Working Paper, 15 April, 2007

International Institute for Self-governance

Sustaining society with renewable energy dollars and ecological property rights

Available from http://papers.ssrn.com/abstract_id=980027

Shann Turnbull
sturnbull@mba1963.hbs.edu

Abstract

Renewable energy can become a fraction of the cost of burning carbon to generate electricity in communities that use money that has a usage charge described as "demurrage". As with Islamic banking, demurrage money eliminates discounting future values from the ability of earning interest today. Investments to sustain humanity on the planet are not disadvantaged. A demurrage charge limits the life of money not used to terminate its existance like all living things to acquire an ecological characteristic. As interest charges typically double the cost of urban infrastructure, ecological money could half the cost of water, housing, education, health and transport facilities. Ecological money facilitates the ability of towns and city precincts to become self-financing self-governing political units. Electricity generated from sun, wind, waves, tide, geothermal; bacteria produced hydrogen provide ways for urban precincts to create a global unit of value but whose value is defined in terms of the local cost of renewable energy. As over 80% of the costs of sustainable energy are interests charges compared with around 20% for carbon fueled generators, ecological energy dollars make renewable energy around four times more competitive. The paper describes how ecological property rights to money, land, buildings and firms maximises the ability of urban precincts to become self-financing on a sustainable basis. Ecological capitalism increases the efficiency, equity, and the richness of democracy in market economies. It also improves the ability of the environment to govern society to assist in making both sustainable.

Keywords: capitalism, community banking; ecology, energy dollars, demurrage, governance, property rights, renewable energy, self-financing, urban precincts.

JEL Classifications: E42; E51; O18; P13; Q24; Q42; R51

Shann Turnbull PhD
sturnbull@mba1963.hbs.edu
Principal: International Institute for Self-governance
http://www.linkedin.com/pub/0/aa4/470
PO Box 266 Woollahra, Sydney, Australia 1350
☎ +612 9328 7466; Mobile: +61 (0) 418 222 378

1.0 Introduction

This article explains how capitalism can become sustainable through the use of renewable energy that is also used to create a local currency that makes renewable energy competitive. The currency would be redeemable into Kilowatt-Hours (Kwhs) generated locally. Energy dollars provide a basis for replacing the current monetary regime with its compelling incentives to discount the future and jeopardise the viability of sustaining humanity on the planet.

To avoid an energy rich community being dependent on external finance or a financially self-sufficient community importing energy, the two resources need to be integrated to create sustainable communities (Swann 1997: 178−83; Bennello, 1997:184−91). An important reason for linking the two is that renewable energy sources become economically more attractive than non-renewable energy when a currency is introduced that eliminates the cost of interest. Islamic banking achieves this objective. Another way, consistent with Islamic banking, is to establish a local currency that has a user fee described as "demurrage" as discussed later in this Section.

Interest costs from capital intensive renewable electrical power generation can be an order of magnitude greater than interest charges from fuel intensive power generation. It is the interest cost that makes renewable power much more expensive than burning carbon. An indicative comparison is provided in Table 1, Indicative cost comparison between renewable and carbon burning power generation.

The investment cost for unit of output of renewable energy ($20/Kwhr) his taken to be twice that of carbon energy ($10Kwhr). The value of the output each year is taken to be equal to the value of the investment to make renewable power twice as expensive. The life of each plant is assumed to be 20 years requiring 5% of the plant cost to be written off each year. The operating cost of the renewable energy plant is mainly maintenance and this is assumed to also be 5% a year ($1/Kwhr). This means that the Earnings Before Interest and Tax (EBIT) per unit of output for renewable energy is only $2/Kwh.

Table 1, Indicative cost comparison between renewable and carbon burning power generation.

Indicative cost comparison of electrical power between: (Assumes sales price =value of investment in plant/Kwh)	**Renewable energy**	**Carbon burning energy**
Value of investment in electrical generation plant (=sales price)	$20/Kwh	$10/Kwh
Operating life of plant	20yrs	20yrs
Cost off writing investment over its operating life (5% per year)	$1/Kwh	$0.5Kwh
All other operating costs before finance charges – (includes fuel)	$1/Kwh	$7.5Kwh
Earnings Before Interest and Tax per Kwh (EBIT/Kwh)	$2/Kwh	$8/Kwh
Cost of interest, or finance charges if privately owned	$18Kwh	$2/Kwh
Cost of electrical power with demurrage money/Islamic banking	**$2Kwh**	**$8Kwh**

However, the cost of fuel together with higher operating and maintenance costs of a carbon burning plant is higher ($7.5/Kwhs). Adding in the cost of writing-off the plant produces an EBIT of $8/Kwh. The means that the finance charge for carbon energy are only $2/Kwh (20% of sales) while they are

$18/Kwh (90% of sales) for renewable energy. If the financial system is based on demurrage money or Islamic banking with the cost of interest removed, carbon energy becomes four times *more* expensive than renewable energy instead of being half its cost!

In addition, the cost of non-renewable fuels like coal, oil and gas do not recognise the cost of nature creating the fuel or the environmental costs when it is used. Economists describe these costs as "externalities". The external cost of non-renewable power generation includes the cost of global warming. This illustrates how markets can fail to achieve socially desirable objectives. Markets can operate in a counterproductive manner, misallocating resources to increase costs instead of efficiently sustaining civilization.

To avoid burning carbon fuels and contributing to global warming local renewable energy sources need to be tapped such as sun, wind, waves, tide, geothermal; bacteria generated hydrogen (hydrogenases) and hydrogen fusion. Every community on the planet has access to some type of sustainable sources of energy. This means that every community on the planet can establish its own independent unit of value based on the cost of converting sustainable sources of energy into electricity measured in kilowatt-hours. New technologies like hydrogen fusion and hydrogenases will ensure that significant sustainable energy sources are universally available. Hydrogenases could become especially attractive in urban communities that lack access to water as this is produced by burning hydrogen to generate power.

It is not desirable for sustainable energy dollars to also carry out one of the other conventional functions of money to be a store of value. For various reasons discussed later a currency needs to be designed on ecological principles to have limited life like all living things. Such ecological forms of money were created in hundreds of US communities in the 1930's to replace the shortage of official money at that time (Fisher 1934) .

These non-official shadow currencies, described as "Stamped Scrip" were created by local councils or chambers of commerce. The money was given away to citizens to invigorate the local economy. However, the money lost all its value unless a demurrage charge was paid to the issuer. This usage cost varied from community to community. But typically each note with a face value of $1.00 would lose all its value after seven days unless a one cent stamp was affixed to the back of the note. The notes would be cancelled after two years when the issuer had collected one cent each week over 104 weeks. In this way the issuer of the note made a 4% cent profit from giving away its money!

The cost of the stamp is described as a "demurrage" charge. A cost of 1% of the face value of a note *per week* would be more attractive to merchants and consumers than modern credit cards that charge around 2% *per transaction*. The more transactions the notes financed each week then the smaller would become the average demurrage cost per transaction. For example if a note was used in 20 transactions in a week the average demurrage cost per transaction would be reduced to one twentieth of one per cent that would represent 0.05% of the average value of each transaction.

Demurrage has been traditional feature of money; it is not a radical new idea. In past centuries when commodities such as gold, silver, copper, tea, tobacco or grains were used as money, large depositors were charged a fee to cover the cost of storage and insurance. Many banks now charge small depositors a service fee that can reach a similar cost. A demurrage charge between 0.05% and 0.25% of foreign exchange transactions described as a "Tobin Tax" has been proposed to inhibit currency

speculation (OECD 2000). The revenues raised would be allocated to finance global projects that could include the costs of reducing climate change.

Locally based renewable energy sources create a self-reinforcing virtuous sustainable economic process. The renewable energy can be used to create a locally determined but globally relevant unit of value while the local currency on which it is based eliminates the cost of interest to make renewable energy sources economically attractive. In addition, renewable energy would plug the drain of economic value out of a community by reducing the need to import fuel for power generators or pay external suppliers for power. Nor would there be a need to export economic value from the payment of carbon taxes.

Currencies with a demurrage charge atrophy with age like living things. The idea that money should increase with age goes against the laws of nature as recognised by Islamic banking. Yet the idea that the value of money increases with the passing of time is widely accepted outside the Islamic community. When money has a time value it results in future values becoming discounted on a compounding basis. It explains why modern investment analysis is inconsistent with sustaining humanity on the planet.

Ecological systems are never static, perpetual or exclusive but subject to continuous change by being renewed through death and birth to obtain a better fit to changing environmental conditions. Property rights to realty and corporations can also be designed to take on ecological characteristics so that they can instigate change, die and/or be renewed. The introduction of ecological characteristics to the ownership and control of money, realty and corporations provides a basis for making urban communities economically sustainable as well as achieving energy sustainability. Ecological ownership and control provides a way of reforming the nature of capitalism to make it more efficient, sustainable, equitable, responsive, and democratic as explained later.

Section 3 describes how towns, suburbs and/or precincts within cities can adopt ecological property rights to further their economic and so political independence as well as providing a grass roots governance mechanism to provide oversight of local sustainable energy production and conservation.

The next Section 2 considers how ecological property rights provide a way to plug the economic drains in urban communities to assist them to become self-financing and so sustainable. Section 3 considers how ecological property rights facilitate the ability of urban precincts to become self-financing and so self-governing. The governance architecture of realty with ecological property rights is considered in Section 4. The financial architecture for a sustainable energy monetary system is considered in Section 5, with concluding comments in Section 6.

2.0 Plugging the economic drains from an urban precinct

This section considers how economic value can drain out of an urban precinct and how this can be minimized by the introduction of ecological property rights.

The adoption of ecological forms of money changes the way a market economy allocates resources as described by Jacobs (1985: 156−81). One way as noted above is that it makes renewable energy sources more attractive. The adoption of ecological forms of property rights creates a way of

transferring economic value without money to introduce an additional way for allocating resources to create self-sustaining, self-financing and self-governing urban precincts as described in Section 3.

Urban communities, be they towns or precincts of City can be viewed as micro economies. To further their financial and hence political independence communities need to eliminate or minimise the loss of economic value from: (i) imports exceeding exports. (ii) migration of its citizens; (iii) wages, salaries, and fees paid to guest workers; (iv) rents, profits, dividends, royalties, and fees paid to external property owners; and (v) interest payments to external lenders. Local generation of renewable energy is but one way of reducing imports.

However, urban planners do not usually consider the architecture of these invisible activities when designing urban precincts. A famous exception was Howard (1946) who designed both the visible and invisible structures for the first Garden City of Letchworth in England at the beginning of 20th century. However, even Howard did not design ways for the invisible structures of ownership and control to be localized to facilitate self-governance. As a result the Letchworth Corporation became the target of a take-over bid from a corporate raider in the 1970's. To prevent this, the Corporation was nationalised by the UK Central Government.

The most important and insidious way urban precincts lose value is through external payments of mortgage interest and rent. These payments can drain away up to a third of householder income. Another way economic value can be drained away - preventing urban communities from becoming self-financing - is through external owners of property capturing the windfall gains created by public and private infrastructure investment servicing their property.

Both the inequity and potential of public investment in infrastructure to make urban precincts self-financing is illustrated by the building of the Jubilee underground train line in London. The Line involved building eleven new stations in 1999 at a cost of 3.5 billion pounds sterling. Riley (2002) reports that the aggregate uplift in the value of land within 1,000 yards of the new stations was 13 billion pounds, 3.7 times greater than the investment of the whole project. This illustrates how public money creates private profit, and reveals how inefficient and inequitable the current system of urban land ownership is. It also illustrates how the ecological land tenure system described in Section 3 allows windfall gains to be captured by tenants and home owners alike (but not by commercial interests or those living outside the precinct) while also using the gains to borrow the funds to build community developments.

While a local ecological currency can minimize the export of interest, ecological property rights are required to limit the export of value through rental payments and windfall gains. Windfall gains can be very substantial as illustrated by the building of the Jubilee line. Surprisingly windfall gains are not part of the traditional calculus of economists. Windfall gains are not typically measured over an urban precinct − and what is not measured and reported is not seen and hence not managed.

Even when windfall gains are measured and reported, they are not necessarily considered part of economics. Economists traditionally limit the extent of their analysis to the "production and exchange of production and exchange of goods and services" and ignore "balance sheet" transactions like the exchange and transformation of assets and liabilities. As result economic text books do not identify the concept of "surplus profits" (Turnbull 2006: 455). When they see the words "surplus profit" they assume that it but a component of what their jargon refers to as "economic rent". Economic rent is

typically described as the revenues required to create or maintain production. Surplus profit is a complementary concept because it describes the revenues that are *not* required for an investment in either productive or non-productive assets.

Surplus profits are income cash-flows in excess of the incentive to invest. They arise after a period described as the investment "time horizon", a point after which investors do not rely to receive any return on their investment. This can be from the risk of production or product failure or obsolescence, emergence of competitive products, technological change, social and political uncertainty and/or the discounting of future income because of the immediate lost opportunity to earn interest without risk today. Accounting doctrines do not require investor time horizons to be identified and so surplus profits are not measured or reported. They can be a major source of wealth inequality and a drain of wealth from a precinct to create poverty in resource rich communities (Turnbull 2006: 451).

Ecological property rights can minimise value loss from a community through external owners capturing surplus profits that includes windfall gains. Like ecological currencies, ecological property rights have limited life. They follow the rule found in squatter settlements: "if you do not use it you loose it". In other words tax and other incentives are required to change the existing system of perpetual, static and inclusive rights to a system that has time limited, dynamic and inclusive rights.

Ecological property rights could be introduced by making the tax deductibility of investment property conditional upon the ownership rights being written off at the same rate as the tax deduction. In this way the profitability of investment property would not be changed as the cost of the ownership loss is being recognised in any event. Ownership would be transferred directly or indirectly to residents to stop the export of rents and capital gains as explained in greater detail in the following Section.

To stop corporations exporting surplus profits outside an urban precinct, tax and other incentives are required for shareholders to adopt ecological properties rights. The incentive would provide shareholders with a bigger, quicker and so less risky profit in return for giving up smaller, slower and more risky returns over the long run.

The tax incentive required is surprisingly small as shown by Turnbull (2000a). In return shareholders would change corporate constitutions to create "stakeholder" shares as well as the shares owned by investors that would now be described as "investor" shares. The constitution would transfer the rights to corporate assets, earnings, dividends and votes from the investor shares to the stakeholders shares at say 5% per year so that in 20 years the corporation would become 100% owned by resident stakeholders. Residents, who were natural persons, could receive stakeholder shares in a similar manner to frequent flyer points according to their contribution to the business as a supplier, employee and/or customer (Turnbull 1997c).

In this way, Ownership Transfer Corporations (OTCs) would be created that would transfer the control of corporations owned by investors any where in the world to individuals in the community that hosts its operations. OTCs limit their size because ecological property rights forces firms to continually distribute most of their cash-flow to shareholders who can then re-invested their money in the offspring enterprises formed by the parent OTC to expand its operations (Turnbull 2000a; 2001a). As a result a profound change results in the ecology of firms as their size becomes limited to human scale while the extent of their activities continues to grow in a way demonstrated by Mondragón firms (Turnbull 2000b: 199−225). Growth is achieved by OTCs raising new funds by giving birth to many "offspring"

enterprises that take-over and/or develops part of their operations to form productive networks that can expand globally.

Besides plugging the economic drain created by firms being externally owned, OTCs also localize the control of businesses in urban precincts to make them accountable to residents. In this way ecological property rights enrich democracy and the ability of communities to become self-governing. But the ability of a precinct to become self-governing also depends upon residents owning and controlling the land and buildings of the precinct as noted earlier. How this can be achieved is considered in the next Section.

3.0 Establishing self-financing self-governing precincts

This Section explains how ecological ownership can be introduced to urban communities to stop economic value draining away as described in the previous Section. The result is to create a more equitable and efficient and so more sustainable form of Ecological Capitalism.

For cities to maximise their ability to become energy and financially self-sufficient, their component precincts and/or suburbs need to become energy and financially self-sufficient. Ecological ownership and control of urban precincts introduces a political structure for governing energy conservation initiatives at the local level on a self-enforcing bottom up basis. This includes renewable energy storage facilities within a precinct, energy trading between precincts, providing an authority to issue energy dollars and managing their local integrity. This indicates the multi-dimensional processes required to be integrated and managed at the local level for establishing financially and energy self-sufficient sustainable urban communities.

The value of urban land is created by how well it is serviced with: water; sewerage; power; roads; transport; communication; hospitals; schools; places of employment, entertainment and recreation. The value is not in the land but how well the site is serviced by external public and private investment that economists describe as externalities. The site also obtains value from the improvements on it which may be a dwelling, home unit, shop, office, factory or entertainment facility. To establish equity and efficiency property rights need to be designed to separate the externally created values in a site from those created by improvements on the site as indicated in Figure 1, Duplex Tenure.

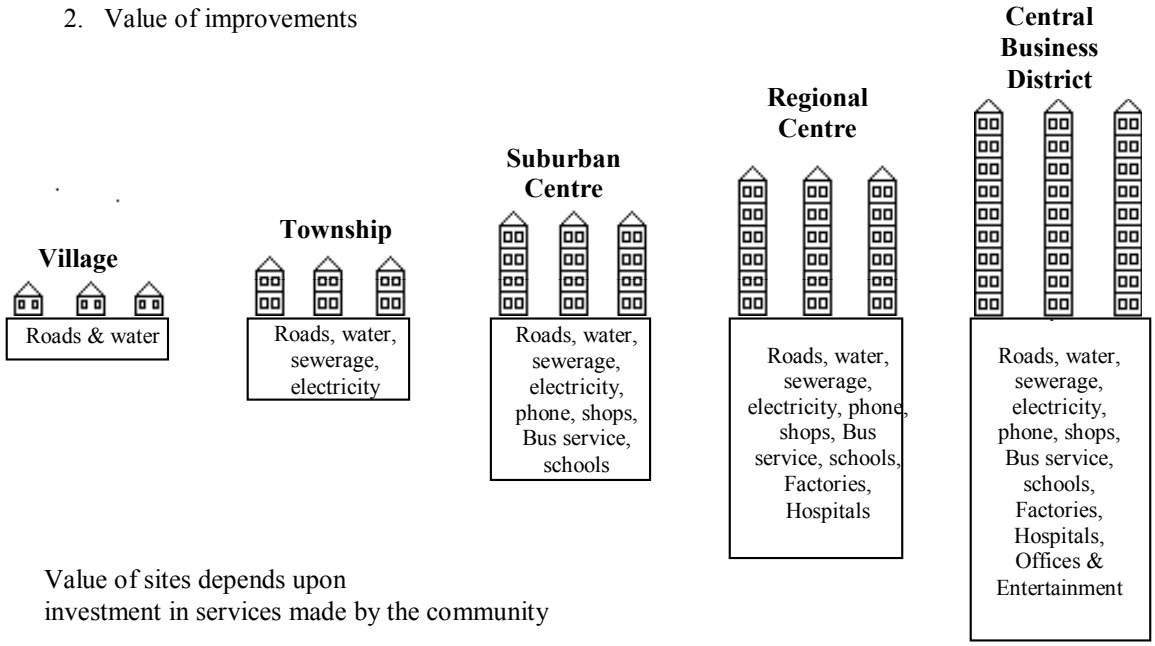
The separation of private and community property rights is a common feature of condominium, company or "strata title" systems and in Community Land Trusts (CLTs). However, these "duplex" ownership systems do not provide separate publicly negotiable title deeds to each type of property right. Nor do they operate over an area sufficiently large to capture most of the values generated externally to any single site.

What are required are two separate title deeds with one deed being represented by a share in a corporation that owns all the sites in a contiguous viable precinct. The other title deed would provide negotiable rights to a specific volume in space like a lease or an Australian "strata title". It is also referred to also as a "Dynamic Lease" (DL) in Figure 1 for reasons described below.

Figure 1, Duplex Tenure

Value of urban property has two components:

1. Site or "Land value"
2. Value of improvements



Value of sites depends upon
investment in services made by the community

Two different types of property rights are required to create efficient equitable markets for the private ownership of urban property:

1. Dynamic Lease (DL) or "Strata Title" for improvements on the site/land,
2. Shares in the co-operative which owns all sites/land in the community.

Dynamic Lease (DL) "Strata Title" Captures value of improvements	Value of DL determined by market value of improvements, (not by windfall gains from community)
Shares in Community Land Bank (CLB) Captures value of site ("Land Title")	Issue value of shares by CLB determined by average market price for all community land. Buyback price from vendors of DL's proportionally discounted for rates not paid over a 25 year period.

CLB captures for resident voters who own or rent dwellings:

- **Windfall gains from community investment by buying back at a discount shares from short term owners;**
- **All windfall gains from all sites owned by corporations and/or non resident voters who do not obtain shares;**
- **Surplus profits from corporations and other investors whose depreciated improvements become property of CLB.**

One share in the land owning corporation could be issued for every square meter occupied by each *residential* DL whether or not the dwelling was on the ground floor or in a high rise. In this way only residents would own all the land occupied by non residents, trusts, partnerships, corporations and higher levels of government.

Another way of thinking about the arrangement is that it represents an incorporated unit of urban government that issues voting shares *only* to its residents, be they owners or tenants. Unlike a CLT and other forms of duplex tenure, the scale of operations needs to be sufficient to establish a public market for the two different types of urban property rights. A basis is then established for conventional lenders to use the property rights as collateral to finance home ownership.

There is no necessity to introduce any new law to create the duplex system of property rights that form a Co-operative or Community Land Bank (CLB). This is because corporate constitutions possess replaceable rules and the rules can be designed to provide the most desirable property rights for the particular structures built in each precinct. Competition for investment between precincts/suburbs would provide a way of determining the most efficacious design of their rules.

A CLB provides a framework to introduce "use it or loose it" property rights to both DLs and the CLB shares. Surprisingly, such dynamic ecological property rights would become more attractive to investors in apartment buildings or in other commercial improvements than with the existing system.

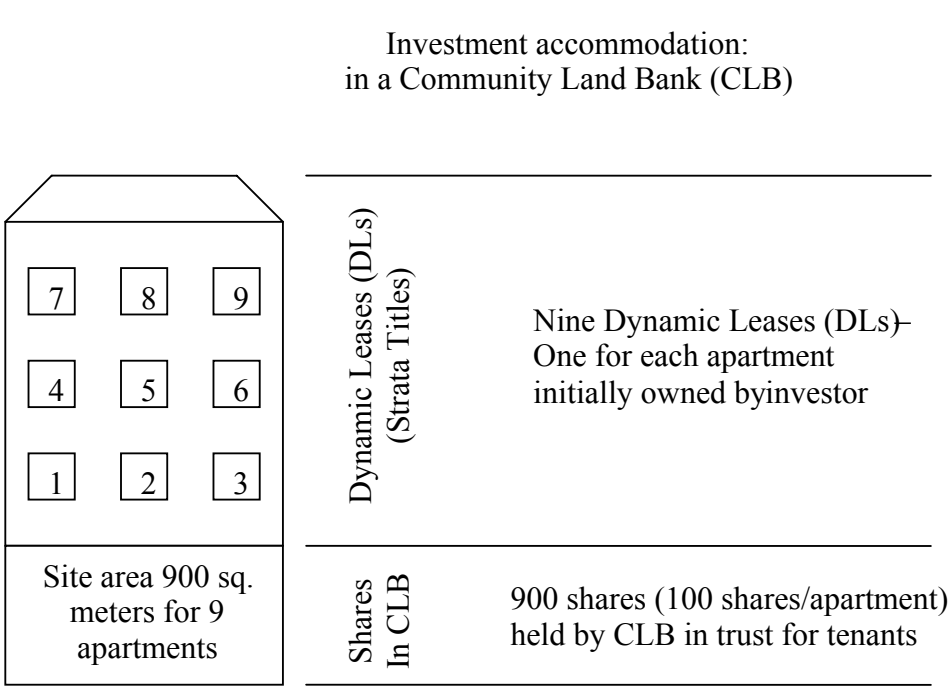
The attraction for investors is that they would not need to purchase the site they occupied. The cost of a site in advanced economies is typically half the cost of a dwelling as reported in the US by Davis and Palumbo (2006). For pioneer home owners in a CLB this creates half price housing as sites become self-financing from the value added by development and only the cost of the dwelling needs to be financed by its owner (Turnbull 1976).

Commercial investors in a CLB would significantly reduce the size of their investment as they would not need to purchase a land site. However, they would be required to relinquish their ownership rights of their investment at the same rate that they wrote it off for tax purposes. Their rate of profit would not be reduced as the cost of losing ownership is offset by the depreciation cost that would be incurred in any event. In this way the residual value of investments in shopping centers, office blocks, recreational facilities and factories would become owned by the CLB and so by all residents be they home owners or tenants. Tenants are included as they acquire CLB shares associated with their dwelling without charge at the rate ownership of their dwellings is depreciated.

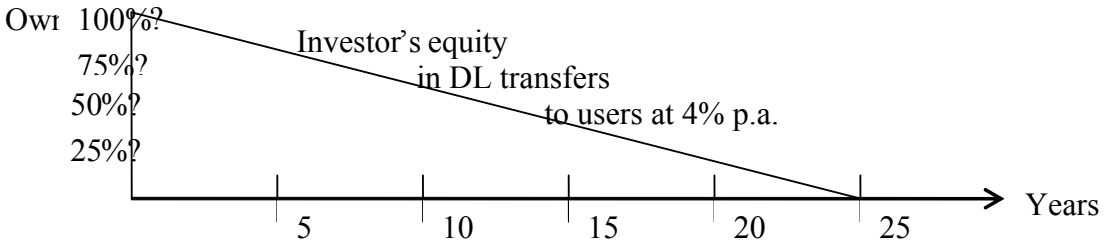
Citizens of CLB in which OTCs were operating would acquire asset ownership in both productive enterprises and in realty of their community. Ecological property rights in CLBs and OTCs introduce a mechanism for mass asset transfer to citizens without the use of money, taxes, welfare or the associated government bureaucracy involved in traditional ways of distributing wealth. *Democratising the wealth of nations* (Turnbull 1975) in this manner is neither identified nor explained by orthodox economic analysis. One reason is that the nature of property rights is assumed to be fixed not a variable.

Only residents in the precinct can own and so vote CLB shares to control their precinct. In this way external ownership and control can be almost eliminated. The ownership of DLs in investment dwellings transfers, as they are written off for tax purposes, to the tenants rather than the CLB. The CLB transfers ownership of the shares "stapled" to the DL to tenants at the same rate. If investors wrote off the cost of their investment over 25 years, their tenants would obtain 100% ownership of both their dwelling and the CLB shares during this time without paying any more than a normal competitive rent as indicated in Figure 2, Dynamic Duplex Tenure. The transfer provides an incentive for the tenants to take over the maintenance cost of their dwellings to increase the return to investors.

Figure 2, Dynamic Duplex Tenure



Only voters residing in CLB precinct can own and vote its shares. Non residents and corporations do not have to purchase a site (CLB shares) to make investment much more attractive. However tenants become co-owners of their dwellings at the rate the investor writes off the cost for tax purposes. With a 4% depreciation rate the tenants acquire full ownership of both dwellings and CLB shares over 25 year to provide an incentive to minimise repair and maintenance costs.



Each tenant acquires co-ownership interest in 100 CLB shares at the rate of 4% p.a. If the tenant moves out after 5 years he/she retains a 20% co-ownership interest in both the shares and the dwelling with subsequent users acquiring residual interests.

The incentive for buying a home rather than renting for pioneer residents in a CLB arise from obtaining half cost housing. If they leave their home and rent it out then they would loose ownership rights in both their DL and the associated CLB shares at 4% per year to become co-owners with their tenants. This creates an incentive for non-user home-owners to sell their property rights.

The price paid for the DLs on the open market would take into account the cost of buying the associated shares from the CLB who would price them in the same manner as for a Real Estate Investment Trust (REIT). The CLB would purchase its shares back from the seller at a discounted price to capture back some of the windfall gains created in the community by either public or private investment and/or by improvements in the quality of life created by how the CLB is governed.

The values captured back from trading in its shares assist in making the CLB self-financing in a way not available to CLTs. CLTs also do not borrow money secured by the equity created from uplift in its land value like a CLB. This denies CLTs from becoming self-financing to force them to be dependent upon obtaining gifts of land to eliminate its cost. For this reason the introduction of CLTs is very restricted. They can not provide either a widely reproducible or sustainable solution to the inefficiencies and inequities in current urban tenure systems.

Ideally, the CLB precinct will include a rich mix of commercial activities to provide rent/rates to service any borrowings to finance its infrastructure and/or cross subsidize residents and/or pay dividends to residents. Ideally also, the number of dwelling in the precinct would be sufficient to support educational facilities up to a basic tertiary level with supporting health care services to sustain its mix of residents over generational changes. This would typically mean a population of from say from 50,000 to 100,000 residents that might involve, say 1,000 to 5,000 acres. If a CLB with a 100,000 residents owned the land around one station of the Jubilee Line then the windfall gain accruing to each individual would be Stg£8,630 − assuming that the windfall gains and cost of the project were evenly distributed between all eleven stations/CLBs.

CLBs have in total six mechanisms for transferring wealth to their residents without including the use of OTCs. These are: (i) Pioneer home owners acquiring shares without cost; (ii) Tenants acquiring ownership over time of their dwelling without the need to make a purchase; (iii) Tenants acquiring ownership of CLB shares without cost; (iv) All residents capturing a proportion of any windfall gains in their dwellings; (v) All residents capturing a share in ownership values of all non residential depreciated improvements in the CLB precinct through ownership of CLB shares; (vi) All residents acquiring a proportion of the windfall gains captured by the CLB when it buys back its shares at a discount from residents selling their dwellings.

As only residents can vote CLB shares, CLBs promote self-governance. The ability of CLBs to become self-financing, unlike CLTs, facilitates their political independence. Both the self-financing and self-governing abilities of CLBs is promoted by the introduction of OTCs as they localise both the ownership and control of productive activities hosted in the precinct. In these ways ecological property rights to money, realty and corporations make capitalism more efficient, sustainable, equitable, responsive and democratic.

The economic and political independence introduced by ecological property rights provides a basis to promote and protect the creation of an independent community banking system based on sustainable

energy dollars. The strengths and weaknesses of creating energy dollars are considered in the next Section.

4.0 Evaluation of sustainable energy dollars

The Section extends the analysis of Energy Dollars provided in Turnbull (1997a) to include national currencies. Most types of money used throughout history have been connected with reality by being redeemable into physical assets such as gold, silver, copper, tea, tobacco, rum, wampum shells, wheat, corn, cattle, slaves and even wives (Galbraith 1976). Modern money is no longer related to reality since President Nixon took the US dollar off the gold standard in 1971 (Galbraith 1976).

Modern currencies are described as "fiat" money as they are defined to exist by the force of law (Greenspan 1997). The monetary tokens issued by governments in the form of notes and coins are given a face value not related in any way to the material used in the token or paper money that may have negligible intrinsic value. Monetary tokens typically represent less than 5% in value of all the money in modern societies. Most money is represented by bank deposits and other credits. The value of fiat money in the form of tokens, deposits and other credits is not defined by any specific goods or services but by the totality of all items traded and invested in one National currency compared with the totality of all transactions in other national currencies. This means the value of modern money is indefinable in terms of any one or defined combination of goods and/or services.

As modern money is not redeemable into any specified goods or services, there is no limit on how much is created (Greenspan 1997). Monetary tokens, such as notes and coins, are produced by governments to generate a profit, referred to as "Seigniorage": is the difference between the cost of manufacturing paper money and coins and their face value. The rest of the money supply is created by private banks who earn "special profits" from creating money in the form of credit.

As Galbraith (1976) observed "The process by which banks create money is so simple the mind is repelled. With something so important, a deeper mystery seems only decent." Banks create money by issuing loans to borrowers who deposit the funds back with the bank. In this way banks creates both an asset and a liability on their balance sheet simultaneously. The loan is recorded as an asset of the bank with the deposit by the borrower becoming a matching liability of the bank. When the deposit is drawn down, to be spent on the purchase of goods and services, deposits are placed back in the bank by the vendors' of the goods and services. If the vendor deposits are at other banks then the money can be lent back to the bank that created the money. The creation of money in this way allows banks to also create "special profits" from the difference between the interest charged on the loan and the interest they may pay on the deposit also created. For non-religious folk the creation of modern money is the second biggest confidence trick perpetuated in the history of civilization.

If the banks creating money are outside an urban precinct then they will drain value away to external regions. According to Huber and Robertson (2000) the value of the special profits earned by US private banks in 1998 was $US114 billion and £48 billion in the UK. These authors reported that this would have represented respectively 4.5% and 15% of central government tax revenue in each country!

Modern money carries out the role of being a "medium" of exchange and a "store of value" but it no longer carries out its historical role in providing a physically definable "unit of value" like a pound weight of sterling silver or a defined weight of gold. In earlier centuries money was defined in terms

of specific commodities as noted earlier. There was no need for a government to get involved in creating or defining the value of money or what could be used as money. It was an era of highly decentralised and mostly non-government controlled "Free Banking" (White 19993). However, the need for governments to raise money resulted in decentralized banking being replaced by central banking that is a form of central planning.

A problem in using commodities to define units of value is that the characteristic of the commodity has to be also defined and measured. The purity of metal commodities can be more easily defined, measured and maintained than the characteristics of tea, tobacco or cattle and so on. By using a kilowatt-hour of energy as a unit of value the definitional and management problem can be overcome as energy can be measured as precisely as required. In this way energy dollars provides advantages not available in modern forms of money or commodity based currencies.

Table 2: Comparison of national currencies with gold and renewable energy dollars provides a number of other criteria for comparison. No quality testing is required for National currencies as Quality is not defined as noted in row 2 of the Table. Tokens of fiat money have negligible intrinsic value while gold can be used in industry to some degree as suggested in row 4 of the Table. Another special feature of energy dollars is that they have an intrinsic consumable value that is little shared by gold and not at all with fiat money as indicated in row 4.

Table 2: Comparison of National currencies with gold and renewable energy dollars

No.	*Criteria for comparison*	*National dollars*	*Gold dollars*	*Energy dollars*
1	Unit of value	Not defined	Ounces/grams	Kilowatt-hours
2	Quality testing	Not required	Density	Not required
3	Intrinsic value	Negligible	Say 10%	100%
4	Subjective value	100%	Say 90%	Nil
5	Source of currency	Government decree	Haphazard locations	Globally
6	Democratic availability	Depends on Gov.	Depends on location	Globally
7	Changes in production of money	Controls & interest rates	Little related to consumption /GDP	Related to consumption/GDP
8	Volume of money controlled:	Indirectly by interest rates	Geography, trade and government	Related economic value/GDP
9	Rate of change in production of money	Fiscal and monetary policies	Fluctuates with region and time	Relatively stable by region and in time
10	Cost of storage	Not required	1% of value per year	Not required
11	Cost of insurance	Not required	1% of value per year	Not required
12	Cost of distributing reserve currency	Negligible with electronic transfers	Changes little with distance	Increases with distance
13	Ecological features	None	Yes	Yes

The definition of what is considered national currency is determined by governments, as noted in row 5. The sources for gold are globally distributed in limited and far-flung pockets, while as noted earlier, renewable energy is globally available. With a gold backed currency, countries that are well endowed with gold obtain an international competitive advantage. Row 6 recognises that renewable energy currencies is democratic being available around the world. As noted in closely related rows 7, 8 and 9 the volume of national currencies made available is typically controlled indirectly by interest rate and fiscal policies but some government may also introduce direct controls as noted in row 9 of the Table. The availability of gold to back a currency in an economy can very much depend upon external factors as noted in the Table. The amount of power made available is closely related to consumer demand so the volume of renewable energy currencies can become automatically related to the level of economic activity or GDP. However, not shown in the Table, the volume of gold and energy currencies could also be controlled by political interventions.

The use of a physical commodity like gold as the unit of value or "reserve" currency introduces storage and insurance costs as noted in rows 10 and 11. These costs are avoided with the National currencies and renewable energy dollars. This does not mean that some storage devices are not required for some forms of renewable energy services. Both gold and energy suffer costs in being moved as noted in row 12. While the cost of transporting gold is relatively minor the cost of distributing energy across a nation can be very significant can rise to over 30% of power generated. However, this cost is an advantage as it provides the incentive for urban precincts to become self-sufficient to promote their financial and political independence.

Both gold and renewable energy depend upon nature while national currencies are not connected to nature in any way as indicated in row 13. Indeed, the ability of modern money to increase its value from earning interest over time is inconsistent with natural processes and is not sustainable.

The importance of having an ecological local currency connected to environmental conditions can be profound. The nature of a currency determines how resources are priced and markets allocate resources according to prices. To sustain humanity on the planet it is the environment that should influence how resources are allocated and governed. In other words society needs to become an "environmental republic" with feedback mechanisms to allow it to be automatically controlled by nature. This cannot occur with modern currencies that are controlled by governments and their monetary institutions in order to maintain political power, a problem exacerbated by the current type of money that creates compelling short-term political incentives to exploit nature though its ability to earn interest.

The importance of having a local currency to allocate resources was highlighted by Jacobs (1985: 161) who stated that "Because currency feedback information is so potent, and because so often the information is not what governments want to hear, nations go to extravagant lengths to try and block off or resist the information". Jacobs (1985: 163) went on to explain:

> Individual city currencies indeed serve as an elegant feedback controls because they trigger specifically appropriate corrections to specific responding mechanisms. This is a built-in design advantage that many cities of the past had but which almost none have now. Singapore and Hong Kong, which are oddities today, have their own currencies and so they possess this built-in advantage.

As outlined in Table 2 renewable energy dollars have quite different operating characteristics to national currencies. This means that changes need also to be made in the architecture of a local monetary system. These issues are considered in the following Section.

5.0 Designing a local real monetary system

An autonomous monetary system in an urban precinct requires four elements as considered in this Section. Many well-known local exchange systems are not autonomous as they tie their unit of value to the National currency. Local Exchange Trading Systems (LETS), commercial barter systems and Stamped Scrip are examples that define their unit of value in terms of the national currency. While such "shadow" currencies are useful in providing a way to identify and so support local activities they do not provide a way for a local community to establish its own priorities on how its resources are valued. As shadow currencies are tied to the national unit of value their value is not definable in any real goods or services as discussed earlier. An internally generated unit of value is required to insulate local resource allocation from those governed by currencies without ecological attributes. A local unit of value also insulates the local monetary system from the perversity of forces produced by globalisation.

The four elements traditionally found in an autonomous monetary system described in greater detail by Turnbull (1997b) are: (i) savings institutions, (ii) money multiplying institutions, (iii) risk management institutions for loss of value or liquidity and (iv) moneychangers. Commercial banks are money-multiplying institutions: they expand the volume of money by making loans as described earlier. Commercial banks today may also carry out the other three activities. This has become possible because money is no longer definable in physical units to deny it being subjected to any reality test for its creation or availability.

An energy-dollar based monetary system would be subjected to the reality test of both the physical capacity to generate power and its availability as and when required. For this reason basic principles need to be considered in designing a local energy monetary system and managing risks to its integrity. It also requires consideration of the practicalities of the technology. To illustrate these points, an urban precinct using solar cells to obtain energy and financial independence will be considered.

We will assume that a solar cell has a 20-year life and so must recover 5% of its cost each year in the value of the output it generates to pay for itself. We will also assume that its annual maintenance cost is 5% so that to become self-financing over its life the solar cells must produce at least 10% of their value each year. A cost of 10% per year could be recovered with a demurrage charge of 0.19% per week, less than a fifth of the 1% cost per week of the Stamped Scrip example considered earlier.

The 5% maintenance cost could be reduced and even avoided if individual owners of solar cells undertook the maintenance themselves. In this way home owners could obtain an additional payback, income and/or "sweat equity" from their solar cells. Tenants, apartment management associations and/or other community associations, and businesses could also become directly involved in minimizing solar cell maintenance costs. The point being that private ownership provides opportunities and incentives to service solar cells or other renewable energy sources even if their purchase and set up costs were financed by lease or rental arrangement with a third party.

Contracts are then created between the owner/agents of the solar cells to sell the minimum expected kilowatt-hours produced each year to the energy management agency of the CLB. This allows the CLB to take over the "lender of last resort" activity that used to be the most important function of central banks in past eras when money was redeemable into a specified commodity. This rationale for Central Banking no longer exists as national currencies are no longer redeemable into any specific goods or services.

Any short fall in delivery of kilowatt-hours from one contractor in the urban precinct could be compensated with extra output produced by other contract suppliers. If more aggregate output was produced than required by demand within the precinct then the CLB could export power to external communities or store it by generating hydrogen from water or by other means. The hydrogen could then fuel energy cells or be burnt to generate electricity by conventional means without any pollution as its only residue is very pure hot water. If the CLB did not possess an energy storage system to average out shortages or surpluses within the CLB precinct, it could import or export power from or to external sources.

This simplistic illustration on how sustainable energy dollars can be created hides the devil in the detail. A typical problem of establishing a local currency is how to get it issued, used and distributed. This problem is minimised by a commodity-backed currency when there is a universal demand for the commodity like electrical power. The power authority could require or provide a compelling incentive for its energy bills to be paid with energy dollars. In addition, the CLB, like any other Local Government Authority could require or provide a compelling incentive for some or all of its rates, taxes and rents to be paid in energy dollars.

Another problem of defining money and making it redeemable in a single real resource is that not sufficient money will be created to service all the transactions involved in modern capitalistic societies. In societies with private ownership of land, firms and productive assets, the value of all monetary transactions becomes many times the value of goods and services produced and exchanged. An autonomous community monetary system will need institutional arrangement to multiply the amount of money created to service all transactions.

Commercial banks carry out a money multiplying function by simultaneously creating loans and deposits as described earlier. However, an autonomous banking system requires a sound basis for managing the risks introduced from money multiplication. Commercial banks are involved in managing two types of risks: (i) Credit risk of a loan loss and (ii) Liquidity risk of all depositors wanting to withdraw their funds.

There is also a system risk that excessive money creation will produce inflation if it not matched by increases in productivity. As noted by Nobel Prize winning economist, Professor Lawrence Klein "the expansion of Federal Reserve credit will not be inflationary if the funds made available flow into investment that raises national productivity" (Speiser 1986). However, current banking practices do not provide a mechanism to differentiate between expanding credit to finance increased productivity or increases in consumer demand. This problem can be overcome by the introduction of credit insurance like is commonly available for housing loans. But unlike housing loans the cost of obtaining the insurance can be used to create a market mechanism for allocating credit expansion selectively for increasing productivity. It also provides advantages in managing credit risks.

Another way of controlling inflationary pressures is by the introduction of competing currencies as described by another Nobel Prize wining economist Professor Friedrich von Hayek (1976a). The introduction of energy dollars achieves this objective. Intellectual creditability for introducing an alternative urban currency system is also provided by Hayek (1976b) in his suggestion for the "Denationalization of Money".

Credit and liquidity risks are best managed by separate and different types of financial institutions. Credit risks are best managed by organizations without any debt and liquidity risks are best managed with organizations that can leverage their equity with a large amount of debt. For instance, secure investments like government bonds may allow a bond trading organization to have a 20:1 debt to equity ratio. This could be over twice that of a commercial bank with say a 10:1 debt to equity ratio that trades in more risky commercial loans. An investment bank trading in even more risky publicly traded equities might have only a 5:1 debt to equity ratio. Risks that have limited liquidity as accepted by insurance companies may mean that they have little or no debt on their balance sheet.

These observations raise questions as the desirability of commercial banks accepting both credit and liquidity risks together, especially when they act as money multipliers for a redeemable currency. With modern money, these risks can be accepted as national currencies are not defined in terms of real resources and not subject to any requirement that it be redeemed. In an autonomous community monetary system, it would be much safer and efficient for differently designed institutions to manage the two different types of risk.

A CLB could license commercial banks to multiply the volume of energy dollars in its precinct on condition that all credit risk was insured by organizations in the non bank sector and their service fees would replace interest payments on energy dollars. In this way the cost of credit insurance would replace the cost of interest.

The elimination of interest costs would make a CLB precinct a highly attractive locality for establishing and operating businesses. It would more than half the cost of infrastructure investment like toll ways, tunnels, rail services, schools and hospitals etc as the cost of interest is typically more than doubles the repayments required over their operating life of 20, 30 or more years. This would mean the unit cost for essential services would be halved to directly reduce inflationary pressures. A proposal for the US Federal Reserve to provide interest free loans to States and Local Government was introduced to the US Congress in 2004 (HR 2004).

The CLB would control the volume of money created through its purchases of insured loans from the commercial banks. In other words, it would be the CLB that created new energy dollars by purchasing the loans issued by the banks to their borrowers. The commercial banks could also be making loans in the national currency to introduce competition between currencies as described by Hayek (1976a). However, the special profits obtained by multiplying the volume of money and credit would be captured by the community through the CLB rather than any external private shareholders of the commercial banks. This is another way in which an independent monetary system can reduce the loss of value from its precinct to enhance financial independence.

The cost of energy dollar loans would be determined not by the interest rate policy of the central government but by the cost of obtaining loan insurance. The cost of loan insurance would then take over the role that interest is supposed to carry out in allocating resources most efficiently.

The introduction of ecologically sustainable energy dollars combined with ecological property rights introduces a profoundly different type of economic system. It introduces quite different technical concepts, language and method of analysis as described by Turnbull (1992) with the institutional arrangements described in Turnbull (1975; 1983).

Some of the implications of this new type of political economy created from ecological property rights are considered in the concluding next Section.

6.0 Governance of sustainable urban communities

In concluding consideration of how renewable energy dollars can play a role in transforming the production and consumption of energy, there is also a need to consider the aspect of community governance. The introduction of ecological property rights to money, realty and corporations introduces an ecological form of capitalism with quite different operating characteristics.

Ecological capitalism introduces continuous change into the power structures of society. It is only through change that progress can be achieved. Evolution is likewise predicated upon change and ecological property rights follow the example of nature. However, instead of change being progressive it can also be regressive and self-destructive. Checks and balances are required to constrain and mitigate regressive and self-destructive changes and these are not typically found, or are not present in sufficient richness, in contemporary societies.

Without checks and balances power can be become concentrated. It has been long recognised that power corrupts and absolute power corrupts absolutely. An appropriate division of power then becomes a condition for the building of sustainable communities. An appropriate division of power is also required to manage complexity. This is specified by the science of communication and control that developed in the mid 20th Century. The application of the science to social organisations at the beginning in the 21st Century provides criteria for designing the governance architecture of sustainable communities (Turnbull 2000a: 401−13; 2000b; 2002a; 2003b: 256−72).

The science of governance explains the laws of nature. It also explains why nature adopts network governance. This is to economise the volume of data, information, knowledge and wisdom that social animals need to receive, process, store and transmit to sustain their species. Network governance is most compelling illustrated by the network or network firms located around the Spanish town of Mondragón. The firms have over 60,000 workers governed by their stakeholders (Turnbull 2000: 199−225).

OTCs provide a way to transform existing corporations with a centralized command and control governance architecture to network firms governed and owned by their stakeholders like Mondragón firms. CLBs are also owned and controlled by their stakeholders and so become another type of multi-stakeholder mutual (Turnbull 2001b). Stakeholder governance requires firms adopting constitutions that introduce a rich separation of powers as illustrated by the Mondragón firms that introduce sustainable competitive advantages.

An analysis of Mondragón firms was undertaken by Thomas and Logan (1982) who reported:

> During more than two decades a considerable number of cooperative factories have functioned at a level equal to or superior in efficiency to that of capitalist enterprises. The compatibility question in this case has been solved without doubt. Efficiency in terms of the use made of scarce resources has been higher in cooperatives; their growth record of sales, exports and employment, under both favorable and adverse economic conditions, has been superior to that of capitalist enterprises.

The reason why the rich and apparently complex architecture of network firms provides competitive advantages is that it paradoxically simplifies the role of individuals (Turnbull 2000: 245). Other reasons why network firms provide operating advantages is provided by the laws of communication and control (Turnbull 2002b).

The science of corporate governance (Turnbull 2002b) identifies how competitive advantage of a stakeholder mutual is achieved without the necessity of it being publicly traded. This is because with an appropriate form of network governance, competition for corporate control is created internally between competing constituencies of stakeholders. Continuous increases in efficiency are achieved in this way (Trunbull 2000a: 401−13; 2001a).

Competition for existence also occurs in nature without the use of markets dependent upon money or prices. The evolution of life forms through natural selection is governed by feedback messages obtained from the local environment. Sustainable communities also require feedback information from their host bio-region to govern how they can adapt appropriately. Ecological capitalism introduces richer, more sensitive and responsive ways to initiate and facilitate changes to sustain society. It also changes how society is governed as the ownership and control of realty and corporations becomes dynamic, time limited and inclusive. This limits the concentration of power of individuals and their ability to exploit each other or the environment.

The possibility arises of local communities being partly governed by the characteristics of their host environment. This would assist in reversing the current trend of humanity governing their environment rather than allowing their environment to govern society as it did in primitive societies. Societies like traditional Australian Aboriginals could be described as environmental republics. For a modern society to be at least party governed by its local environment a bottom up political economy is required. CLBs represent a basic building block for a global system of governance (Turnbull 2003). In the language of system science CLBs would become the bottom level of hierarchy of "holons" described as a "Holarchy" (Turnbull 2000: 130).

The changes required to improve the ability of society to be sustainable are not as great at those that have incurred in the past. Table 3, Dominant characteristics of social change: Past, Present and Sustainable Future details many of the changes that have occurred over the last couple of millenniums and compares the changes with the current situation and that proposed in this article for a sustainable future. However, for humanity to avoid extinction from global warming, the more modest changes proposed are required in a much shorter time. Global warming has created the need to introduce elements of environmental republicanism for governing society.

Financing urban communities with sustainable energy dollars provides one way to begin transforming society to facilitate the survival of humanity. The transformation of the current system of ownership and control of money, realty and property provide complementary approaches to reinforce the establishment of sustainable communities.

Table 3, Dominant characteristics of social change: Past, Present and Sustainable Future

	Characteristic	Past	Present	Sustainable Future
1	People treated as	Property	Resource	Potential
2	Role of women	Breeding	Cheap labour	Full partners
3	Purpose of work	Sustenance	Income distribution	Fulfillment
4	Distribution of national income.	Employment	Employment & government transfers	Employment & transfer of property income
5	Relationship to the environment	Subservient	Dominant	Stewardship
6	Natural resources	Use	Exploit	Sustain
7	Source of land acquisition	Conquest or inheritance	Purchase or inheritance	Use and/or purchase
8	Period of land ownership	Time of use	Perpetual	Time of use & so limited
9	Source of business ownership	Start up or inheritance	Purchase/start up & inheritance	Start up, investment and stakeholder rights
10	Business owners	Proprietors	Shareholders	Stakeholders
11	Period of business ownership	Life of owner	Perpetual	Limited
12	Property rights	Discretion of Sovereign	Static, monopoly and perpetual	Ecological: dynamic, inclusive, time limited
13	Structure of business	Paternal and centralised	Hierarchal and centralised	Decentralised stakeholder mutuals
14	Monopolies	Granted to private interests by Sovereign	Prohibited or controlled by Government	Eliminated by time limited dynamic rights
15	Institutions	Perpetual	Evolving	Dynamic
16	Basis of money	Commodities	Fiat of government	Goods or services
17	Creation of money	De-centralised competitive basis by private sector	Centralised government controlled monopoly	De-centralised competitive basis by private sector
18	Cost of money	Cost of storage & quality control	None, earns interest	Demurrage cost
19	Allocation of resources	Command & control	Markets & hierarchies	Use, benevolence, semiotics & markets.
20	Value system	Absolute	Materialistic	Humanistic
21	Distribution of economic values	Autarchic	Market forces	As to stakeholder contributions & need
22	Accumulation of economic value	Limited by political power	Not limited	Limited by ecological property rights
23	Economic & political power	Centralised in Sovereign	Government & big business	Decentralised to communities.
24	Power architecture	Hierarchy	Oligarchy	Holarchy as in nature

7.0 References

Benello, C. G. (1997), 'Community financing resource optimization' in Morehouse, W. (ed.) 1997, Chapter, 23, pp 184−91.

Davis, A.M. and Palumbo, M.G. (2006), "The Price of Residential Land in Large U.S. Cities", Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C., available at http://www.federalreserve.gov/Pubs/feds/2006/200625/200625pap.pdf.

Fisher, I. (1934), *Stamped Script*, Adelphi Press, New York.

Galbraith, J.K. 1976, *Money: Whence it came, where it went*, Penguin Books, England.

Greenspan, A. (1997), 'Central Banking and Global Finance' presented to the Catholic University of Leuven, Belgium, January, available at: www.fame.org/PDF/Gsjan14_R2.PDF.

Hayek, F. A. (1976a), *Choice in Currency: A Way to Stop Inflation*, The Institute of Economic Affairs, Occasional Paper 48, London.

Hayek, F. A. (1976b), *Denationalization of Money: An Analysis of the Theory and Practice of Concurrent Currencies,* The Institute of Economic Affairs, Hobart Paper Special 70, London.

Howard, E. (1946), *Garden Cities of To-Morrow*, Faber and Faber, London.

HR, (2004), 'State and Local Government Economic Empowerment Act', introduced into the House of Representatives of the 108th Congress, May 6, available at http://thomas.loc.gov/cgi-bin/query/z?c108:H.R.4310.IH.

Huber, J. & Robertson, J. 2000, *Creating New Money: A Monetary Reform for the Information Age*, New Economics Foundation, London, available at: http://www.neweconomics.org/Default.asp?strRequest=pubs&strContext=pubdetails&intPubID=31

Jacobs, J. (1985), *Cities and the wealth of nations: Principles of economic life*, Vintage Books, New York.

Jones, C., Hesterly, W.S. and Borgatti, S.T. (1997) "A general theory of network governance: Exchange conditions and social mechanisms", *Academy of Management Review*, Vol. 22, No. 4, 911−45, available at http://www.analytictech.com/borgatti/oppamr6z.htm.

OCED, (2000), 'Tobin tax: could it work?' *OECD Observer*, March 2000, available at http://oecdobserver.org/news/fullstory.php/aid/664/Tobin_tax:_could_it_work__.html

Riley, D. (2002), *Taken for a Ride,* Centre for Land Policy Studies, London.

Morehouse, W. (ed.), (1997), *Building Sustainable Communities: Tools and Concepts for Self-Reliant Economic Change*, Intermediate Technology Development Group of North America Inc. New York, Second Revised Edition,

Speiser, S.M. 1986, *The USOP Handbook: A guide to Designing Universal Share ownership Plans For the United States and Great Britain*, The Council on International and Public Affairs, N.Y.

Swann, R. 1997, 'Building a community banking system', in Morehouse, W. (ed.) 1997, Chapter 22, pp. 178−83, New York.

Thomas, H. & Logan, C. 1982, *Mondragón: An economic analysis*, George Allen and Unwin, London.

Turnbull, C.S.S. (1975), *Democratising the Wealth of Nations*, Company Directors Association of Australia. Full text of second edition published in the virtual library funded by the Ford Foundation Capital Ownership Group project in 2000, available at: http://cog.kent.edu/lib/TurnbullBook/TurnbullBook.htm.

Turnbull, S. (1976), "Land Leases without Landlords", presented to United Nations Habitat Forum, Vancouver, June 8th, available at http://ssrn.com/abstract=630861.

Turnbull, S. (1983), "Cooperative Land Banks for low Income Housing" in Angel, S., Archer, R.W., Tanphiphat, S. and Wegelin, E.A. (Eds), *Land for Housing the Poor*, Select Books, Singapore, Section IX, pp. 511−26, available at http://ssrn.com/abstract=649642**.**

Turnbull, S. (1986), 'Financing World Development through Decentralised Banking', in *Perspectives in International Development*, Ed. Mekki Mtewa, pp.91–6, Allied Publishers, New Delhi.

Turnbull, S. (1992), 'New Strategies for Structuring Society From a Cash-flow Paradigm', presented to the Fourth Annual Conference of the *Society for the Advancement of Socio-Economics*, University of California, Irvine, March 27, available at http://ssrn.com/abstract=936868.

Turnbull, S. (1996), 'Financing a Social Economy', in *Bank Safety and Soundness - The Bergamo Report*, Institut für Finanzdienstleistungen e.V. (IFF), Ed. Ufo Reifner, Proceedings of the Third International Conference on Financial Services, 'Bank Safety and Responsibility towards the Consumer', pp.115–18, Hamburg, Germany.

Turnbull, S. (1997a), 'Creating a Community Currency', in Morehouse, W. (Ed.) 1997, Chapter 21, 167−77.

Turnbull, S. (1997b) 'Elements of Autonomous Banking' in Morehouse, W. (Ed.) 1997, Chapter 20, 159−66.

Turnbull, S. (1997c), "Stakeholder Co-operation", *Journal of Co-operative Studies*, Society for Co-operative Studies, Vol. 29, No. 3, January, (no.88), pp 18−52, available at http://ssrn.com/abstract=26238.

Turnbull, S. (2000a), "Stakeholder Governance: A cybernetic and property rights analysis", in Tricker, R.I. (ed.), *Corporate Governance: The history of management thought*, Ashgate Publishing, London, pp. 401−13, available at http://cog.kent.edu/lib/turnbull6/turnbull6.html.

Turnbull, S. (2000b), *The governance of firms controlled by more than one board: Theory development and examples*, PhD Thesis, Macquarie University, Sydney, available at http://ssrn.com/abstract=858244

Turnbull, S. (2001a), The case for introducing stakeholder corporations', Working Paper, Institute for International Corporate Governance and Accountability, The George Washington University Law School, available at http://ssrn.com/abstract=436400.

Turnbull, S. (2001b), "The competitive advantage of stakeholder mutuals", in Birchall, J. (ed.), *The New Mutualism in Public Policy*, Chapter 9, pp. 171−201, Routledge, London, available at http://ssrn.com/abstract=242779.

Turnbull, S. (2002a), *A New Way to Govern: Organisations and society after Enron*, New Economics Foundation, Pocket Book No. 6, London, available at http://ssrn.com/abstract_id=319867.

Turnbull, S. (2002b), 'The science of corporate governance', *Corporate Governance: An International Review*, Vol. 4, October, pp. 256−72, available at http://ssrn.com/abstract_id=316939.

Turnbull, S. (2003), 'Emergence of a Global Brain: For and from World Governance', Working paper, May 2003, available at http://papers.ssrn.com/abstract_id=637401.

Turnbull, S. (2006), 'Grounding economics in commercial reality: A cash-flow paradigm', in Kreisler, P., Johnson, M. and Lodewijks, J. (Eds.), *Essays in Heterodox Economics: Proceedings, refereed papers, Fifth conference of Heterodox Economics*, University of New South Wales, Australia, pp. 438−61, available at http://ssrn.com/abstract=946033.

Turnbull, S. (2007), 'A framework for designing sustainable urban communities', Working Paper, available at http://papers.ssrn.com/abstract_id=960193.

White, L.H. (1993) ed., *Free Banking: Modern Theory and Practice*, Volumes I, II, and III, Edward Elgar, England.

oooOOOooo

10,230/15042007