E-SYSTEMS

Investing in Equity, Efficiency, and the Environment

Rob Lichtman, Director ✧ EMAIL: rob.lichtman@esysfound.org Web Site: www.esysfound.org

ROERSTRAAT 54 ✧ 1078 LR AMSTERDAM ✧ THE NETHERLANDS ✧ TEL: +31 (0)621 977 000 ✧ NL REG. NUM. 3303547

The Low Emissions Economy Partnership (*LEEP*) Initiative:

Organizing and Financing Sustainable Urban Innovation

by

Rob Lichtman, Director
E-Systems Foundation
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The Low Emissions Economy Partnership (LEEP) Initiative

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The Low-Emissions Economy Partnership (LEEP) Initiative

1. SUMMARY

The Low-Emissions Economy Partnership (LEEP) Initiative proposes working intensively with a small, global group of urban regions to make a breakthrough on sustainable resource use. The €30M initiative in three pilot cities is designed to overcome a range of market and government failures, and address gaps in organisation, analytics, and finance. It suggests a public-private partnership structure that can become self-financing within five years, through large savings generated by more sustainable energy and water systems. The proposed initiative will save over €100 M per city. This offers a model that can be replicated widely elsewhere.

2. DISCUSSION: THE URBAN IMPERATIVE

The LEEP initiative is justified for several reasons:

- Urban areas remain the actual economic engines of most nations, accounting for up to 75% of national output.

- Urban areas comprise the largest concentrated source of greenhouse gas emissions, and this will increase from 66% to 75% of total emissions by 2030 (IEA, *World Energy Outlook*, 2008). While some disagree with the amounts, the trend is clear.

- Urban areas contain the largest concentration of poverty, with serious risks of political instability caused both by uneven economic growth and rising sea levels, which threaten over 600 million people over the next several decades, through both flooding and disease.[1]

- Urban areas have tremendous underutilized power, perhaps even more than other levels of government, to influence choice of technologies, building codes and the pattern of spatial growth – all of which either prevent or promote sustainable resource use. Urban areas are also more easily accountable to citizens.

3. CONSTRAINTS

However, urban areas face a number of important constraints that are overlooked by current "sustainable city" initiatives:

[1] G. MacGranahan *et. al.* (2007) "The rising tide: assessing the risks of climate change and human settlements in low elevation costal zones", in *Environment and Urbanisation*. Vol. 19(1): 17-37. This estimate will understate the problem if current IPCCC estimates of the rates of climate change and sea level rise are revised upwards, as seems likely, based on more recent greenhouse gas emissions measurements.

- **Urban governments have woefully inadequate capacity**, the mix of skills, finances, and ability to innovate, further limited by complex tendering rules and political interference.

- **Urban governments have a very simplistic, disjointed understanding** of resource flows, financial flows, and optimal technology choices, due partly to the "silo-ing" of portfolios, where e.g. energy, water engineers, and spatial and financial planners rarely optimize solutions together. Cities of +1 million residents have annual budgets that approach $1 billion. Yet compared to energy firms or investment banks managing similarly large budgets, urban governments have very crude financial and long-term investment planning tools.

- **Practical methods are lacking that show the linkages between economic growth, infrastructure technology choices, emissions, and long-term fiscal and social impacts.** Consultancies, universities, infrastructure firms, government planners, and citizen´s groups are not easily brought together to support municipal decision-making.

- **Businesses are constrained by shareholders' or lenders' demands, shorter time horizons, and unrealistic expectations** of being a sole urban supplier to cover fixed costs. Businesses may push "their" solution vs. dealing with more complex competing demands voiced in the urban political context. With high transactions costs, smaller innovative firms face high barriers to entry. Even before the current credit crisis, businesses and urban governments trusted each other warily.

- **Existing, profitable solutions to reduce emissions, improve service delivery, and reduce costs are routinely ignored** due partly to capacity issues, but also to serious structural problems, e.g. disincentives among value chain actors and multiple market failures.

4. MODELS OF CHANGE

Current thinking about how to stimulate more sustainable urban resource management can be grouped within two models of change:

1. **The conventional view** says a mix of businesses and market forces, enlightened government regulation, especially regarding energy and water prices, empowered citizen's groups, steady technological innovation, and "sharing" best practices will all come together and save the day.

2. **The alternative view** says while all this is necessary it is not sufficient. Even if a range of supportive or breakthrough technologies and tax/price regimes were present, even if the political will is there, all will be overwhelmed by pervasive market failures, split incentives amongst actors in the decision or value chains, and the profound gaps in sheer implementation capability of local government, business and citizens' groups.

Arguably, even with existing technologies and prices, we should be able to cut energy and water demand 20-50% in a cost effective manner.[2] Indeed, the correct market signals have actually been in place for probably 20 years. Our detailed efficiency work in Cape Town has shown that even with very low South African electricity tariffs, efficiency investments would yield almost risk free 15-20% IRRs in large buildings, returns that should be hugely attractive in the current capital constrained recession. Yet, these opportunities are being routinely *ignored* unless we work intensively with buildings managers and engineering firms, providing extensive due diligence, communications, and hand-holding via a small dedicated office.

Perhaps over time, the relevant markets will mature, price increases will become more draconian, and transactions costs will go down, etc. But extensive international research suggests this is highly unlikely, any time soon.

Increasingly, influential business groups are coming to support the alternative view. Thus, in a recent influential study, McKinsey (2008) notes:

- Market forces alone will not capture the substantial potential for energy productivity and lower energy demand growth. Our research shows that even a sustained oil price of $70 a barrel would not have a significant impact on energy demand…Global energy markets are rife with market inefficiencies and distortions that explain why consumers and businesses fail to capture the savings from higher energy productivity.

- … Real obstacles stand in the way of investments in energy efficiency [especially] a set of *market and policy imperfections*…Consumers don't have enough information about energy-efficient options, fuel subsidies discourage efficient energy use, and landlords and tenants alike resist energy-efficient investments they believe would mostly benefit the other party.

- [Thus], to capture the full energy productivity prize, energy intermediaries must *find innovative ways to overcome information and agency barriers* (italics added, p. 1).

- Subtle changes in the way users receive information and learn about their choices have direct pecuniary implications and can encourage consumers to take advantage of the savings available to them. (p. 10).[3]

The deeper problem is that all these actors are locked in a so-called "Nash Equilibrium", where there is little unilateral reason to cooperate, given the current structure of incentives,

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[2] As examples, see McKinsey Global Institute´s supply cost curve analyses in over 20 countries (https://solutions.mckinsey.com/ClimateDesk, 2007-on-going), and the World Business Council´s "Energy Efficiency in Buildings" project (www.wbcsd.org). An on-the-ground example is the Empire State Building in New York City large scale retrofit effort (www.esbsustainability.com) that is leading to almost 40% savings that pay for themselves within five years, on a structure built in the 1930´s.

[3] Recent work on market failure in energy includes McKinsey (2009): *Pathways to a Low-Carbon Economy*, (2008) *How the World Should Invest in Energy Efficiency* and (2007): *Curbing Global Energy Demand Growth: The Energy Productivity Opportunity*, available from www.mckinsey.com website; B. Prindle (2007): "Quantifying the Effects of Market Failures in the End-Use of Energy", study done by the American Council for an Energy-Efficient Economy for the International Energy Agency, available from www.aceee.org. See also A. Lovins (2005): "Energy End-Use Efficiency"; and (1992): "Energy-Efficient Buildings: Institutional Barriers and Opportunities", both available from www.rmi.org/sitepages. All these studies contain extensive cross-country references.

information, and mistrust.[4] Actors maintain their individual behaviours even when they result in suboptimal results and miss out on greater, overall gains. That equilibrium structure can only be changed by a combination of outside information, incentive funds, and organisation.

Limitations of the Conventional Response: Current Urban Initiatives

A quick look at a number of current sustainable urban initiatives illustrates the problem. "Mega-efforts" such as the troubled Chinese project on Dongtang island, near Shanghai, the $35 billion effort in Songdo, South Korea, or the $22 billion effort in Masdar, UAE, are top-down engineering demonstration solutions with little relevance to most cities. The International Council for Local Environmental Initiatives (ICLEI) has its "eco-Budget" process, building upon older Agenda21 work, tries to provide a "scorecard" to urban governments. The Clinton Initiative has partnered with Microsoft to develop urban greenhouse gas emissions tracking/accounting software as part of their "Project 2 Degrees", and has a range of collaborations with the "C-40 Cities", which include increasing energy and water efficiency in municipal buildings, and the benchmarking of new "Carbon Positive" large scale eco-property developments. The World Sustainable Business Districts Network links efforts within key cities. The World Bank is exploring working with a number of cities to develop a more integrated economic-environmental planning framework, and is building a new "Urban Knowledge Platform". There are a range of interesting demonstration projects in Stockholm; Copenhagen; Amsterdam, Berkeley, California; Freiburg and Berlin, Germany. There are a multitude of other national initiatives, best practice databases at e.g. C40/Clinton Global Initiative UN-HABITAT, the Sierra Club's "Cool Cities", "the Living Planet" programme of the WWF, and others. The World Economic Forum's "Slim City" produced a set of "Knowledge Cards", and it has a range of on-going "work streams" in the areas of "Smart Energy, Urban Mobility, and Sustainable Buildings", all part of presenting a "risk free platform…to exchange ideas". The World Business Council on Sustainable Development has modelling projects in urban energy efficiency and mobility, and a new "Urban Infrastructure Initiative" where a team of its member multinationals is working in several cities. The OECD is beginning a multiyear "Green Cities" effort.

5. THE GAPS

While some of these conventional efforts offer pieces of what is needed, they are scattered, disconnected, and often involving special funding conditions.[5] Unfortunately, none of these efforts grapple convincingly with a set of fundamental issues:

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[4] This notion comes from John Nash's work, i.e. Nash (1950) "Equilibrium Points in N-person Games", *Proceedings of the National Academy of Sciences* 36, pp. 48–49. His analytical framework, for which he won the 1994 Nobel Prize in Economics, became the basis for modern game theory, and which was later popularized in the 2001 film, *A Beautiful Mind*.

[5] Even where good beginnings have been made, e.g. New York City's "PlaNYC", it was due to an unusual combination of good leadership, and access to resources far beyond those available to most cities (e.g. the Rockefeller Foundation grant that supported the Climate Change Risk Assessment and the close proximity of world class university and consultant experts). Impressive Swedish projects must be understood within a context of large tax revenue streams under local control, city ownership of land and development rights, a supportive culture and regulatory regime, and highly competent local governments.

ORGANIZATION	City government departments are often "siloed" off from each other and the financing departments. They underestimate the effects of structural constraints and market failures. They lack long-term organizational capacity and finance to implement, to overcome limitations of local government that span across legislative and regulatory limits, corruption and political interference, to fiscal disincentives and a lack of control over budget sources. Businesses continue to have short-term return time horizons, and are not set up to integrate across sectors and are reluctant to provide up-front financing to deal with large transactions costs managing government and other stakeholders.
ANALYTICS	Performance metrics are static and narrow. Their links with broader political, financial, and social development decisions are uneven or non-existent. They fail to deal with lifecycle costs, of capital vs. operating budgets, and different growth and land use scenarios. Their use, if any in governing, is too dependent upon a particular government. They are rarely comprehensible to businesses and citizen´s groups. Effective integrated planning frameworks are underfinanced, compared to the billions spent by investment banks with similar budgets and assets at risk as in large cities.
FINANCE	Financing is too dependent upon complex, uncertain, external domestic and international revenues and grant programs. They are not creating an approach that can become self-financing, locally controlled and generated, and thus able to be replicated elsewhere.

The professional leadership, organization and finance are simply not in place to provide credible urban innovation, careful monitoring, and an ability to become financially viable. A dedicated local organization is needed to help address these questions, in an integrated and strategic fashion. This capacity gap, or borrowing from IT jargon, "the problem of the last 30 miles", is *the weak link* in the chain. Credible organisation and seed funding must build the leadership and management capacity that can then drive the rest.

This lack of capacity is the key bottleneck, and must be the focus of a new approach to urban sustainability. A small, dedicated public-private partnership group could hire competent staff and manage local innovation / incubator funds flexibly. The LEEP office would work closely with city governments, local business and community groups to do the integrated analyses upon which all else builds. It could negotiate a range of revenue-generating activities. These would include participating in strategic housing-mixed use properties to jump start local engineering and design capabilities, to managing large parts of the overall urban energy and water flows, taking a fee from the huge savings this could

generate, all of which can make the effort self-sustaining, and able to be replicated elsewhere. This also finances delivery on large low-income housing close to employment opportunities, a critical piece of the puzzle.

A summary of the local LEEP partnership capabilities needed is shown below:

LEEP PARTNERSHIP CAPABILITIES	COMMENT
Independent Public-Private Partnership	Has own Board, comprised of representatives of local government, businesses, finance, universities, community-based NGOs.
Provide patient finance & seed capital	Offers attractive rates, draws in additional private capital, retains a portion for operations and manages local $2-5M incubator / innovations fund.
Neutral forum for deal-making & conflict resolution	A credible, objective, flexible, apolitical organization is needed with sufficient capacity to innovate.
Integrate & negotiate across government & supplier boundaries	Feeds ideas and deals into long-term planning, i.e. *public* (service delivery, less pollution, better land use) & *private* (affordable housing, reduced energy, & water use); use state-of-the-art integrated energy, water, transport planning models to link to local budgeting systems.
Works on a project or program basis; Delivers local & international engineering & financing skills	Does not conflict with local government; rather it supports it when useful to both parties. Office can also start new private initiatives as appropriate. Key is to provide expertise without cumbersome city bureaucracies and political interference.
Capture savings from energy, water, waste systems efficiency gains	Reinvest in pro-poor initiatives and incubate new businesses through bulk purchase agreements and fees.
Completes one large low-mixed income, mixed use / housing property development	Use state-of-art eco-design principles & technologies, to complete large scale project close to the city center; critical demonstration, incubator, learning effects. Closely involve community housing groups in all steps. Also helps generate revenue to make effort self-financing.

6. LEEP INITIATIVE STRATEGY

The LEEP Initiative combines a number of elements into a more comprehensive strategy:

- **Make effort "urban needs driven"** so it is not seen as business-focused *per se*; bring in social and environmental concerns of governments and citizens, and the resource efficiency needs of business. Set up a respected, diverse Advisory Group to support it.
- **Work with a limited group (3-5) of mid-sized, strategically important city-regions,** not mega-regions e.g. London, and not hugely capitalised show pieces, but rather existing, important, committed cities of 1-4 million residents. Create a deeper network and learn from each other's actual experience.
- **Build and finance the capacity** to overcome a number of important constraints facing urban governments and businesses; provide a flexible, locally-managed innovation fund. In a sense, this creates the functional equivalent of a special economic zone where normal rules and constraints are relaxed to promote innovation, such as what China did along its coast, or (more controversially) what Paul Roemer and others propose with "charter cities". What is argued here is a more modest, local grown and managed way.
- **In each region, work with a dedicated, public private partnership organisation** to facilitate (force) the integration needed, by combining talented staff with control over incubator/innovation funds, backed by international technical support, to work with local governments and businesses as a neutral broker and facilitator. Ensure that the partnership is strong enough to not be dependent upon a particular government in office, so that it can operate throughout several political cycles.
- **Establish a small LEEP office to coordinate the Initiative**, raise funds, provide technical, management support, monitor results, and act as a neutral platform to bring stakeholders together.

7. OVERALL DELIVERABLES (3 YEARS)

- **Build organisational capacity in participating regions**, including local "Innovation funds", obtained from large foundations, open systems of governance, building when possible upon existing organizations (e.g. in Cape Town, and San Diego).
- **Provide on-going technical support for regions** to allow work to be integrated into business and government investment planning, through a combination of consultancies, infrastructure and engineering firms, and university groups as appropriate.
- **Develop and test an Integrated Analytical Framework** – developed with competent consultants, tested in participating regions. This would be a joint effort to be discussed with e.g. the World Bank's Urban Department; IIASA, Wien; some urban planning consultancies such as Calthorpe and Fregonese Associates, some pioneering local government work in Sweden; ARUP, Buro Happold, WSP, Sweco, McKinsey, and others. This would allow cities to see economic and spatial growth, energy, water, waste linkages and the effects of different technology and policy packages, over time. It must go well beyond the simple "accounting" frameworks Rather it must respond to broad urban government and business decision-making needs, versus a narrower environmental agenda, and be tightly linked with city budgeting processes.

If we want to advance the delivery of regional solutions that are equitable and sustainable, we need a tool that clearly shows a mayor, a finance department, local banks and businesses, journalists, and citizens groups the benefits of the better way. We do not have this tool, at present. E-Systems actually tried to develop this in Cape Town; we used a systems dynamics model, but we had limited resources, no follow-up and it was only a partial first look. So we are reasonably familiar with the detailed issues of what this means.

What we do have globally is a series of incomplete, inconsistent, partial, scattered approaches, e.g. See the vast array of indices, benchmarks, etc. from, e.g. ICLEI, the World Bank, OECD, C40 Cities, Microsoft-Clinton "2 Degrees", and a range of consultancies and universities, on *ad infinitum*. All are fairly useless; they are static, too technical, and cannot convince the powers that be[6]. What might the "planning tool" look like? Some key elements:

- Be dynamic – to show different scenario mixes of policies and technologies over time.
- Include lifecycle costs and benefits – with transparent assumptions.
- Show effects of different growth scenarios – esp. land use and population densities.
- Reduce and integrate this complexity without ignoring it.
- Show the effects of all on municipal budgets – capital and operating, over time.
- Show the effects on local taxes. (This and the budget issue may well be the keys to presentation and impact).
- Be visually compelling, comprehensible, adjustable, and accessible to/by a diverse audience of non-specialists.
- Get embedded into municipal financial planning (because it works) – at an affordable cost (money *and* time).
- Ideally, be able to be used by many governments – so the tool is not just a custom piece of software and the development effort could be used widely.

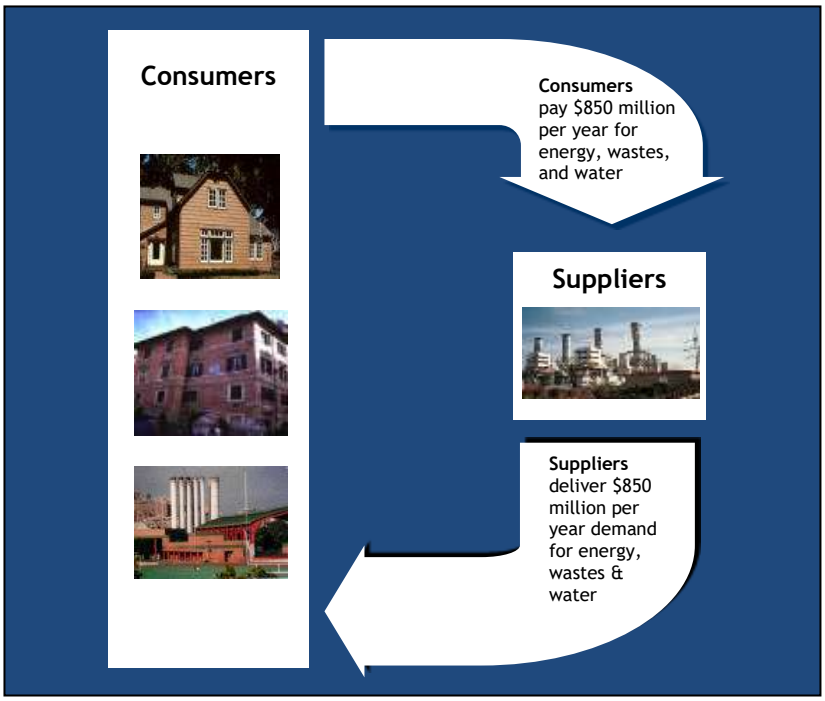
- Using all this, **develop a regional sustainable resources strategy for each region,** with public and private sector buy-in, with 1) specific investment plans and targets on emissions reductions, energy and water delivery, and 2) credible projects that meet social goals (set in motion several affordable housing/mixed-use, large eco-design property developments).

- **Create a self-financing model** via fee recovery (through bulk management of energy and water flows, advising on large scale eco-property development, etc.) – so the effort

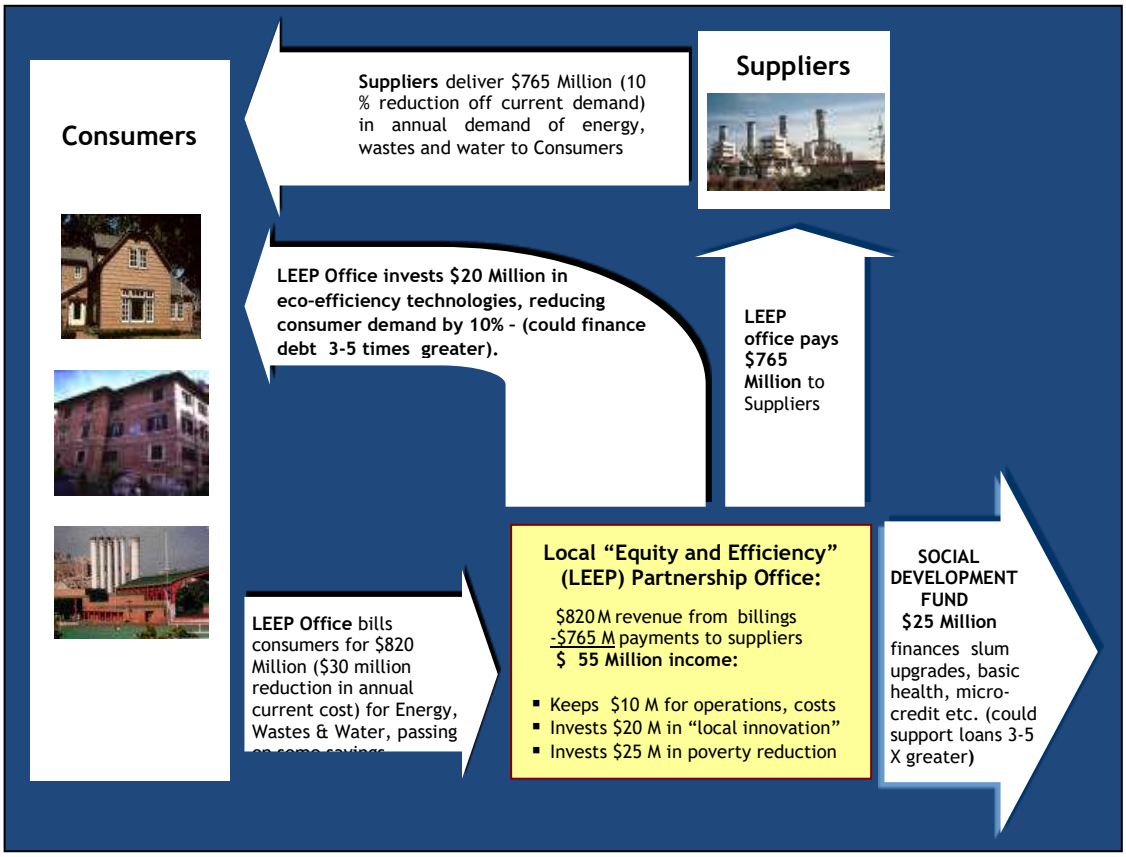
[6] See a useful summary of recent work in Patrick Condon et. al. (2009) "Urban Planning Tools for Climate Change Mitigation", available from the Lincoln Institute of Land Policy, Cambridge, MA. There is a deeper issue here: what really affects or influences decision-making at the local/regional level? Do we really understand how they balance political and financial concerns? An effective analytical tool will need to address this. The issue needs further discussion with some actual urban decision-makers, rather than the usual economists and environmentalists pushing metrics that they find useful. We have been surprised in discussions with key staff in e.g. New York City and Chicago, that little cost-benefit calculations were used. Decisions were taken based on leadership and political judgements. The analytical frameworks should at least make such discussions more open and accessible. This analytical framework problem has been flagged elsewhere (OECD, 2009: *Competitive Cities and Climate Change*, several workshops sponsored by US EPA, and E-Systems is in discussion with a number of global engineering and consulting firms about the issue.

can be replicated elsewhere, in 3-5 years. While there are various ways this could be configured depending upon local conditions, e.g. government or utilities could pay a performance fee, an example s shown below:

a. Current Resource Use (2010): Cape Town, South Africa



b. Financing Development Through Sustainable Resource Use



8. ADDING VALUE

The LEEP initiative develops a more comprehensive approach than current conventional efforts to address urban sustainability. It adds value in the following manner:

VALUE CREATED	COMMENT
1. Provide a Credible Strategy	The LEEP effort is designed to provide comprehensive, professional support to overcome the constraints that affect urban regions, including skilled management, practical "integration" tools and knowledge of technologies, finance to buy down transactions costs and address market failures, and a long- term capacity to innovate and respond to broader political, economic, and social demands.
2. Provide Real Integration	The LEEP initiative provides a unique combination of technical support, finance, and organisation to bring stakeholders together, to drive down transactions costs, and to use sustainable resource use to support long-term issues of job creation and strengthening municipal finances. It creates a capacity where integrated solutions are developed and made visible. Examples include reducing urban water flows for heating and cooling to save huge amounts of energy and reduce greenhouse gas emissions and costly urban infrastructure investments; using transportation subsidies more efficiently to promote denser housing closer to jobs, etc., or capturing waste methane to provide cooking gas, heating and cooling for low-income residents. It would show how all this affects capital and operating expenses over time for business and government. All require sustained cooperation among a range of private and public actors, integrated analysis and follow-through that only a dedicated office can provide.
3. Build Lasting Capacity to Innovate	The LEEP effort would support private-public partnership organisations that work closely with local government, businesses, and citizens. This organizational form needs technical and financial support, over a medium term time horizon. The organisation must be professional and neutral to last through different political cycles, and to have a range of staff skills and its own innovations funds. This needs a dedicated office as traditional urban government departments, with limited staff, budgets and skills have all they can do to manage existing infrastructure and systems.
4. Catalyse Finance	The LEEP initiative will help channel finance to support the innovation and integration needed, through its extensive set of contacts with private and public donors and corporations. It can do this far more effectively than an individual city or company by using the neutral, global reach of its donor and technical network.

5. Deliver Technical Support & Planning Framework	The LEEP effort would work with one or several teams to develop a planning tool that would be used across participating regions. A practical framework needs to be coupled to city decision-making/ financial models to show the linkages between energy-water-waste flows, emissions, and city government long-term capital and operating budgets. This framework needs to balance technical sophistication so it can show the effect of some credible, detailed scenario planning (with different technology and policy packages) while still being compelling to grab the attention of a mayor's cabinet and finance department, business leaders, and journalists. The LEEP initiative would organize the development of such a tool and collaborate with some of the top teams in the world, such as World Bank Asia Department.; IIASA, Wien; Sustainable Cities Group, Lund University, Sweden; ARUP, and possibly McKinsey, building upon their multi-country greenhouse gas abatement studies. The framework would need to fit different city-regions planning and budgeting processes but would contain many common elements. This is a critical missing piece in integrated planning. Catalyzing its development would represent a unique contribution and potential asset. It would be useful in any city, and would go well beyond simple, static accounting frameworks used by e.g. the Clinton Initiative in its "2 Degrees" or "Carbon Positive" projects, or ICLEI's "eco-budget" efforts.
6. Share Solutions	Rather than vague "sharing knowledge", the LEEP effort shares specific solutions, in specific places. It helps test ideas in a small range of pilot regions, and it will develop a range of collaborations for the regions to share costs, to cooperate on shared technologies, and arrange for more detailed technical, financial, and organizational exchange, e.g. there may be a range of common energy efficiency financing mechanisms, or ways to use biological systems to treat wastewater that could be jointly developed by city-regions. It monitors progress and over time can bring in new city-regions to use this experience.
7. Create a Model That Can Be Replicated & Become Self-Financing	By combining capturing a portion of efficiency gains, charging various fees, and sharing of returns from new eco-property development, the overall LEEP effort can become self-financing, and able to be expanded to other urban regions (Section 11 below explores some cash flow scenarios). Again this needs to be independent of a particular political or donor cycle.

9. COORDINATING THE EFFORT: E-SYSTEMS

Established since 1998, E-Systems is a non-profit foundation, with an independent board, registered in Amsterdam. E-Systems provides seed capital and technical support to large urban regions. Beyond having conceptualised the idea, E-Systems would develop and support the LEEP Initiative in several ways:

1. **We can bring several city-regions fairly quickly to the LEEP initiative:** We have a long-standing collaborative agreement with the World Business Council for Sustainable Development (Geneva) and are working with them and the C40 to test the LEEP idea. Discussions are now underway in Stockholm, Amsterdam, Paris, and several other candidate regions in Latin America and Asia.

1. **Cape Town, South Africa**: We have extensive relations with the Cape Town City government and the public-private partnership organisation it helped establish, the Cape Town Partnership. Since 2005, E-Systems has financed a review of sustainability in City capital investment planning; coordinated the most comprehensive regional baseline studies of energy, waste, and water use; supported preliminary planning for two large scale mixed use/ mixed income eco-design property developments; financed an integrated model that looks at long-term linkages with energy, waste, water systems and municipal budget liabilities; and established the first private sector led energy and water efficiency initiative for the inner city that helped finance large building audits and sharing of efficiency gains. Much of this work is on-going, and it is expanding to include incubator funds for SME start-ups in energy and water efficiency, exploring large scale inner city housing alternatives, and a more sustainable look at 20 year city infrastructure investment needs. The Cape Town Partnership is the key local player in this, involving a broad range of local public, private, university, and citizen's groups. They work closely with the UCT team – the African Center for Cities..

2. **San Diego, California**: We have relationships with key private sector actors who are creating a new push for regional sustainable development as part of the US $ 1 billion San Diego Foundation, the newly formed Equinox Center, and various connections with the Obama Administration who see Southern California as a key area of interest due to its large energy and water needs and border issues with Mexico. The idea, broached informally, of joining a global LEEP initiative has been met with great interest. A California site also provides links with the state's powerful technical and venture capital networks, as well as an extensive private foundation network already funding development work in San Diego.

3. **China**: We have a well-connected team, led by Dr. Ma Zhong, Director, Beijing Environment Institute, Renmin University. Dr. Ma is recognized as one of China's top environmental economists, he advises the State Environmental Planning Agency, the EU Commission, has managed a number of large World Bank projects in China, set up the Rockefeller LEAD program there, has brokered a number of deals to start biomass power stations with municipal governments. Dr. Ma has identified a number of candidate city regions.

- **Good network of global technical experts** – E-Systems tracks a wide range of energy and water technologies, policies, venture capital interests, and the activities of innovative

companies, universities, and donors. We have contacts in a number of firms, such as ARUP, Shell, GE Ecomagination, Soros Investments, the World Business Council for Sustainable Development, ARUP, Buro Happold, USEPA, and several departments in the World Bank. We have operational experience in setting up energy and water efficiency programs, and managing regional economic modelling projects.

- **Good network of established Foundation & EU donors contacts**. These include a number of large US foundations (Gates, Moore, Rockefeller, Google), and Dutch, Danish, German, and Swedish Development Cooperation Ministries.

- **Proposed Advisory Board contacts already established** with a number of candidates after discussions begun in Davos 2007, and which continue, who could be candidates for an active Advisory Board:

  - Ged Davis, Co-Director, World Energy Assessment.
  - Foundations Rockefeller: (President J. Rodin as this ties in with their urban interests), Google (briefly discussed with Larry Page), and the Gates Foundation (e.g. l, Melinda Walker), all to be brought in early.
  - International Donors: Dutch, Danish, German, Swedish Development Cooperation and MISTRA Urban Futures, and DG/TREN in the European Commission – where we have contacts.
  - Corporates – ARUP, Buro Happold, WSP, GE, Fluor, ABB, McKinsey Global Institute, Siemens, Vattenfall, Johnson Controls, CH2MHill, IBM, Cisco, Google.
  - Financial Institutions: D. Bloom (Generation Investments), V Khosla, T. Lombardier (LODH), Jonathan Soros (all aware of idea through prior contacts).
  - Technical Experts: Swedish e.g. TB Johansson, Lund University, Ulf Ranhagan and Nils Brandt, KTH University; Abha Joshi-Ghani, Manager, World Bank Urban Department W. McDonough; John Thomas, USEPA; Gordon MacGranahan, IIED London, all aware of the idea.
  - Civil Society: Possibly, someone from the WEF Social Entrepreneurs Programme (aware); Shack Dwellers International/Fund for the Urban Poor (aware); Neal Peirce, City-States, a member from each participating city.

10. COSTS & BENEFITS

A 3 city-region effort would cost about € 30M. It should be possible to recover this amount over a 5 year period as explained below. The number of city regions involved, levels of co-financing, the pacing of roll-out etc., are all issues that can be discussed. The initial capitalisation is needed to jump start the effort, and E-Systems has on-going funding discussions with large private foundations, international, EU, and US donor agencies, and private financial groups.

What is proposed is to prepare eventually for a fully-funded 3 pilot region effort to affect regional economies with a combined population of over 11 M people. Energy, waste, and water (EWW) expenditures would be reduced by over $1B per year, and greenhouse gas emissions reduced by over 8.5 Million Tons per year. These are very rough estimates, based on E-Systems' rule of thumb of 5% of income spent on managing EEW flows, and assume a 10% efficiency gain. The numbers are probably conservative; recent McKinsey greenhouse gas reduction cost curves suggest 30-50% savings are economically viable with existing technology. The table below shows the rough orders of magnitude involved:

Scale of Benefits: 3 Pilot Regions

Regional Economy	a Population	b Per Cap GRI	c Gross Reg Income/Yr	d 5% EWW Spending	e 10% savings	f Emissions CO2e T/ unit GDP *	g Total Emissions CO2e p Yr (c x f)	h 10% reduction estimate/yr
Cape Town	3,200,000	8,800	28,160,000,000	1,408,000,000.00	140,800,000.00	0.0008297	23,364,352	2,336,435.2
San Diego	3,400,000	44,000	149,600,000,000	7,480,000,000.00	748,000,000.00	0.00026662	39,886,352	3,988,635.2
China Urban Est.	5,000,000	4,500	22,500,000,000	1,125,000,000.00	112,500,000.00	0.0010465	23,546,250	2,354,625.0
	11,600,000		200,260,000,000	10,013,000,000	**1,001,300,000**		86,796,954	**8,679,695.4**

Notes: * Coefficients from www.cait.wri.org based on latest 2005–6 data and exchange rates. Based on nominal GDP not PPP corrected which increases intensity. Uses figures from California state data, and national South African and Chinese data.

The LEEP Initiative effectively finances transactions costs, and provides urban regions with working capital and planning support. It seeks to provide an attractive combination of lower cost of innovation funds, and objective technical support to help urban governments, businesses and citizens' lower costs, risks, and significantly improve living standards.

These stakeholders cannot otherwise obtain access to this comprehensive package of funds and services. In return, a set of contacts is signed with either an urban government or a government-business consortium to cover these costs plus a return within a 5 year period.

The LEEP offices would combine a variety of approaches within this broad framework to generate revenues:

- Obtaining a percentage of energy, waste, water savings if the LEEP office manages these flows, as described earlier.
- Straight broker or consulting fees, according to a fixed amount and schedule.
- Various concession arrangements – build operate transfer, build operate, finance, transfer, etc.
- Equity in new businesses, or property development.

Indicative costs for the effort are shown below (in Euros):

3 City 3 Year LEEP Program (in EUR)

ITEM	Per yr per region	3 regions / 1 yr total	3 YR TOTAL
Regional Office (5 people, rent, IT etc.)	1 million	3 million	9 million
Local Innovation Seed Fund (capitalized one time)	1 million	3 million	3 million
Global Coordination Office		1 million	3 million
Tech Consultants (team of 5 at 3 months/year, fees travel)		1 million	3 million
Contingencies		0.5 million	1.5 million
TOTAL:	**2** million	**8.5 million**	**19.5 million**

11. STAKEHOLDER CASH FLOWS

In view of the savings the LEEP initiative can generate for urban regions, it is appropriate to recover a portion of the savings to support and expand slowly the LEEP initiative. If through the LEEP initiative, an urban region saves € 50 M per year, over 5 years; the present value of these savings exceeds € 100 M. The LEEP Initiative could ask for 1-2% of this as a fee, potentially realizing over € 1 M per region; actual savings and fee valuation could be much higher. An example of how resource flow savings could be shared among consumers, businesses, and investors is summarized below, based upon energy and water savings from a range of international data, e.g. the McKinsey supply cost curves (2008-2009), cited earlier:

LEEP Initiative: Indicative Cash Flows (Millions of Euros)

Line	ITEM	YEAR 1	2	3	4	5	Remarks
	REGIONS' Viewpoint: Savings and Payments						
1	Starting in year 3, Regions save +50M /yr			150	150	150	Savings to 3 urban regions, just over 5 year period (50M is low-end estimate)
2	vs total payments to LEEP Initiative			30	30	30	Payments from 3 regions to LEEP Initiative: 10M per year/per region x 3 regions, for 3 yrs
3	**Net savings to regions**			**120**	**120**	**120**	This increases to 150M per year (50M per region) after year 5
4	Present Value (PV) of 15 yrs accumulated savings @ 7%	1,026					3 regions net savings as above, then 50M/yr over remaining 10 yrs (15 yrs total), discounted @ 7%
5	PV of payments over 5 years @7%	79					
6	PV Payments / PV Savings @7% over 15 years	7.7%					Effective borrowing cost to cities
	LEEP Viewpoint						
7	**REVENUES**			**30**	**30**	**30**	
	COSTS						
8	3 Regional Project LEEP offices	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)	offices might require less funds as project matures
9	1 M revolving fund per region x 3 regions	(3.0)					fund is one time injection
10	Central Coordination Office, Consultants, Legal, Contingencies	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	
11	**Total Costs**	(10.5)	(7.5)	(7.5)	(7.5)	(7.5)	LEEP has 7.5M fixed costs (for 3 regions at any one time), plus revolving fund; these are covered starting in year 4
12	**Income (EBITA)**	**(10.5)**	**(7.5)**	**22.5**	**22.5**	**22.5**	So roughly 25.5 M needed to start up for 3 years. To expand to additional regions, another 3 year cycle needs to be financed.
13	Repayment to Investors			(5.0)	(9.0)	(10.0)	Payments are set here to yield rougly 10% IRR on investor cash flow-line 15 below; could be increased if necessary
14	Net cash before (if any) taxes			**17.5**	**13.5**	**12.5**	allows for expansion to ~3 regions
	INVESTORS Viewpoint						
15	Investors postion per year	(10.5)	(7.5)	5.0	9.0	10.0	Assumes some delay so investors still pay 7.5 M in costs in year 3, get first payment later that year
16	Investors cumulative position	(10.5)	(18.0)	(2.5)	14.0	19.0	"clear" profit in year 4- 5, depending upon timing.
17	**Investors' 5 year IRR on 25.5 M:**	**11%**					

Notes:

No stress testing of delays, varying penetration / adoption rates, excludes infrastructure finance costs.

But, assume we are off 50%, still suggests 500M would be saved by investing 90M, and analysis does not include benefits of jobs, local multipliers, reduced health costs, etc.

12. RISK MANAGEMENT

The table below shows how several risks faced by the LEEP initiative can be addressed:

RISK	RESPONSE
Sufficient financing is not obtained by end of initial period.	As described above, LEEP does not proceed unless it is funded from a combination of corporate, government, and private foundation sources. There is an initial exit point if insufficient funds are obtained in a timely fashion. A strong active well-connected advisory board will help with fund-raising, and full implementation could always be stretched out in further phases, e.g. delaying new city regions joining, slowing analytical framework development, etc., to link with available funds. The LEEP is designed to actively seek funds from diverse US and EU government donors, corporations, and private foundations where we have existing contacts.
Individual city-region effort disappoints or fails	Each city region is ultimately responsible for its own activities and thus any failure will be theirs, and not the LEEP office. The LEEP Initiative would agree to a set of deliverables regarding funds, technical support, workshops etc., in simple MoU's with the cities. As long as it meets its targets and schedules, the LEEP effort will be seen as having done its best. We will have selected important cities, with very experienced teams, backstopped by strong international technical and financial support. But things could still go wrong (e.g. London has already curtailed its efforts; there could be South African or Chinese political instability in 2015, etc.). Diversifying risks argues for involving a minimum of 3 regions, so at least 1-2 are successful.
Analytical Framework Development becomes problematic	An international expert team will be retained to develop this in close cooperation with participating city-regions and interested corporations. The groups suggested are among the world's most experienced. Governance of this will be an important aspect of Advisory Board monitoring and reporting. If the framework cannot be adopted in all regions, it can be rolled out over time. Though not ideal, In the worst case, the LEEP effort can proceed without the framework by stimulating local innovation just by helping build capacity to channel new investments in energy, water, and housing areas.

13. INTERESTS: PRIVATE & PUBLIC INCENTIVES TO COOPERATE

Group	Key Needs / Desired Outcomes	Incentive to Cooperate
Rich Consumers	▪ Reliable supply ▪ Lower costs ▪ Lower taxes ▪ Increased security ▪ Protect investments and way of life	LEEP idea will increase likelihood of all these occurring; transfer of resources to poor will not be burdensome; Social development fund should reduce crime, increase security and feeling of community.
Poor Consumers	▪ Affordable basic supply ▪ Lower costs ▪ Increased security ▪ Reduce health hazards & environmental dangers ▪ Obtain secure shelter ▪ Obtain affordable finance	LEEP idea makes all more likely; technical help is financed, social development fund provides resources to respond to basic needs – providing new finance that otherwise would not exist.
Local Government	▪ Reduce capital & operating costs ▪ Reduce pollution and crime ▪ Reduce social welfare expenditures ▪ Balance revenues with expenditures ▪ Share risks with business	LEEP idea supports all these outcomes. Some rebalancing of revenues-taxes-services might be needed, if surpluses derived from energy, waste, water charges.
Businesses	▪ Reduce operating costs ▪ Reliable supplies ▪ Obtain affordable technical assistance ▪ Obtain help reducing up-front soft costs ▪ Use neutral broker to help discuss negotiate with government and citizens' groups	LEEP idea supports all these outcomes, bundling finance and technical solutions at costs lower than what businesses could obtain on their own isolated efforts.
Supplier Utilities	▪ Steady revenue stream ▪ Reduce operating costs ▪ Maximize revenue ▪ Share risk with government	LEEP idea could simplify billing for utilities (one customer-the LEEP office); could reduce marginal costs as new demand could be met with existing (peak) capacity, resources freed up for export to national grid. Gross revenues might be reduced.
"LEEP" Office	▪ Balance revenues with expenditures ▪ Provide affordable technical assistance ▪ Provide sustainable financing ▪ Sufficient cash flow to pay finance and supplier charges	LEEP office has great incentive to respond effectively, shop for best practice and least cost suppliers, as this maximizes LEEP's revenues and impact.
Central Government	▪ Decreased cost of supporting local government ▪ Decrease welfare and transfer costs ▪ Decrease infrastructure cost and risk. ▪ Decrease pollution emissions ▪ Stable currency – less energy imports and help balance of payments	LEEP idea supports all outcomes. Cost and management of efforts pushed down to local level. "Sustainable" solutions are rapidly implemented to reduce oil imports, greenhouse gas emissions, distant water supply, etc. Local resource mobilization is used to manage social protection, job creation, medical insurance, etc.

14. DIRECTOR´S C.V. ROBERT JON LICHTMAN

Personal Information

Contact: Director, E-Systems Foundation
Roerstraat 54
1078 LR Amsterdam ✧ THE NETHERLANDS
Tel: +31 621 977 000 ✧ Email: rob.lichtman@esysfound.org

Education: M.B.A., Harvard Business School (1984) focused on strategic planning in energy & agriculture sectors, graduate work in benefit-cost analysis, energy, agricultural & development economics; B.A., Tufts University (1977) *magna cum laude*, Social Sciences.

Languages & Systems: English (native), French, German (conversational), & Swedish (basic). Advanced use of Windows text, graphics, spreadsheet models, web site and network design.

Professional Experience

Since 1977, Rob Lichtman has undertaken activities to base economic development on the sustainable use of resources, both at the project and policy levels. Mr. Lichtman currently directs E-Systems Foundation, developing projects with several large urban regions in different countries to base their energy, food, waste utilization, and "clean" industrial systems largely on processes that use renewable resources efficiently, equitably, and ecologically. The work is funded by several private foundations and government donors. The first pilot region is Cape Town, South Africa, as part of a large urban management project financed by the United Nations Foundation/UNDP, Danida, the Moore Foundation, and CORDAID, a Dutch foundation. The idea was presented during the 2007 World Economic Forum's Davos meetings. Related negotiations are underway in the Netherlands, Sweden, the Czech Republic, Costa Rica and China, with support from the Netherlands Environment Ministry and others. This follows an earlier grant from the Rockefeller Foundation, identifying community-based examples of sustainable development. Mr. Lichtman is also working with several Indian rural organizations to develop innovative, low-cost biogas systems to provide shaft power, cooking gas and electricity, and to commercialize the technology. Lichtman is currently senior advisor to the World Business Council for Sustainable Development's "Low Emissions Economy" Project, collaborating with the C40 Cities Group to test the idea in several cities.

Mr. Lichtman has had staff and consulting assignments with numerous international development organizations including the World Bank, UNDP, the Swedish International Development Agency (SIDA), the Netherlands Environment and Development Cooperation Ministry (VROM, DGIS), USAID, ILO, UNCTAD, GTZ, and domestic groups such as the Government of the Canton of Geneva. With an MBA from Harvard Business School and an economics and government background, Mr. Lichtman's consulting has ranged from development strategy, project finance, technology assessment, energy efficiency and economic modelling, to organization design. Mr. Lichtman has spent several years working with Indian technical groups and village voluntary organizations, developing biogas systems, the basis for a book and several papers. Mr. Lichtman led a field mission to Nepal to examine water turbines as part of a larger project to promote the successful dissemination of small-scale technologies. Mr. Lichtman has participated in joint World Bank/USAID missions to develop household fuels strategies for several African countries. He has also written a number of studies of agricultural technologies, international trade, finance, and technology transfer issues, was part of the OECD Sustainable Development Roundtable, and he authored several discussion papers for the 1992 UN Conference on Environment and Development.

Mr. Lichtman has led many negotiations between businesses, governments, NGOs, and international development agencies. He has participated in the senior management of two consulting firms, and he has helped several organizations incorporate financial/economic methodologies and concepts of strategic planning into their operations. Mr. Lichtman was a partner in a real estate group near New York City, where he supervised construction of a $5 million housing project. He is a competent photographer, guitarist, sailor, and ski mountaineer.