysical resources available to human beings, it will be discovered that we are incredibly wealthy. Wealth, as stated before, being predicated on the degree of organised competence to nurture, protect and accommodate today's and tomorrow's lives. It will be clearly manifest that we have aboard spaceship Earth four billion, billionaire, heirs-apparent who have never been notified of their magnificent inheritance which has been over long hidden within the world's obsolete laws, customs and administrations whose divorcement of money from real wealth has hidden from the whole world the late twentieth century realised existence of omni humanity sustaining inexhaustible wealth.

## NOTES AND REFERENCES

- 1 On the Dymaxion House see *The Harvard Crimson*, 22 May 1929, pp. 24–32.
- 2 *Hearings before the Committee on Foreign Relations*, US Senate, Ninety Fourth Congress, First Session, May/June 1975, Washington DC, US Government Printer, 1975, pp. 181–202.
- 3 Sheppard, R., 'Buckminster Fuller has new dome plan', *Montreal Star*, 10 July 1976.
- 4 Meadows, D. H., Meadows, D. L., Randers, J., Behrens, W. W., *The Limits to Growth*, London, Earth Island and New York, Universe Books, 1972.
- 5 See Forrester, J. W., *World Dynamics*, Cambridge, Mass., Wright-Allen Press, 1971.
- 6 For a discussion of Habitat 1976, see Carver, Humphrey, 'Habitat 1976: The Home of Man', *Town Planning Review*, Vol. 48, No. 3, (July 1977), pp. 281–286.
- 7 The resolutions and the roles of the various meetings are discussed in *Ekistics*, Vol. 42, No. 252, (November 1976).
- 8 The domes are manufactured by the Molded Fiberglass Company, Ashtabula, Ohio, and the windmill by Kedco of Inglewood, California. The synchronous inverter came from Windworks, Mukwanago, Wisconsin. In all fifty firms voluntarily equipped the *Now House*.
- 9 See *Fortune* magazine, April 1946, for an article 'Fuller's House: it has a better than ever chance of upsetting the building industry'.
- 10 On this and associated issues of efficiency and attitudes in the building industry, see 'The Rebirth of the American City', *Hearings before the Committee on Banking, Currency and Housing*, US House of Representatives, Ninety-Fourth Congress, Second Session, 30 September 1976, Washington DC, US Government Printer, 1976, pp. 1011–1016.