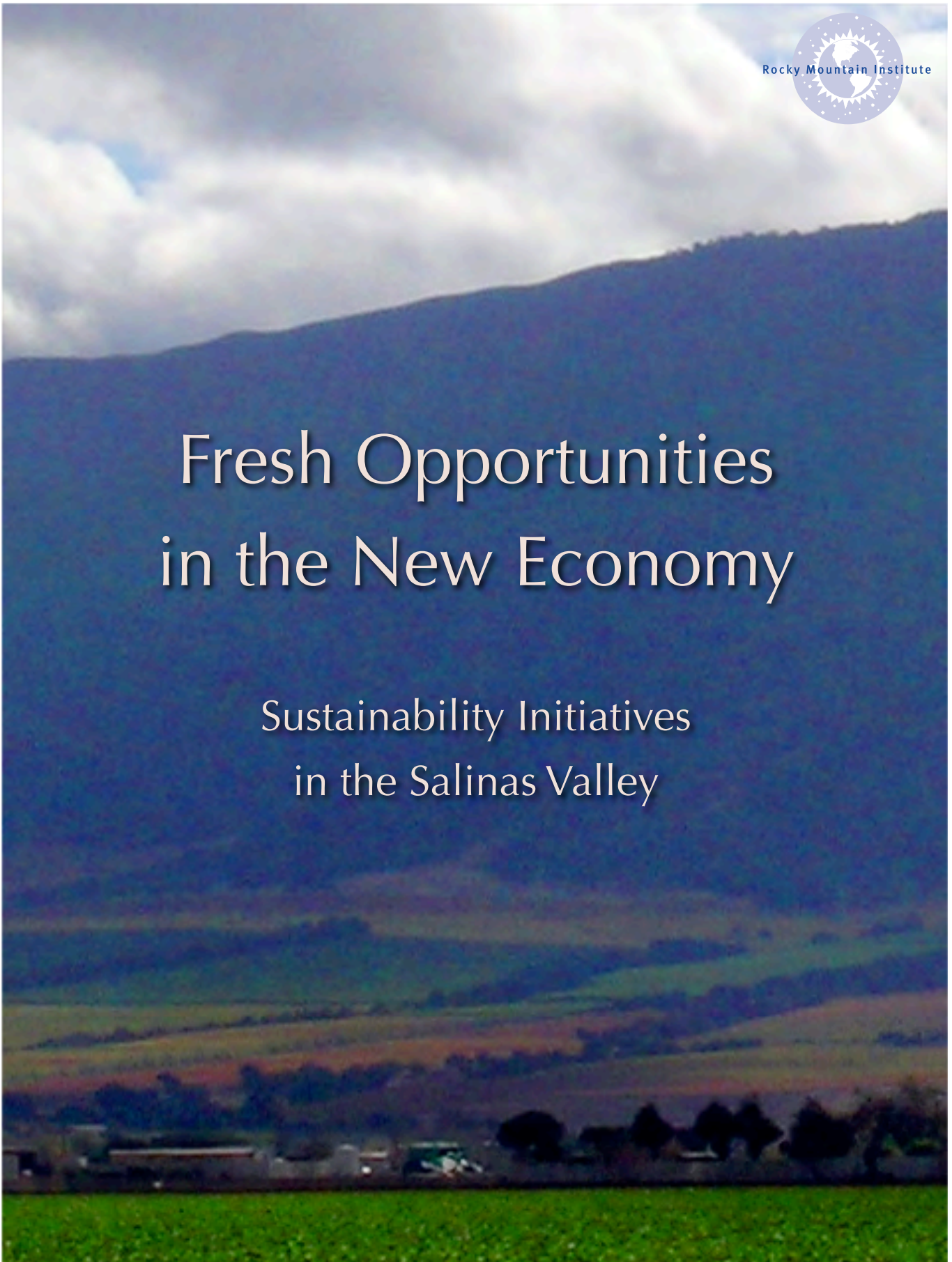




Fresh Opportunities in the New Economy

Sustainability Initiatives
in the Salinas Valley





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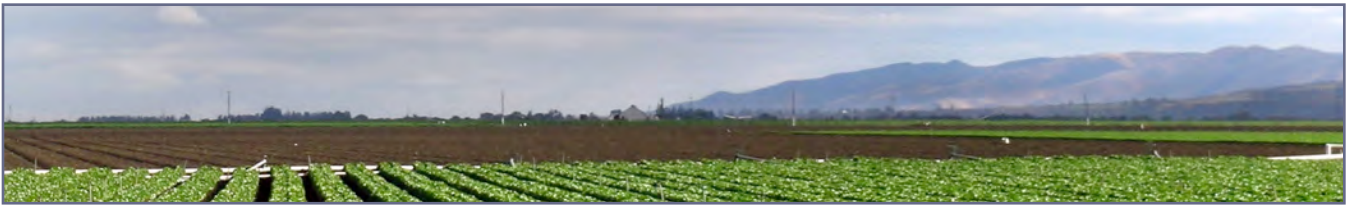
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INTRODUCTION

Innovative community leaders understand that the new green economy will be a major force driving our economic recovery, nationally and locally. At the core of this new economy is increased “resource productivity,” which includes smart ways to build our existing assets to create jobs, business opportunities and a cleaner environment. One reason that increasing resource productivity is such a powerful tool is that it creates jobs and savings regardless of whether the economy is expanding.

Possibly the most immediate and exciting opportunity for increasing resource productivity in the Salinas Valley is the retrofit of existing buildings for greater energy efficiency. At first, such an idea may seem neither exciting nor economically beneficial. Energy-efficiency retrofits may just sound like spending money for some distant environmental goal. But the whole-system perspective offered paints a very different picture; it’s the landscape of a recovering economy.

Whole-System Thinking

Seen narrowly, buildings are financial burdens with increasing operating costs. Because most were built at a time of cheap energy, they leak and use electricity inefficiently. But seen through the whole-system lens, these apparent “cost centers” are rediscovered as “profit centers.” Improving their efficiency through such measures as new lighting, insulation, caulking, and advanced cooling systems will reduce their energy bills.

Here’s the important part: the expenditures required for such measures are not lost. Rather, they are predictable, low-risk investments that offer attractive returns. And the work required to retrofit the buildings puts lots of people to work, especially the building trades. Further, as a remarkable bonus, these investments also attack one of the largest sources of the emissions that are causing the climate crisis: inefficient buildings.

Building retrofits benefit
community, economy, and
environment.

The better news is that energy is not the only resource that can be made more productive. One is waste. Salinas Valley citizens need look no further than their neighbors in Gonzales for a powerful and profitable example of putting waste to work — creating businesses and jobs in the process. In fact, a company like Converted Organics doesn’t regard wet organic materials left over from school cafeterias as waste at all, but as feedstock to its business. Their proprietary technology (www.convertedorganics.com) converts the gunk into a valuable fertilizer, jobs, and profits.

See Appendix A for more on whole-system thinking.

Salinas Valley: A History of Innovation

This report to the people of the Salinas Valley is an invitation to pursue several opportunities that will benefit the community, its economy, and the environment. Some of Rocky Mountain Institute's recommendations may be new. Others may expand on ideas previously discussed. Still others may be controversial.

Neither innovation nor economic crises are strangers to the people of the Salinas Valley. Entrepreneurs and investors have demonstrated a long history of creativity and strategic risk-taking that has netted extraordinary results. Just a few examples: large-scale reuse of wastewater for agricultural applications, Converted Organics, Blackstone Winery's solar-electric system, a long series of innovations in value-added agriculture and shipping techniques, and current planning to switch back to rail freight.



Most of these innovations were disruptive and inconvenient to someone. Each challenged long-held assumptions. All required thinking outside conventional boundaries.

Collaboration: Among Citizens and Communities

The current economic crisis demands creative, whole-system thinking. But that's not easy. Doing it often requires a different approach to problem solving and a willingness to question one's long-held assumptions about important local issues. Finding sustainable solutions requires collaboration among many citizens with a wide range of experiences, skills, and interests. It's too much to expect that a one or two leaders fully understand the whole system.

Success requires broad recognition that this extraordinary valley is in many ways a single entity — economically, socially, and environmentally. It may be convenient and individually satisfying to develop an initiative in one location in the Valley. But, in many cases whole-system solutions require whole-valley collaboration. An example cited below is renewable energy. Several cities in the Valley are thinking seriously about moving forward with renewable energy ideas, which is terrific. But the conditions that exist across the Valley are so similar that the most sensible approach is to develop a valley-wide analysis of, and strategy for, renewable energy opportunities.


Many whole-system solutions require whole-valley collaboration

Rocky Mountain Institute's Work in the Salinas Valley

RMI was asked by officials of the Salinas Valley Enterprise Zone and the City of Salinas to provide our observations and recommendations for more sustainable Salinas Valley communities, with an emphasis on climate-change mitigation and related economic development. We started our work late in 2008 by meeting with leaders and citizens in all the Valley's communities to develop an understanding of the Salinas Valley's unique situation — aspirations, issues, municipal operations and programs, stakeholder perspectives, and barriers to sustainability.

Though we were able to learn a lot, in the few days we were in the Valley we could not hope to fully understand the Valley's deep history and wide range of opportunities. That's why readers of this report are essential to the success of this initiative. We hope that, in addition to considering our recommendations, you also look beyond them. Use the whole-system perspective on which they are based to expand on these and discover additional creative opportunities.

Consider too that sustainability is not a list of environmental projects. Quite the contrary, it's an innovative way to consider local problems, issues, and opportunities by examining their inter-relationships with the community, its economy, and the environment. In the past, conventional thinking dictated that, when considering some important issue, local leaders had to decide which would prevail — economy, community, or environment. In sharp contrast, the sustainability lens discovers that community, economy, and environment are not competing interests, but complementary parts of a whole.



Sustainability is a way of thinking,
not a list of projects.

As you examine each recommendation below, consider if it is likely to lead to a sustainable solution, that is, one that simultaneously supports the community, its economy, and the environment. And if it doesn't, think about how can it be improved to do so.

Next Steps

In the event that Salinas Valley leaders decide to prioritize the twelve recommendations offered in this report, the authors suggest that Valley leaders approach their selection process in a systematic way. For example, you could use the decision making tool that is included in this report as Appendix B. It's a straightforward method for developing selection criteria based on the values and realities of your communities, then using those common criteria as the basis for your challenging choices.

RECOMMENDED INITIATIVES

RMI's recommendations are described below. For each idea, the report includes the following information, where applicable:

- An initiative that Valley communities should consider pursuing in order to achieve stronger economic and environmental performance, especially regarding the climate;
- The purpose or rationale for the initiative;
- Areas in which technical analyses may be required to better understand alternative actions and policies regarding the initiative;
- Performance metrics, that is, ways in which progress can be measured; and
- Next steps towards implementing the initiative.

The relative length of these descriptions does not imply the relative value of the recommendation. Also, the recommendations are not offered in order of importance, with one exception: RMI regards the first initiative as the highest priority for stronger economic and environmental performance.



A suggestion regarding metrics: When developing metrics (a.k.a. performance indicators), refer to the professional website of the Community Indicators Consortium at www.communityindicators.net. In particular, review a document called, *Creating Stronger Linkages between Community Indicator Projects and Government Performance Measurement Efforts*

1. Energy-Efficient Building Retrofits and Tune-Ups

Recommended initiative:

Implement energy-efficiency retrofits and tune-ups of buildings owned and operated by local government. Such efforts are a powerful way to put people to work and to attack one of the largest sources of the greenhouse gases that are causing the climate crisis. Also, a retrofit program may attract federal support through the economic stimulus package now being developed by Congress and the new administration.

Retrofits often take place with the regular replacement cycle of the major building systems (including building envelope, lighting, HVAC systems, and plumbing), but often are cost-effective in shorter timeframes. Retrofits that are optimized for energy efficiency can yield greater than 50% energy savings.

Retrocommissioning (the term of art for “tuning up” a building) is advisable for almost any existing building. Retrocommissioning typically saves between 5 and 20% energy consumption, with an average of 15%. Large buildings (more than 3,000 ft²) have complex systems that, analogous to a car, require maintenance within a few years of installation and throughout the life of the building. Often, operations-and-maintenance staff is not trained to provide this maintenance. As result, replacement of items such as belts and bearings along with preventive maintenance activities (changing filters, oiling parts, etc.) are not carried out.

Purposes:

- Retrocommissioning and retrofits optimize the operation of buildings, which leads to significant energy cost savings and enhanced occupant satisfaction. Typical projects have benefit/cost ratios of 1.6 and 2.1 for institutional and residential sectors, with simple paybacks of seven and three years, respectively. These results do not account for the benefits of increased indoor air quality and thermal comfort, which are widely recognized to increase worker productivity and student performance, and decrease absenteeism.
- Invigorate the local economy with jobs in building trades and suppliers, and by freeing up disposable income as a result of savings achieved.
- Retrofit of government building will develop momentum and credibility for similar work in the private sector, which would employ even more people.
- These projects lower carbon emissions, which reduce the buildings’ negative effects on the climate and which may be a financial benefit in the near future when carbon is regulated.
- Lower energy consumption benefits local utilities that are interested in avoiding increased demand. (Some utilities have paid 50 to 100% of costs for services in support of these building improvements).

Needed technical analysis:

Examine many buildings for whole-systems retrofit opportunities, rather than a single-system (piecemeal) approach. For example, examine all building owned by local government or schools.

- Inventory major building systems against life expectancy of those systems and projected replacement timelines for major pieces of equipment.
- The buildings that have major equipment replacements in the pipeline within five years are good candidates for retrofits.
- If a retrofit is performed on equipment that is not ready for replacement, then the net present value (NPV) of the retrofit project will significantly decrease (i.e., the full cost of replacing the equipment will decrease the NPV of the project).
- Even if only one major building system is due for replacement, whole-systems retrofits should be considered to maximize energy savings and carbon avoided. Whole-systems design may result in reduced capital cost. For instance, installing high performance windows and other energy-efficient equipment will reduce demands on the buildings chiller, so the chiller can be downsized. The resulting saving from the smaller chiller will more than compensate for the added cost of the windows and other energy-efficient equipment.

Examine buildings to determine priority candidates for retrocommissioning.

- Examine energy bills to determine average annual energy consumption per unit area (kBtu per square foot) for each building, for example, in the local public-building portfolio.
- Compare this energy intensity to national database of similar building types, as determined by the Energy Star program's Target Finder tool.
- Buildings that use most energy relative to other buildings in the portfolio and the national average are strongest candidates for retrocommissioning.

In addition to the steps above, see Energy Star Energy Management program guidelines on http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index

Possible metrics:

The economic case for retrocommissioning and retrofitting could be based such measures as.

- Capital and operational costs and benefits.
- Net present value of each retrofit or retrocommissioning
- Energy consumption in various sections of buildings as measured by equipment installed as part of a whole-systems retrofit.
- Number of jobs created.

The environmental case could be based on greenhouse gases emitted before and after retrofits. Greenhouse gas emissions are the primary cause of the climate crisis.

Next steps:

- Develop the technical analyses suggested above.
- Identify local employment-training needs that Hartnell College might fulfill.
- Decide whether to collaborate with a for-profit Energy Service Company (ESCO) or to create a local nonprofit ESCO. In many cases for-profit ESCOs focus only on retrofit projects with high profits and low transactions costs, leaving behind many opportunities that would benefit the community. Small to mid-size office buildings (as might be owned and operated by a municipality) are often too small to be attractive to for-profit ESCOs, which are commonly compensated by the amount of energy cost savings and the size of the capital project. However, a city may attract a for-profit ESCO by offering several of its buildings as a unified project.

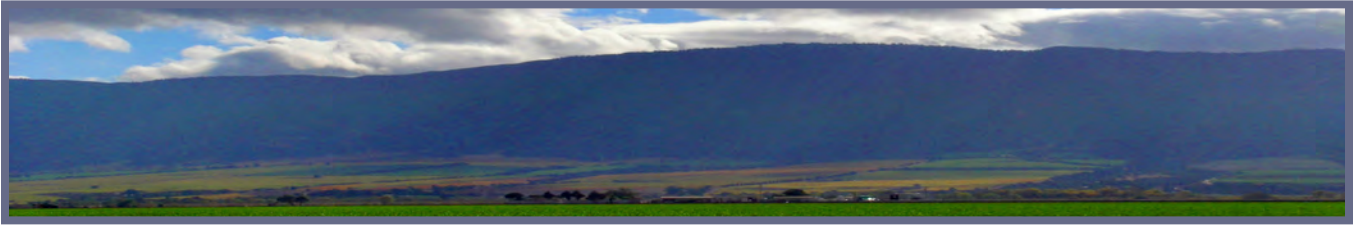
Examples of Energy Services in Communities:

New Jersey has set up its own non-profit ESCO in order to comprehensively address individual communities or all communities in the state.⁸ The town of Brattleboro, VT solicited for-profit ESCOs to make energy efficiency improvements in its municipal and elementary school buildings. The town has publicly disclosed the questions it asked ESCOs as well as the RFP it developed to solicit ESCO interest. These documents can be found at http://www.cleanair-coolplanet.org/for_communities/ESCOs.php.

Through the Cambridge Energy Alliance, Cambridge, Massachusetts is using various selected ESCOs. This municipal program includes the presence of a peer-reviewer consultant who watches over the ESCO's shoulder to ensure quality standards and depth of savings.

“Responsibilities of the ESCOs will include: identifying electric, gas, oil, and water efficiency measures; supervising the installation of measures; and most importantly, ensuring that the expected savings materialize. “They were selected through a competitive bid process—closely reviewed by a team of experts—on the basis of the strength and depth of their technical abilities, a proven track record in delivering excellent quality and value to customers, significant local presence and experience, and the capability to deliver.”

Many non-profits throughout the country help residents and small and mid-sized business owners pursue improved energy efficiency in their buildings. Often the services of these organizations are sponsored by utilities. The services tend to include audits, identification of available rebates, and project management during installation. However, these non-profits don't provide guaranteed energy savings or financing. Example non-profits include Community Energy Services, New Ecology, Conservation Services Group. (www.ebenergy.org, www.csgrp.com, www.newecology.org)



2. Community Sustainability Action Plan

Aligning Economy and Environment to Benefit Community

Recommended initiative:

Develop a plan for several concrete initiatives that will drive sustainable solutions and strengthen the economy of the Salinas Valley. Though there are several compelling reasons to develop such a plan, its development should not impede short-term initiatives that can progress immediately. Though we use the term “sustainability” here, there may be a more appropriate term for the Valley. For example, the effort might be framed as a “valley-wide vision.” The plan should include:

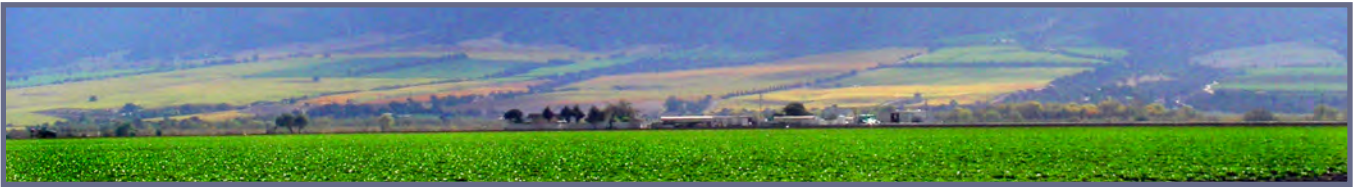
- o Desired outcomes,
- o Measures of progress toward those outcomes, and possibly measurable objectives,
- o Initiatives to achieve those outcomes, including:
 - Who will be responsible,
 - Tasks required,
 - Technical needs,
 - A budget for each initiative, and
 - Sources of support.

Purposes:

- The plan defines the whole-system of which each initiative is a part. It’s motivational, helping its readers understand the bigger picture surrounding each initiative.
- The plan offers a context in which individual initiatives can be prioritized.
- Each initiative can be marketed in a way that demonstrates continuity and progress of the whole.
- It demonstrates the interconnections among the various initiatives and the multiple benefits they offer across the Valley.
- Collaboration ensures that the plan is informed and owned by the people of the Valley.

Next steps:

- Select a well regarded individual or organization to drive the planning effort.
- Develop the most appropriate name for the planning effort.
- Determine what organizations and individuals should be involved.
- Develop a plan for community collaboration.



3. Valley-Wide Sustainability Coordinator

Recommended initiative:

Hire a valley-wide sustainability coordinator. Optimally, this person would support the development of a sustainability action plan or a regional energy plan or both. But the position is needed regardless of whether these plans are developed. In some communities, these positions have been funded initially from local sources outside local government. The new coordinator could, for example, operate under the auspices of the Enterprise Zone.

Many city sustainability coordinators more than pay the cost of their positions by, among other things, finding energy savings. However, basing the position entirely on such a revenue stream will tend to skew its activities toward chasing energy saving rather than the wider range of goals assigned to it.

Purposes — Such a position could:

- Drive sustainability projects that might have otherwise languish low on the too long to-do lists of other city and county staff.
- Build local capacity to develop and execute certain projects that would otherwise be contracted to consultants.
- Ensure cost-effective project analysis and implementation across the Valley.
- Ensure that single-project benefits accrue to multiple communities.
- Offer citizens and leadership a sense of the larger vision into which many seemingly independent sustainability projects fit.
- Increase mutual support among the various communities.

Possible metrics:

- Improved economic and environmental performance due to the position
- Cost-savings generated by the position
- Satisfaction of the various jurisdictions

Next steps:

- To guide and develop strategy toward creation of this position, develop a core team among interested Valley communities.
- Find sources of funding and advertise for the position.

4. Carr Lake

Recommended initiative:

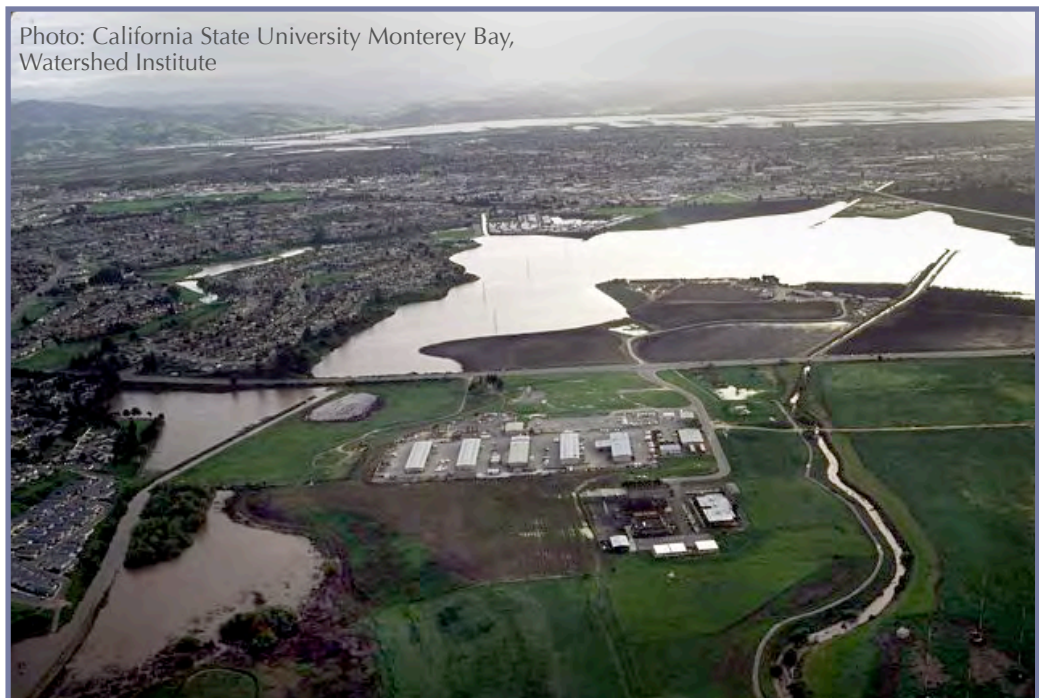
Design Carr Lake as a remarkable sustainable-development asset — one that enriches the community, strengthens the local economy, and improves environmental performance.

Maybe once in a century, a few fortunate cities have one, maybe two remarkable assets around which an innovative and prosperous future can be designed. Carr Lake may well be that asset for the citizens of Salinas. Though efforts are currently underway to acquire this community jewel, that acquisition may be more difficult without a creditable vision, and a credible long-term strategy. Also, even if acquisition is assured, a long-term strategy should be developed as early as possible to optimize opportunities, develop and institutionalize criteria for appropriate uses, avoid time-consuming digressions, and manage expectations.

Purposes:

Roughly the size of Golden Gate Park, Carr Lake could be the keystone of Salinas' future. A park-centered design, integrated with the rest of the community, could account for wide range of community issues including:

- Recreation and celebratory opportunities for the many cultures of Salinas, and for Salinas families, including those of low-income
- Flood and food-safety concerns for downstream farmers
- Neighborhood connections
- Business and investment opportunities
- Enhancing a sense of community
- Increased local-government revenues
- Ecological restoration, for example, cleaning up significant water quality problems for the Monterey Bay Marine Sanctuary
- Habitat
- Aesthetics



Needed technical analysis:

To be determined based on site land-uses and design developed by the city through its public process. Examples: flood and food-safety issues, irrigation factors, recreation needs, existing and potential natural habitat.

Possible metrics:

To be determined based on goals and uses identified by the city through its public process. Examples: volume of agricultural water resulting from redesign of site, acres of park per resident.

Next steps:

- Conduct a Carr Lake “discovery charrette” for the Salinas community to program appropriate uses for the Carr Lake site and the relationships among those uses. The public may identify such uses as recreation, trails, habitat, storm water absorption, and domestic and agricultural water storage, collection, and conservation.
- Following the discovery charrette, conduct a design charrette to develop a draft sketch of the site.
- Develop a detailed strategy, including such factors as governance and funding.



5. Regional Energy Plan

Recommended initiative:

Drive energy efficiency and develop renewable sources of energy, especially locally, to offset the need for fossil fuel based energy. Such a plan could be part of the Community Sustainability Action Plan.

Reducing the amount of energy used through energy efficiency measures is the most cost-effective path to both strengthening the local economy and reducing the greenhouse-gas emissions that are causing the climate crisis. Complementary efforts to build renewable energy sources will further benefit the climate and accelerate the emerging green economy in the Salinas Valley, where some of the best solar resources in the nation offer great promise. Renewable sources are valuable also because they tend to be visible and call attention to local green energy efforts.

Fortunately, each Salinas Valley community is already considering or planning for some of these opportunities. However, given the similarity of conditions throughout the Valley, a more cost-effective approach would be to first analyze the full range of options as a region.

The regional green energy plan should not focus only on one favored technology such as wind or solar. Rather, its analysis should objectively consider all options and should be balanced among solutions for commercial, residential, industrial and agriculture. Also, it should include a wide array of implementation options, for example, system benefits charges, third-party financing or administration of efficiency programs, utility administered efficiency programs, and city-backed loans through property taxes (see Oakland example below).

Purpose:

- Reduce energy waste and produce renewable energy, consistent with the state's goal of 25% reduction in carbon emission by 2020 (Assembly Bill 32).
- Create local jobs in building trades and suppliers, technology, and related industries.
- Reduce emissions of the greenhouse gases that are causing the climate crisis.

Needed technical analysis:

Renewable energy

- On a valley-wide basis, determine the feasibility of solar, geothermal, wind, and other renewable energy sources.
- Identify and develop incentive programs offered by utilities and government.

Energy-efficiency

- Identify the most cost-effective energy-efficiency opportunities in the Valley, beyond building retrofits described above.
- Identify and develop programs to be offered by utilities and government. Consider load leveling and such demand-management programs as real-time pricing (found to save 4% of energy consumption) and feedback programs such as in-home energy consumption displays (saved 11%).

For one example of a detailed energy investment strategy for a city, go to www.rmi.org/sitepages/pid256.php and click on the Scenario Analysis of Alternative Electric Resource Options for the City of San Francisco (E02-16)

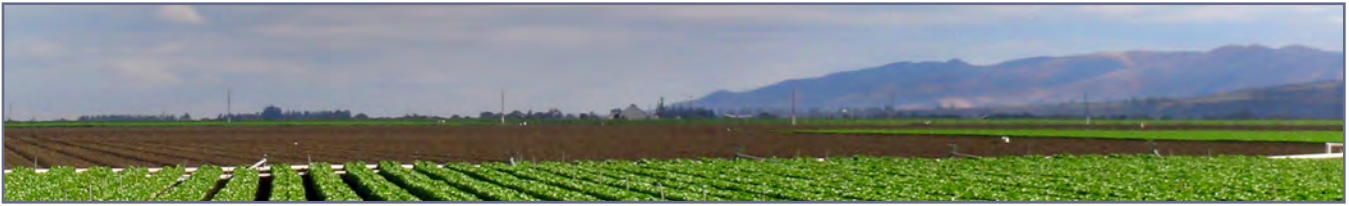
Possible metrics:

- Local electricity supplied by renewable sources
- Contribution to renewable portfolio standards of California
- Dollars injected into local economy
- Greenhouse-gas emissions

Next steps:

- Develop a core team to oversee this effort.
- Based on the analyses described above, determine the most cost-effective local energy investments, which should include energy-efficient buildings, other energy efficiency programs, and such renewable energy technologies as wind and solar.
- Include investments in visible technologies that excite public interest.
- Among the various Valley jurisdictions, develop a memorandum of understanding that identifies local energy investments (including supply-side and demand side), and that benefit the Enterprise Zone.
- The investment strategy should include a means for effectively delivering these energy solutions. For example, the core team may decide to collaborate with a for-profit Energy Service Company (ESCO) or to create a local nonprofit ESCO.

Note that Oakland has developed a municipal scheme for financing renewable energy, which removes one key disincentive to solar-electric systems. Called Financing Initiative for Renewable and Solar Technology (FIRST), the program will provide financing at 7.75% for up to \$37,500 per installation. Payments will be made through a special tax on the participant's property tax bill. If owners move out of their house during the 20-year repayment period, the property tax assessment and the solar-electric system remain with the property.



Smart Growth

Introduction to recommendations #6 and #7

Land-use debates are uncomfortable in every community in which they take place. The Salinas Valley is no exception. But a successful community is one that can work through uncomfortable conversations to find solutions that are widely beneficial. Doing so requires openness and flexibility on everyone's part. Success requires each person to first acknowledge, then re-examine his or her own assumptions in order to see opportunities emerge from problems.

Obviously no local leader intends to "pave" the Salinas Valley, that is, to replace agriculture with urban development. Such a scenario seems unimaginable, even absurd in a place where local leaders are committed to a strong agricultural economy.

But recent history is instructive: Over the past half century, leaders in many American cities did not intend to pave surrounding agricultural areas. Such an idea was equally unimaginable at that time. But, despite good intentions, dozens of American cities have sprawled widely into the surrounding countryside.

Cumulatively, these decisions have condemned generations of suburban residents to reliance on the automobile for virtually any activity outside the boundaries of their homes. The results are well known and even tedious to review: higher mobility costs, more time away from family, reliance on foreign oil, isolation of the elderly and children, more air pollution and greenhouse-gas emissions, and even increased obesity.

Here's the point: Each local-government decision regarding land use in each of those cities sought just a little urban expansion. No single decision resulted in a sea of rooftops reaching to the horizon. But cumulatively, thousands of single decisions did just that. Similarly, the development model currently popular with many Salinas Valley leaders will not prevent the eventual paving of much of the Valley. That model assumes that prosperity requires continual expansion. And it may be driving the Valley to a future that looks like just another sprawled city.

Economic development does not necessarily require community expansion.

The good news is that economic development can flourish alongside smart growth. Better, a well designed community that avoids sprawl is more attractive to investment. With careful design, each Valley city can get all the economic development it needs within its existing development footprint. Smart economic development creates more business, jobs, income, and wealth regardless of whether a community physically expands. In fact, smart economic development and smart growth, related to land use, are two parts of the same whole. For more on these concepts, see Appendix D.

6. Land-use Standards and Principles — Smart Growth

Recommended initiative:

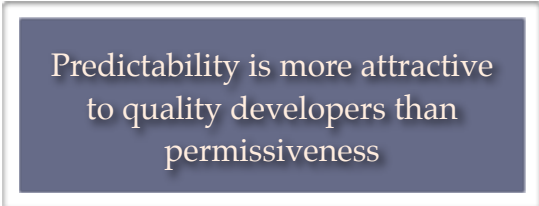
In each community, design a consistent set of standards and principles for development. Optimally, these would be part of land-use plans. These standards and principles should include such elements as compact street-network design and mixed land-uses, which would result in many important benefits: They would help accommodate future development within each community's current footprint, reduce traffic per residential unit (however counterintuitive that may seem), maintain the community's character and sense of place, and maximize walk-ability and cycle-ability. They might, for example, use the Awahnee principles as the beginning point for developing standards and principles (www.lgc.org/community_design/index.html).

Transportation problems are often the unintended consequences of many years of land-use decisions that have not been based on consistent standards and principles. Therefore, land-use plans must include a transportation component. Moreover, the transportation plans of the various cities in the Valley should be coordinated to ensure appropriate links among the various commercial, industrial, and residential areas.

Also important: When considering each land-use application, stick to the plan, standards and principles. Virtually every community is tempted by one or more application to violate its principles "just this once." But such violations render plans meaningless and more difficult to sustain if challenged in court. A land-use plan is pointless unless the local government is willing to defend it in court; just as, traffic laws are meaningless unless local government is willing to enforce them.

This recommendation is prompted by two primary considerations: First, the residents and leaders of several communities in the Valley feel strongly that land-use decisions in their particular community can be haphazard, unpredictable, and based on the perceptions of current decision makers, rather than a consistent set of standards that are consistently applied. They say that citizens have no way of knowing what future is intended by decision makers.

The second consideration is that developers who seek high quality projects regard local-government uncertainty as far more daunting than strict regulations. Said differently: predictability is more attractive to quality developers than permissiveness. Here's why: When regulations are clearly stated and fairly applied, even when they are strict, quality developers can reasonably expect success when their proposals comply. And they know what the process will cost. In sharp contrast, when local government land-use decisions seem to be based on the opinions of current decision makers, results are unpredictable and therefore expensive, even when the decisions are permissive. This is why, in places where local governments pass strict land-use regulations, over time the quality developers stick around, while the others move on.



Predictability is more attractive
to quality developers than
permissiveness

One last point: High quality doesn't necessarily mean high prices. Quality developers understand the value of affordable housing. They can comfortably include such housing in their proposals when they are confident that their competitors will be required to do the same. Also, local government can include affordability in its definition of quality.

Purpose:

- Provide a viable and predictable basis for high-quality future community growth.
- Nurture a healthy business climate for quality development.
- Ensure that new developments are consistent with the values of their host community.
- Minimize dependence on the automobile for many kinds of resident trips.
- Reduce emissions.



Local Government Commission,
Chinatown Renewal Project

Needed technical analysis:

Land use professionals, who understand California laws, could develop codes and standards based on the community's desired land-use outcomes and community design.

Possible metrics:

- Community opinion regarding the quality of new developments
- Resident vehicle miles traveled per day
- Traffic counts at certain key locations in the community
- Density per acre

Next steps:

- Provide information to local leaders so that they can better understand the current thinking regarding land-use development.
- In each community, conduct a visual preference survey of residents, which survey provides a wide array of community design options from which residents can choose.
- In each community, convene elected officials and other community leaders for the first stage of a revised land-use plan: Identification of their desired outcomes regarding land use in the community. This conversation could include principles by which the community should develop.
- Enlist land-use professionals to develop codes and standards based on the community's desired outcomes.

7. Fiscal Impact of Land-Use Decisions — Smart Growth

Recommended initiative:

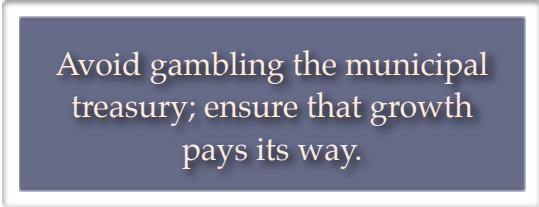
Strengthen local capacity to understand the effects of new land-use proposals on the local-government budgets and ability to provide quality public services. Such fiscal-impact analysis is often ignored, despite the fact that it's a critical component of smart growth, and also that it addresses public officials' fiduciary responsibility.

One reason it's often ignored is that many local leaders believe that new developments in previously undeveloped areas increase the tax base. They're right, but that's only half the story. Depending on the particular characteristics of a given development proposal (especially location, density, and uses), it usually will increase the tax burden even more. That is, it will probably negatively affect the city's budget.

For example, the public-service costs of a residential subdivision in an area without public services (e.g. schools, police, water) will usually exceed the tax revenues generated by the new homes. This will have one (or both) of the following effects: It will force existing taxpayers to pay the difference in order for their public services to remain satisfactory. Or it will result in a community-wide decline in the quality of the public services.

For years, many people have believed prosperity required expansion of the community's footprint. For them, this new information about the fiscal impacts of community expansion may come as a shock. That's why hard data is essential to bringing this critically important information into local conversations about the future.

Fortunately, there are organizations that help local governments understand the fiscal impacts of land-use decisions so that land-use decisions don't gamble the municipal treasury. One is the American Farmland Trust, which has experience in the Central Valley, discussed in *The Future is Now: Central Valley Farmland at the Tipping Point?* at www.farmland.org/programs/states/futureisnow/default.asp. Also, one can read more on AFT's fiscal analysis approach at www.farmland.org/services/fiscalplanning/default.asp



Avoid gambling the municipal treasury; ensure that growth pays its way.

A downturn in the housing market is the ideal time to develop new land-use policies. There's less pressure to complete the policies rapidly. Also, policies can be developed objectively without regard to any particular proposed development.

Purposes:

- Ensure that new development has a positive or neutral effect on the city's budget. Said differently, ensure that growth pays its way.
- Develop a more complete understanding among local leaders of the public-service cost implications of sprawl compared to development within existing settled areas. In short, develop the local capacity to compare the net cost of infill to the net cost of sprawl.

Needed technical analysis:

Identify the cost of public services generated by each unit of development in areas already provided with those services; and compare those costs to similar costs generated by similar development in areas not yet provided with public services. Such an analysis will be complete only if it includes all public services, including schools, and not just infrastructure. To be accurate, it also should include the marginal cost of new capital facilities.

Possible metrics:

- Net public-service cost of each unit of development
- Acres of agricultural lands converted to other uses

Next steps:

- Develop specifications for the technical analysis, and then contract for the analysis.



8. Putting Waste to Work

Recommended initiative:

Develop a valley-wide composting program for all organic agricultural waste.

Last year, Salinas Valley Solid Waste Authority (SVSWA) issued a request for proposal from contractors to oversee and manage the expansion and conversion of the Johnson Canyon Landfill into the Johnson Canyon Resource Management Park in Gonzales with an impressive goal of reducing the waste stream into the landfill by 75 percent by 2015 through recycling, reuse, composting and other means. This includes processing “source separated yard and green/wood wastes, agricultural and food materials, and other organic waste through composting and/or anaerobic digestion or other technologies as proposed” by the chosen contractor. SVSWA is comprehensively examining ways to meet their goal.

In addition to this creative proposal, particular attention could be given to the opportunities for composting the large amounts of agricultural waste produced throughout the Valley.

Purposes:

- Decrease the amount of fertilizer imported, which increases the local economic multiplier.
- Increase soil fertility.
- Possibly reduce the need for irrigation as composted soils retain moisture better than non-composted soils.
- Possibly improve agricultural production by mixing compost differently for specific applications that require different combinations of nutrients.

Needed technical analysis:

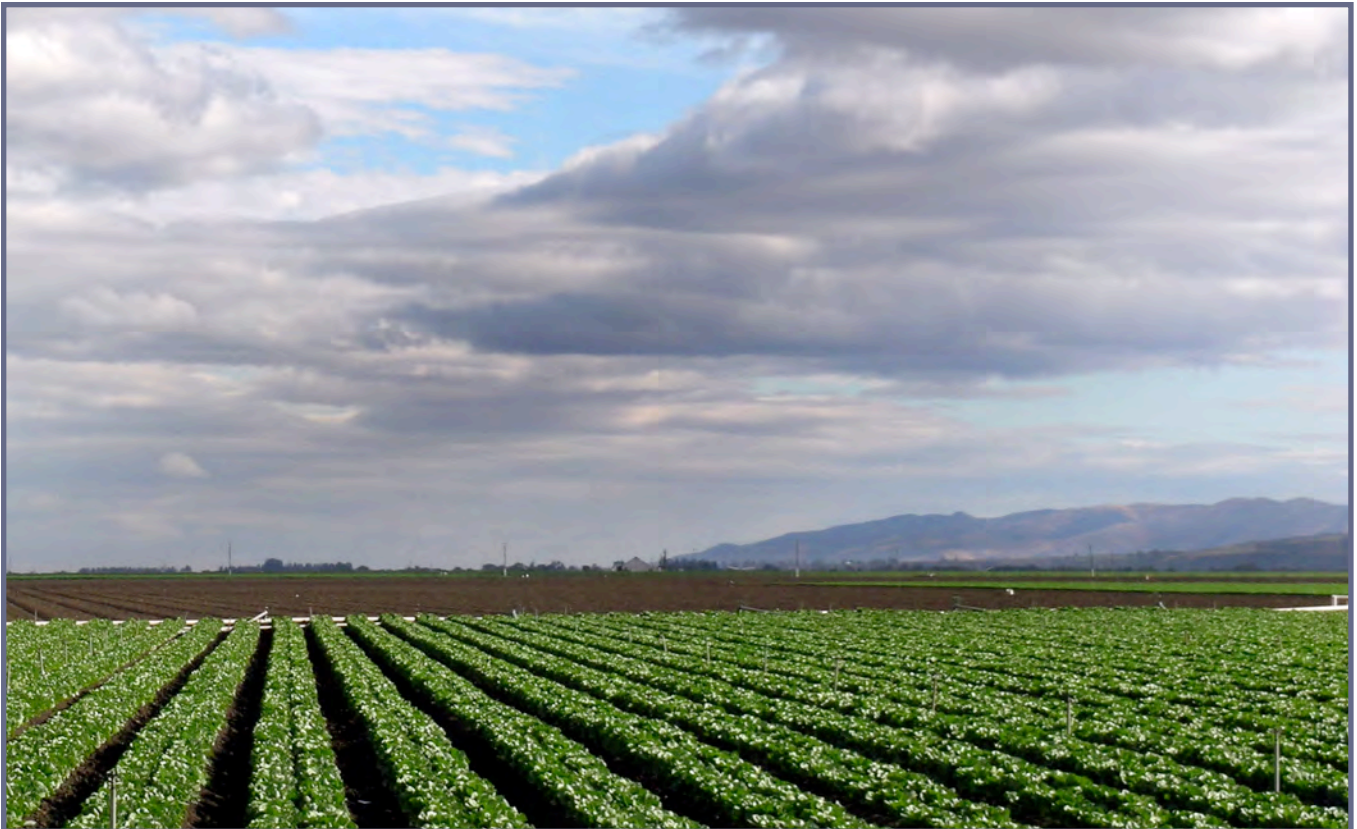
Assessment of the various organic and agricultural waste streams throughout the Valley and evaluation of the compost needs of agricultural producers.

Possible metrics:

- Amount of organic waste diverted from landfill
- Quantity and quality of organic compost produced
- Volume of fertilizer “imports” to the Valley
- Soil fertility and yields
- Amount of irrigation water needed before and after application of compost

Next steps:

- Discuss the possibilities of a valley-wide integrated compost program with SVSWA.
- Discuss opportunities for existing composting companies (e.g. Central Coast Compost and Converted Organics) to work with SVSWA and the chosen contractor for the Johnson Canyon Resource Management Park on the organic composting operations to support local businesses and expand business opportunities.



9. Green Economic Development

Recommended initiative:

Take full advantage of the emerging green economy in the Salinas Valley. Seek ways build on the community's existing assets, fully exploit available green technologies, and anticipate or help develop emerging green technologies. For more on asset-based development, see Appendix D.

Purposes:

- Create new business opportunities and jobs.
- Strengthen the competitiveness of the local economy.
- Mobilize excess local business capacity.
- Expand the capacity of Hartnell College to teach skills necessary in the emerging economy.
- Strengthen local environmental performance.

Needed technical analysis:

- Assess excess industrial/business capacity in the area, for example, number of people out of work (e.g. due to a business closure) and their skill sets.
- Inventory local green skill sets.
- Assess related educational and training options available in the region.
- Determine of the key areas of green business opportunities in the region.



Possible metrics:

- Number of jobs in local green businesses
- Number of new green businesses starting in and moving to the Valley
- Number of Hartnell classes related to sustainable technical and business skills

Next steps:

Conduct a workshop with entrepreneurs and economic development professionals who would receive the analyses noted above. The workshop would provide opportunities to network and build business relationships. It would identify:

- Categories and scale of local green business potential.
- Specific opportunities for business development and partnerships (private and public).
- Steps to implement initiatives developed in the workshop.

One successful example of such a workshop conducted for a region in Indiana is described at www.rmi.org/sitepages/pid516.php

10. Regionalization of Public Services

Recommended initiative:

Improve the quality of local public services, and reduce costs, by effectively allocating and collaborating across the economic region in appropriate service sectors, for example, public works, renewable energy, water, solid and liquid waste, first responder, education, recreation.

Purpose:

In today's economy, cities and towns cannot afford to operate in isolation. Economies of scale go hand-in-hand with economies of scope. The combined buying power of a region will always out pace that of a single city or town.

Needed technical analysis:

Regionalizing services must be done intelligently and effectively. Done incorrectly, it can backfire. An example of a success:

In Massachusetts, one study found that each town had a capital improvement and replacement program for fire and emergency equipment that it was unable to fund sufficiently. It also determined that too often required administrative and support functions were not being performed or were being carried out by inappropriate personnel, exposing the fire departments to potential lawsuits.

More importantly, the study also estimated that regionalizing emergency services would result in significant cost savings. It included steps for achieving consolidation over a two-year period. Although the towns were unlikely to see substantial savings in the first year, they would realize an estimated \$442,000 annual benefit thereafter.

(http://www.patriotledger.com/opinions/opinions_columnists/x1626255385/COMMENTARY-A-regional-approach)



Thus, a feasibility study would be required to evaluate regionalization. As this practice has gained in popularity, more and more consultants have entered the market place and the resulting reduction in cost has occurred.

Possible metrics:

- Unit cost of given services per jurisdiction and the associated impact to the cities' budgets
- Citizen satisfaction with public services

Next steps:

The council of Mayors should consider this idea and determine if there is the political will to contract the feasibility study.

11. Cooler Buildings

Recommended initiative:

Examine the feasibility of using desiccant cooling or other low temperature freezing materials in cooler buildings.

Desiccant cooling is a new and potentially clean technology that can be used to condition the internal environment of buildings without the use of harmful refrigerants. Unlike conventional air conditioning systems, which rely on electrical energy to drive the cooling cycle, desiccant cooling is an open heat-driven cycle, which uses a desiccant wheel and thermal wheel in tandem to achieve both cooling and dehumidification. Because it is a heat driven cycle, there is the potential to use environmentally cleaner sources of energy such as gas, hot water, waste heat or any heat source, including solar thermal energy, able to elevate the air temperature to a level adequate for reactivation.

Purpose:

Reduce the cost of, and greenhouse-gas emissions caused by, cooling systems.

Needed technical analysis:

Analyze the best system configuration and technologies for cooler buildings (solar, solar thermal, natural gas etc.). Include an associated net-present-value analysis to evaluate all options.



Possible metrics:

- Money spent per unit of cooling
- Energy consumed per unit of cooling
- Greenhouse-gas emissions per unit of cooling

Next steps:

- Determine if there is the will within the grower community to investigate this possibility.
- Hire a consulting firm to complete the feasibility study and design the system.
- Investigate the potential for an ESCO to retrofit one cooler or as many as possible for maximum savings.

12. Innovative Water technologies

Recommended initiative:

Develop innovative water technologies and market them outside the region. Two promising examples are nanotech water desalination membranes and solar nano-photocatalytic wastewater treatment.

Nanotech Water Desalination Membranes

Examine the possibility of partnering with UCLA in developing nanotech water desalination membranes, which could be applied to the valley's 180-foot aquifer or to the ocean. When perfected, it will be very valuable. See:

Technology Description (<http://nanotechnologytoday.blogspot.com/2006/11/nanotech-water-desalination-membrane.html>)

Reverse osmosis desalination uses extremely high pressure to force saline or polluted waters through the pores of a semi-permeable membrane. Water molecules under pressure pass through these pores, but salt ions and other impurities cannot, resulting in highly purified water.

The new membrane, developed by civil and environmental engineering assistant professor Eric Hoek and his research team, uses a uniquely cross-linked matrix of polymers and engineered nanoparticles designed to draw in water ions, but repel nearly all contaminants. These new membranes are structured at the nanoscale (the width of human hair is approximately 100,000 nanometers) to create molecular tunnels through which water flows more easily than contaminants.

Unlike the current class of commercial reverse-osmosis membranes, which simply filter water through a dense polymer film, Hoek's membrane contains specially synthesized nanoparticles dispersed throughout the polymer, known as a nanocomposite material.

"The nanoparticles are designed to attract water and are highly porous, soaking up water like a sponge, while repelling dissolved salts and other impurities," Hoek said. "The water-loving nanoparticles embedded in our membrane also repel organics and bacteria, which tend to clog up conventional membranes over time."

With these improvements, less energy is needed to pump water through the membranes. Because they repel particles that might ordinarily stick to the surface, the new membranes foul more slowly than conventional ones. The result is a water purification process that is just as effective as current methods but more energy efficient and potentially much less expensive. Initial tests suggest the new membranes have up to twice the productivity — or consume 50 percent less energy — reducing the total expense of desalinated water by as much as 25 percent.

Solar Nano-Photocatalytic Wastewater Treatment Process

Another potential for Salinas is to build another wastewater treatment facility using beyond-state-of-the-art nanotechnology. It would have the same function as a conventional wastewater treatment plant, but at far less cost. And taking it to scale in Salinas would be a first, proving a technology that could be marketed. Also, it would produce water that would exceed California water-treatment standards, which could be used in fields or returned to the ocean.

Technology Description (<http://www.azonano.com/news.asp?newsID=1237>)

The new *solar nano-photocatalytic* wastewater treatment process can replace a chlorination disinfection step as a tertiary treatment process to disinfect the micro-organisms and, at the same time, remove the organic compounds, making the wastewater suitable as a water resource.

“Normally micro-organisms are used to break down large organic compounds but, because these compounds are biologically un-degradable, we have to use another form of energy to break them down. Our energy comes from UV sunlight in association with photocatalysts. Energy generated from the photocatalyst cell reaction can kill micro-organisms and break down the un-degradable compounds, resulting in clean water that can be used for an extended range of agriculture and aquatic uses. And it won’t damage the ecosystem,” Dr Jin said.

“The other good news is that this treatment process will be very cost effective because the solar photocatalysts can be recovered and reused. They use cheap energy from the sun,” he said.

Purposes:

- Solve important local water challenges, for example, building a wastewater treatment facility for \$10 million versus \$75 million.
- Develop marketable technologies. Prove the concept for companies partnered with Salinas Valley entities.

Needed technical/economic analysis:

- Determine the cost of building and operating the nanotech wastewater treatment plant.
- Perform net-present-value analysis to support the business plan.

Next steps:

- Explore way to attract these startups to Salinas.
- Approach nanotech startups (e.g. Eric Hoek and Dr. Jin)
- and determine their interest in working with Salinas Valley entities. Alternatively, Salinas Valley entities might develop their own nanotech startup.

13. "Soft Path" Water Management

Develop a regional whole-system, "soft path" water-management regime — yet another way to increase local resource productivity.

Purposes:

- Ensure permanent, abundant, high-quality water supplies to all users in the region.
- Protect aquifers from saltwater infiltration.

Citizens of the Salinas Valley know too well that their water issues are notorious. The clash between the northern and southern farmers, city residents, environmentalists, the county, and the state has a long stressful history.

The most imposing threat to the Valley may not be the national economy, crime, the cost of agricultural inputs, or the questions around residential and commercial development; but rather the inability to develop long-term solutions to the region's water dilemma.

RMI recommends that Valley leaders consider the water "soft path," which offers solutions that agencies, companies, and individuals can pursue to meet the water-related *needs* of people and businesses, rather than merely supplying water. It leads to systems that supply water of various qualities to various appropriate uses, with higher quality water reserved for those uses that require higher quality. The soft path includes a combination of greatly increased end-use efficiency, storm water harvesting, storage innovations, precise management systems to avoid system losses, reuse strategies that reduce water demand, and matching of system components to the exact quantities and qualities required for appropriate classes and locations of end-use.

Appendix C compares "old school" to emerging "soft-path" approaches to water management.

Fortunately, the Salinas Valley has already started down this soft path with at least one remarkable success. Ten years ago, a \$75-million water reclamation plant began pumping treated sewage water to irrigate 12,000 acres of crops. The valley became the largest user of treated sewage water for irrigation in the United States. Though entirely necessary, this extraordinary success was also insufficient. More solutions are required to avoid further erosion of the very foundation of the region's economy.

Needed technical analysis:

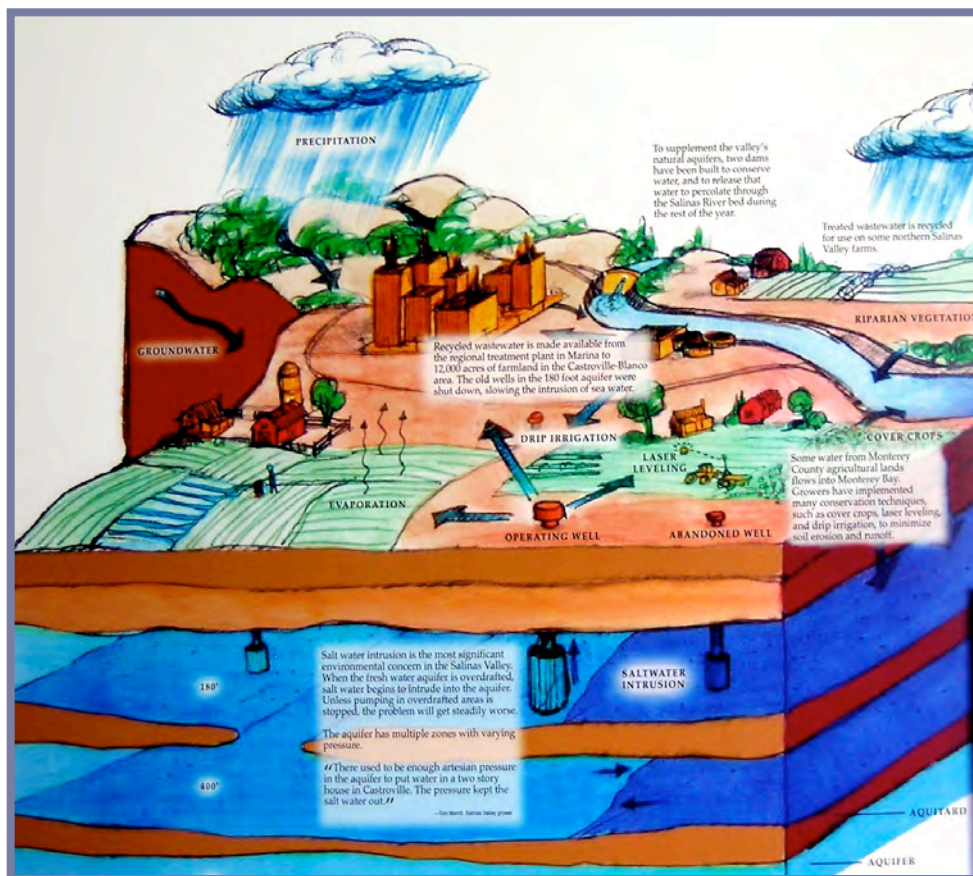
Find a highly credible, nationally recognized organization with significant convening and technical skills to help develop necessary solutions. Selection of the organization would need to be supported by all major water stakeholders in the region. The solutions would be a package of leverage points, with the highest net present value to all stakeholders moving forward.

Possible metrics:

- Reduction in overall water use
- Extent of seawater infiltration into the 400 ft aquifer and the prevention of infiltration into 900 ft aquifer
- New projects identified and developed to enable the soft path

Next steps:

- Determine if there is the political will to pursue this opportunity.
- Develop a memorandum of agreement between the stakeholders that defines a roadmap to total water management for the Salinas Valley.



Steinbeck Museum

14. Collaborative, Whole-System Problem-Solving

Recommended initiative:

Strengthen local capacity for whole-system thinking and collaboration by conducting local seminars on these topics. Such seminars could be part of existing leadership programs or run independently.

Purposes:

With the rapid changes and unusual challenges that communities are now facing, collaborative problem-solving and whole-system thinking are essential. Also, they're not easy for anyone. Therefore, expand local capacity to exercise these two sets of skills, which also will strengthen the effectiveness and public acceptance of creative initiatives in all communities:

- Collaborative problem-solving includes a set of skills that don't necessarily come naturally to all community leaders and which must be adapted to each community's unique circumstances. For more on collaboration, which is related to civic engagement and community involvement, see Appendix E.
- Whole-system thinking: Today's community challenges are far more complex, numerous and rapid-fire than just a generation ago. They require advanced problem-solving skills. When local decisions are based on whole-system thinking, local leaders find durable solutions and turn problems into opportunities, many of them business opportunities. Also, they minimize the potential for negative unintended consequences. For more on whole-system thinking, see Appendix A.

Next step:

Select a local entity to coordinate and fund the seminars.





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Appendix A: Whole-System Thinking & Natural Capitalism For a Prosperous & Sustainable Future

This paper offers a summary introduction to concepts that are helpful in developing sustainable solutions. It begins with discussions of a few aspects of whole-system thinking and ends with a brief description of the four principles of natural capitalism. Though valuable and useful, this paper is a mere glimpse at topics that are sufficiently challenging to fill a university-degree curriculum.

Integrative Design and Whole-System Thinking

Integrative design is one of the most important tools for tackling the world's greatest energy- and resource-related challenges. It accomplishes large resource savings at lower cost than modest, incremental savings achieved by conventional means.

Integrative design is a process employing whole-system thinking through which the interconnections among and within systems are actively considered and solutions are designed to address multiple problems. Because this approach optimizes the entire system rather than individual parts, it naturally is more challenging than conventional (reductionist) problem solving, which tends to reduce a problem into separate components and then focus on those components individually.

Thinking in terms of whole systems requires ingenuity, intuition, and teamwork—especially teamwork. Don't expect to fully understand a whole system by yourself, at least at first. Instead, gather colleagues to help.

Whole-system design is not new. Old expressions such as “you can't see the forest for the trees” and “the whole is greater than the sum of its parts” affirm that being able to understand the big picture has long been understood as important. But our industrial past pushed society away from thinking in terms of entire systems. Highly skilled, designers, facilities operators, and decision-makers often define problems too narrowly, without identifying their causes or connections, which merely shifts or amplifies problems.

This kind of “silo” thinking is often found in all kinds of large organizations, whose various departments each handle their own set of problems and issues in isolation—limiting opportunities, innovation, and creativity. In contrast, integrative design cuts across departments, occupations, and disciplines—often revealing lasting, elegantly frugal solutions with multiple benefits, which often enable us to transcend ideological and turf battles and unite all parties around shared goals.

For many businesses, understanding the dynamics of systems is essential to maintaining long-term profitability. Not only does the integrative design process point the way to solutions to particular resource problems, but it also reveals interconnections between problems, which often permits one solution to be applied to numerous challenges. Investing in single “system solutions” can often generate multiple benefits, providing several sources of revenues and a higher return on investment.

Take cars, for example. Driven by complexity, automotive engineers and designers tend to specialize. One person's job is to make a given component or subsystem the best it can be. As a result, the modern automobile has evolved, through an incremental process of small improvements to individual components, without much change to the overall concept. The current market position of U.S. automakers painfully demonstrates how reductionist thinking, specialization, and incrementalization has stifled sweeping innovation and has limited market share.

The problem with blind specialization is that optimizing isolated parts often “pessimizes” the greater system or other parts of the greater system—integration and synergy are lost, and complexity, over-sizing, and inefficiency abound. What's lacking is a sense of the big picture, the whole system.

System Definition

A system is a set of inter-related elements that behave in a specific way. Our lives are embedded in systems: families, communities, industries, economies, and ecosystems. Even the machines we rely on are systems. All these systems have increasingly profound effects on the human and biotic systems around them. Examples:

- A fishery: fish, boats, fisher-people, catch/year, type of technology, weather, price of fish, etc.
- A business: people, shared purpose, salary, rewards, stress, commitment, amount of work, facilities, costs, revenues, etc.

Solve the Right Problem

When the solution to the problem being addressed creates significant additional problems or “unintended consequences,” it may be the wrong problem. It’s important to correctly identify the problem in the first place in order to ensure that a solution to the selected problem actually achieves underlying goals. Often, preconceived notions about problems—so-called “mental models”—are misguided.

For example, when building new projects, affordable-housing agencies tend to define their challenge as minimizing first cost. The buildings that result are often drafty and inefficient with exceedingly high, often unaffordable, utility bills. In sharp contrast, Isles, a nonprofit housing group in Trenton, reframed its challenge. They now focus on minimizing monthly housing costs of tenants. Where other housing advocates might have said, “Energy is not my problem, not my job,” Isles included minimizing energy costs as part of its challenge. The result was that Isles began building higher-quality, more efficient apartments whose utility-bill savings exceeded additional capital costs when folded into mortgages. While others are content in the darkness of their organization’s silos, Isles’ integrative approach is solving tenants’ problems.

Related concepts: Ask the right question; choose the right goals and objectives. Ensure that they address the real issue. Problems need to be explored at deeper and deeper levels of causality until the root cause is reached. For example, a pool of oil on the floor of a manufacturing plant might have been caused by a leaking piece of machinery, which was in turn was caused by defective gaskets. The defective gaskets may have been bought by a purchasing department motivated by a policy of buying all equipment at the lowest price. If we attempt to solve the problem by changing gaskets, it will soon recur. In contrast, whole-system thinking involves the aggressive pursuit of root causes in order to identify what is really going wrong. This avoids a common trap when trying to identify and fix problems: symptom treatment, which is both inefficient and self-defeating.

Similarly, carefully defining *end goals* can help a company serve clients and gain a competitive advantage far more effectively than constantly pushing to sell more of a product, regardless of consumer need. As RMI’s CEO Amory Lovins famously points out, people don’t really want electricity; they want hot showers and cold beer. A smart company seeks ways to provide heating and cooling at competitive prices, instead of forever selling only electricity. This approach is called end-use/least-cost thinking.

Resilience

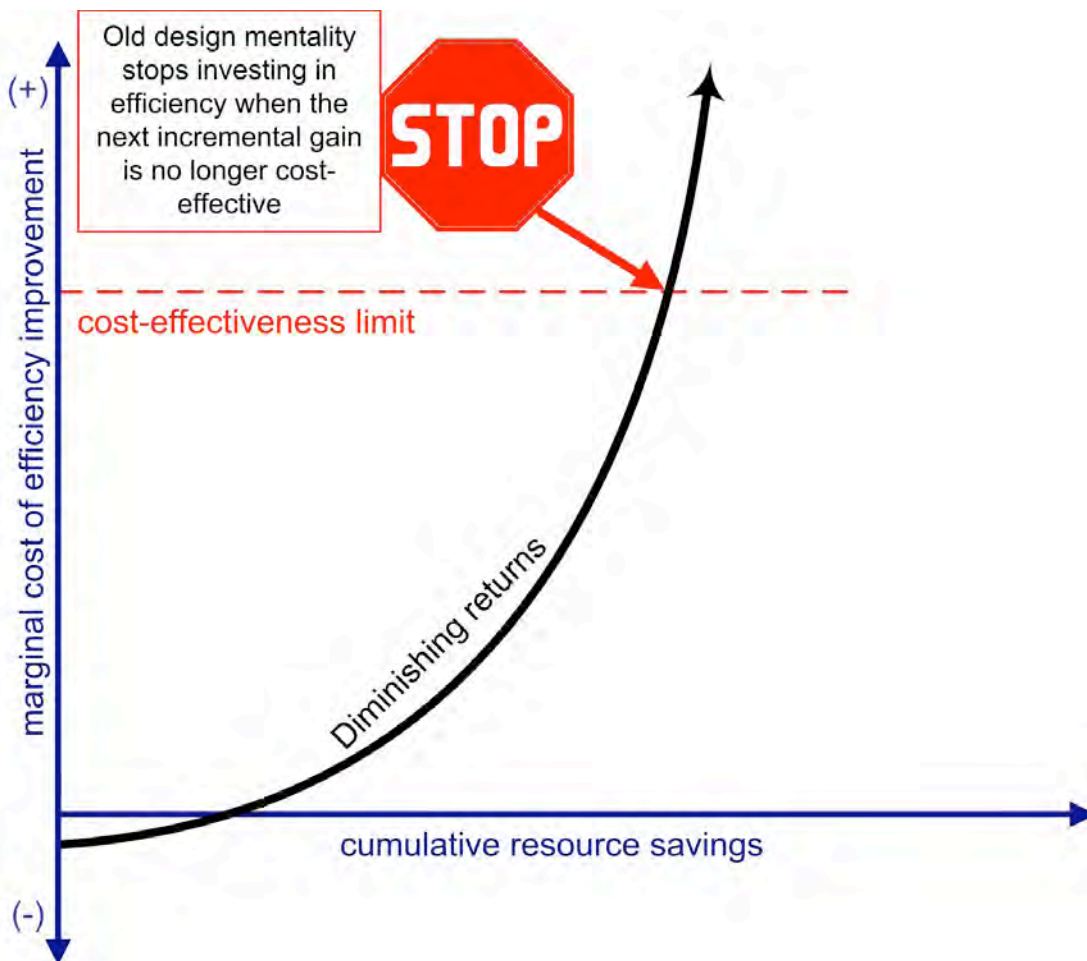
An essential characteristic of a sustainable system is resilience. A stiff and brittle tree will not withstand a storm, while a supple tree can bend and survive a hurricane. Similarly, a community or organization is not sustainable if its energy source is “brittle”—that is, if its operations depend entirely on a high-risk, price-volatile, polluting energy source whose future supply is uncertain. Such an organization or community should seek alternative means to drive its economy before the next economic storm.

Another aspect of resilience is diversity. A prairie comprised of a wide range of plant and animal species is far better prepared to survive a drought or insect infestation than the same area planted with one species. Similarly, a business with a diverse portfolio is stronger and better able to withstand economic

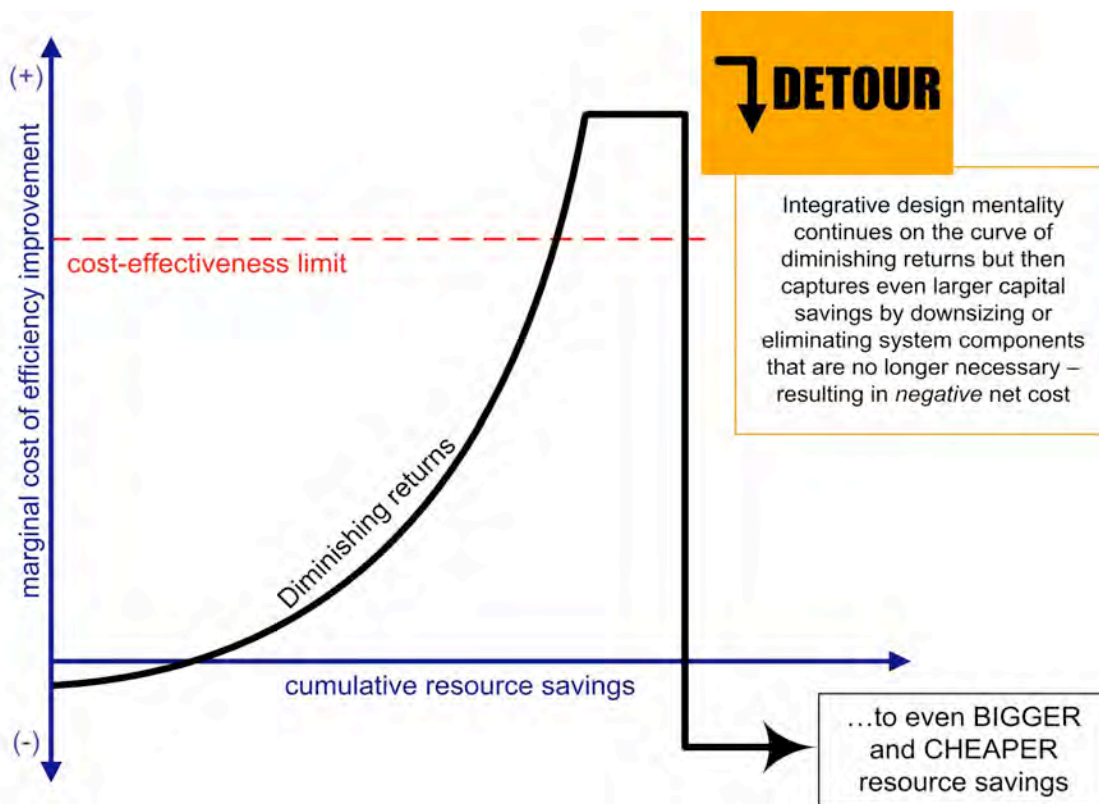
changes. Also, when it is considering changes that will affect its community, a business will be more resilient and experience fewer delays if it collaborates with a diverse range of community stakeholders.

Diverse mangrove forests protected the Indonesian coastline during the 2004 tsunami, while land cleared of mangroves for development or shrimp farming was devastated. Similarly, planting diverse native vegetation to replace turf saves maintenance costs and water. And lastly, hiring for ethnic diversity that reflects the surrounding community will make an organization more compatible with that community, and it may make it a more interesting place to work.

“Tunneling through the Cost Barrier”



Most of us view efficiency as a process of diminishing returns. Let’s say you’re trying to make an office building more energy efficient. You prioritize all the things you could do, from the highest return on investment to the lowest. You work your way down the list until either your budget for improvements is used up, or the return on your investment is so small that you’d be better off spending the money on something else. You’ve reached an apparent cost barrier (see diagram above).



Conventional wisdom says you should stop when you get to that cost-effectiveness limit. But, there are times when, by allowing you to exceed that threshold temporarily and investing in large, fundamental changes you can tunnel through the cost barrier and achieve huge savings at lower total cost (second diagram).

For example, one can add energy-efficiency improvements to a building sufficient to downsize or even eliminate the heating, cooling and ventilation system, which actually reduces total capital costs. Through better, smarter design, a typical building can be cheaper to build, need less energy for heating and cooling, less water for washing and watering, and require fewer breakable systems and devices—all while emitting less pollution and making occupants happier, healthier, and more productive.

Surprisingly, big savings can be easier and cheaper to achieve than small ones if you combine the right ingredients in the right way, and if your organization is structured to do so.

Perverse Incentives

In many large organizations, both private and public, siloed thinking often creates perverse incentives. For example, one department, say, Capital Projects, might be responsible for capital expenditures, while another, say, Facilities, might tackle the operations and maintenance budgets for the organization's buildings. In many organizations, the Capital Projects department has no incentive to spend its budget on energy-efficiency retrofits of buildings when the savings resulting from the retrofits will improve the General Services budget. The result: stifled innovation and higher costs. From a whole-system perspective, Capital Projects is optimizing its budget, while "pessimizing" the organization's budget.

Properly informed, the organization’s leadership will prefer to optimize the whole system. Properly incentivized, Capital Projects will do the same.

“Siloed” Thinking versus Whole-System Thinking“

<i>Conventional “Siloed” Thinking</i>	<i>Whole-System Thinking</i>
Big problems require big solutions	Big problems can be solved by many small solutions
Problems are a burden	Many problems are opportunities
Centralized solutions	Distributed solutions
Optimize my portion of the system, the part I understand, and from which I benefit	Optimize the whole system
Processes are linear	Processes are cyclical, with closed loops
One problem requires one solution	Problems are interconnected, so are solutions
Nature supplies raw materials	Nature supplies raw materials and services
Waste = problem to throw “away”	Waste = food. There is no “away”
Prosperity requires perpetual expansion	Prosperity requires increased diversity, resource efficiency, and waste minimization
Prosperity requires increasing throughput	Prosperity is increased net benefit
Supply-side solutions only	Demand-side solutions first
Economies of scale	Economies of systems
Economy is independent of nature	Economy is a subset of nature
Short term	Long term
Solutions generate individual benefits	Solutions generate multiple benefits
Smart, powerful individuals are the best sources of solutions	Collaboration among people with diverse knowledge and interests derives effective solutions
Leaders have the right answers	Leaders have the right questions
Leaders talk	Leaders listen
Hard infrastructure	Green infrastructure

Natural Capitalism

The book *Natural Capitalism* describes the opportunities that are arising with the birth of the green economy, which differs from conventional business systems in philosophy, goals, and fundamental processes. In the next century, as the human population doubles and the resources available to each person drop by one-half to three-fourths, a remarkable transformation of commerce and industry can occur. Through this transformation, society will be able to create a vital economy that uses radically less material and energy. Such an economy can free up resources, reduce taxes on personal income, increase per-capita spending on social ills (while simultaneously reducing those ills), and restore the damaged environment. Done properly, these necessary changes can promote economic efficiency, ecological conservation, and social equity.

Natural Capitalism (free at www.natcap.org) introduces four central strategies that enable companies and communities to operate by behaving as if all forms of capital were valued.

Radical Resource Productivity

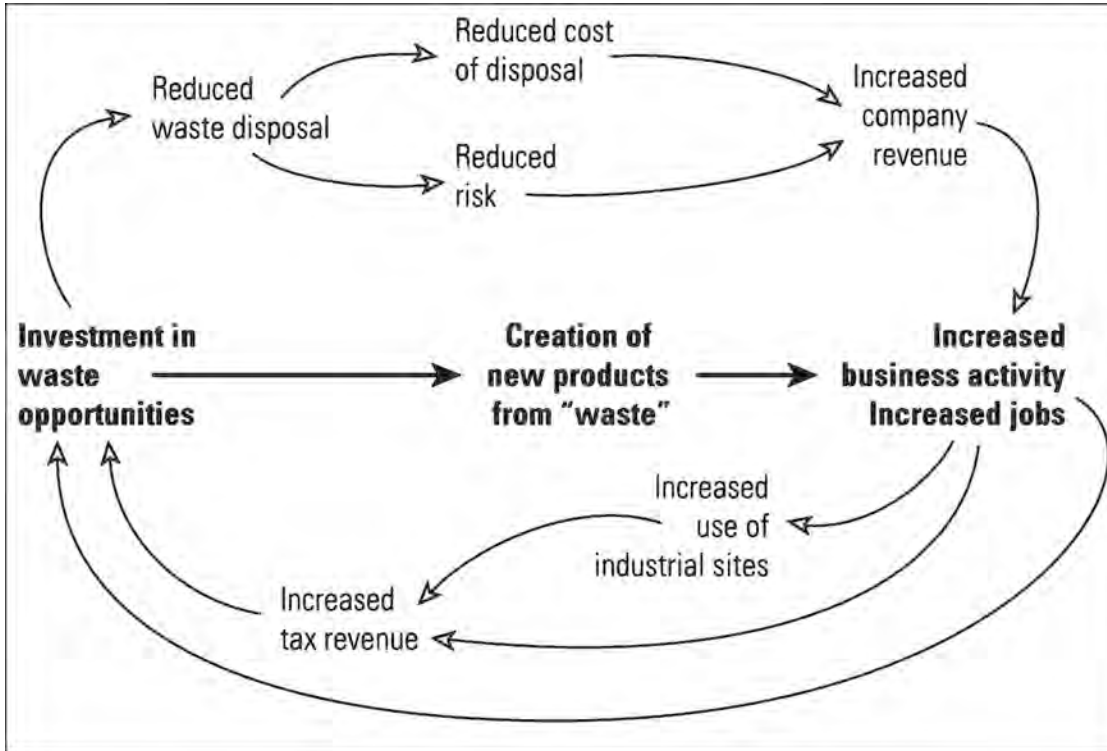
Radically increased resource productivity is the cornerstone of natural capitalism because using resources more effectively has three significant benefits: it slows resource depletion at one end of the value chain; it reduces pollution at the other end, and provides a basis to increase employment with meaningful jobs. The result can be lower costs for business and society, which no longer has to pay for the chief causes of ecosystem and social disruption. Much environmental and social harm is an artifact of the uneconomically wasteful use of human and natural resources, but strategies for radical resource productivity can avoid degradation of the biosphere, make it more profitable to employ people, and thus safeguard against the loss of vital living systems and social cohesion.

One path to radical resource productivity is “end-use/least-cost thinking.” Rocky Mountain Institute Chief Scientist and *Natural Capitalism* co-author, Amory Lovins coined the phrase to guide decision-making in the energy industry, though it applies to a wide range of situations. People don’t want electricity or oil or coal, he reasoned. What they want are the services energy provides: illumination, cold beer, comfortable living rooms, hot showers, and so on. How can we provide these services, he asked, with the least overall cost? Lovins concluded that building central power plants to power baseboard heaters in drafty houses was not a least-cost solution to keeping people comfortable. For far less financial and environmental cost, one could simply insulate the houses properly. His ideas prompted some in the electric utility industry to implement “demand-side management,” energy service programs that seek to meet customers’ needs more cost-effectively through energy savings instead of providing more power at a high cost. Though this approach may sound like common sense, it is actually a fairly novel way of making decisions. (www.rmi.org/sitepages/pid61.php)

Biomimicry

Natural systems create no waste. Everything that is no longer useful to one organism becomes food (energy) for another. Similarly, much industrial waste is a resource out of place, a nutrient seeking another industry where it can be of use. Reducing the wasteful throughput of materials—indeed, eliminating the very idea of waste—can be accomplished by redesigning industrial and business systems

along biological lines, enabling the constant reuse of materials in continuous closed cycles and often the elimination of toxicity. (www.biomimicry.net)



Industrial symbiosis (or waste matching) is an innovative form of industrial collaboration that redefines waste and by-products as inputs for other industrial operations. It “engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, and/or by-products” (Chertow). In a city, it can offer development opportunities regardless of prospects for future industrial expansion, creating more wealth within an existing mix of industries. See *Cuyahoga Valley Initiative: A Model of Regeneration* at www.rmi.org/sitepages/pid177.php.

Service and Flow Economy

A fundamental change in the relationship between producer and consumer is underway. It’s a shift from an economy of goods and purchases to one of service and flow, which changes the incentives regarding reuse of materials. For example, nearly all offices now lease copier services rather than buy copy machines as they once did. Thus, it’s in the interest of the copy-machine company to design the machine to be recyclable instead of designing it so that all the parts of an old machine are discarded.

In essence, an economy that is based on a flow of economic services can better protect the ecosystem services upon which it depends. This requires a new perception of value. It requires shifting from perceiving the acquisition of goods as a measure of affluence to an understanding that the continuous receipt of quality, utility, and performance promotes well-being. A “service-and-flow economy” offers incentives to put into practice the first two innovations of natural capitalism by restructuring the economy to focus on relationships that better meet customers’ changing needs and to reward automatically both resource productivity and closed-loop cycles.

Investing In Natural Capital

Sustaining, restoring, and expanding stocks of natural capital will support the biosphere in producing more abundant ecosystem services and natural resources. This statement is based on the understanding that natural systems not only provide products (*e.g.*, wood from a forest), they provide—at no cost—many services that humans cannot do without. (*e.g.*, flood control by a forest’s root system). A community or company located near a river downstream of a mountain forest will eventually feel the effects if that forest’s *products* are harvested without regard for its *services*. As history has repeatedly demonstrated, those effects can be catastrophic.

Businesses must restore, sustain, and expand the planet’s ecosystems so that they can produce their resources and services even more abundantly. If businesses do not do so proactively, the cost of reinvesting in natural capital will increase, stocks will be depleted, and ecological problems will multiply. This will lead to societal pressures through regulation and costly and inefficient governmental actions. To avoid this scenario, reduce risk, and avert a reputation of environmental irresponsibility, a business must work to ensure that there will be sufficient ecosystem services in the future. This concept is the fundamental reason that many companies are reducing carbon emissions and buying carbon offsets even when they are not required by regulations to do so. Additionally, with growing consumer awareness, environmental stewardship offers a significant market advantage.

For more information, including free download of the book, see www.NaturalCapitalism.org.

Unintended Consequences

The following excerpt from *Natural Capitalism* provides a cautionary tale of a well-intentioned solution running amok in a complex system:

“Consider what happened in Borneo in the 1950s. Many Dayak villagers had malaria, and the World Health Organization had a solution that was simple and direct. Spraying DDT seemed to work: mosquitoes died and malaria declined. But then an expanding web of side effects (“consequences you didn’t think of,” quips biologist Garrett Hardin, “the existence of which you will deny as long as possible”) started to appear. The roofs of people’s houses began to collapse, because the DDT had also killed tiny parasitic wasps that had previously controlled thatch-eating caterpillars. The colonial government issued sheet-metal replacement roofs, but people couldn’t sleep when tropical rains turned the tin roofs into drums. Meanwhile, the DDT-poisoned bugs were being eaten by geckoes, which were eaten by cats. The DDT invisibly built up in the food chain and began to kill the cats. Without the cats, the rats multiplied. The World Health Organization, threatened having to deal with potential outbreaks of typhus and sylvatic plague, which it had itself created, was obliged to parachute fourteen thousand live cats into Borneo. Thus occurred Operation Cat Drop, one of the odder missions of the British Royal Air Force.” (*Natural Capitalism*, p.286–287).

Appendix B: Critical Thinking for Sustainable Community Decision-Making

A Community Leadership Tool

Communities are shaped by decisions made over decades. Though some of these choices are made with full knowledge of possible consequences, those made with insufficient thought and information can leave communities with unfortunate and unanticipated outcomes—some felt immediately, most delayed many years.

This tool supports more creative and better-informed decisions by helping decision makers examine each important decision in light of long-term inter-relationships among community, economy and environment. It can be used to identify the best of several alternative actions or to decide for or against a certain proposal. More creatively, discussions that take place during its use can lead to substantial improvements to a proposed action.

Community leaders can use the tool to explore many aspects that might otherwise be missed, or the subtle inter-relationships among those aspects. It will help them think about aspects that are often left out of decision making.

Involving Others

This tool is most effective when everyone potentially affected by, and knowledgeable about, the proposed action participates in its use. It is not particularly useful when only like-minded people are involved. Therefore, participants should include people from different points of view.

Begin by carefully determining who should be involved in the discussion to solve the problem or consider the proposal at hand. List all groups, formal and informal, who may be interested in the outcome. For example, those for and against; or those who want A, B or C alternatives. Ensure that at least one thoughtful member of each group fully participates in the conversation.

You'll have better success recruiting these people if the discussion does not appear skewed to one way of thinking. Impartiality requires that the conversation be convened by a neutral organization or multiple organizations with differing points of view. Also, it requires that leaders from those organizations have a hand in determining the factors used in the matrix on the following page (the items in the first column).

You may need to find participants with technical background in the subjects to be considered, as well as related subjects. For example, if the decision relates to the wastewater system, then people who understand water systems, soils, and alternative treatment systems should be involved.

Preparing the Tool

The tool is a matrix containing a dozen factors that can be examined when considering many important community decisions. Summaries of the factors (pages 4 & 5) include questions to ask while considering each factor. Begin the discussion by revising this list of factors to fit with your particular circumstance. You may add factors and questions to better focus this tool on your particular community or the particular decision at hand. Also, if your community has developed a vision or goals statement, you may want to include factors found in that statement.

You may remove certain factors from the matrix. Or you may want to strike questions within some of the factors. But be cautious: consider if removal would simply avoid an important but uncomfortable discussion.

For a detailed analysis, you may want to develop a more precise matrix that includes a row for each question.

Alternatively, you may begin with a blank matrix, using none of the suggested factors. If so, begin your discussion by asking participants what important factors should be considered, what questions should be asked, before making this decision. Then fill in the left column with the group's responses.

Column A of the matrix will apply to the proposed action. Column B can be used for a "no-action" alternative (that is, doing nothing or denying the proposal) and Column C might be used to examine an alternative action, including one that might emerge in the course of the discussion regarding the originally proposal. If the community is considering two or more alternative ways to solve a problem or tackle an issue, create as many columns as there are options.

There are several possible ways to set up this matrix for your discussion: You may draw it on a large chalkboard. You might use marking pens to draw it on newsprint roll-ends, taped to a blank wall. Or you might set up a computer-based spreadsheet and project it on a screen.

A skilled facilitator should lead the discussion, someone who understands how to ensure that all sides are fairly heard. An individual with power and influence is seldom the best facilitator, often the worst. The conversation should be convened on neutral "turf," not in a location identified with one point of view.

Using the Tool

Begin your discussion by introducing the pending action, issue, problem, or proposal. Review the events that lead to this gathering, then ask all participants to briefly introduce themselves. If the meeting is tense due to controversy about this topic, you may want to ask a question that allows participants to notice their common interests. For example, you may ask why they live in the community.

Next, describe the purpose of the matrix and who decided what would be included in it. This is where it's crucial that you are able to say that people with differing points of view were involved in creating this tool.

At this point, you may ask the group if they do not object to use of this tool. But be careful, such a question can lead to a long discussion.

Begin using the tool by asking participants to consider the first option (on the top row of the matrix) in light of the first factor (the first item in the left column.) Focusing on one matrix box at a time, ask participants to say how each should be filled in.

Participants have seven options: (++) if they think the proposed action will have a highly positive effect, (+) for a positive outcome, (0) no effect, (-) a negative outcome, (--) a highly negative effect, (?)

if they don't have enough information to estimate the effect, or (n/a) if the factor does not apply to proposed action they are evaluating.

It's often easier on the group's thinking process to fill out the rows rather than the columns. This approach allows the group to consider each alternative action in light of one factor at a time, rather than considering each factor in light of one alternative at a time.

Seek a consensus response for each box. Consensus is not unanimous support. Rather, it's a condition under which all participants can live with the results. The object of using this tool is not only to find the best answer; it is also to create a context for genuinely creative discussion. Creativity requires that each participant be willing to respectfully question the assumptions of fellow participants and, in turn, to allow questions regarding his or her assumptions.

Important:

If participants indicate potential negative outcomes, then also discuss ways in which the proposed action might be changed to achieve more positive results. If the changes are significant, you may wish to fill out Column C for the revised action.

In many cases, when the matrix is complete, the appropriate decision will be obvious.

Notes:

If participants respond with “?” regarding an important factor, you may wish to obtain more information before proceeding with the decision. But be careful, gathering more information can be a too-easy way to avoid a thorny decision.

This tool is not designed to result in a numerical score by which a decision can be made. Rather, it displays the positive and negative aspects of proposed actions so that participants can more easily recognize likely implications and render a sensible decision. If, instead of entering pluses and minuses in the matrix, you decide to score numerically, then you should first weight the various factors, then multiply individual scores by the weight of each factor.

Decision-Making Matrix

A. Proposed action: _____

B. No action

C. Alternative action: _____

	Factors	Alternative Actions		
		A	B	C
1	Community			
2	Economy			
3	Growth and throughput			
4	Self-Reliance and security			
5	Finances and affordability			
6	Environment			
7	Resource use			
8	Long-Term Effects			
9	Off-site Effects			
10	Waste			
11	Unintended Consequences			
12	Multiple Benefits			

Notes: The factors are not listed in order of importance.

The matrix can be used to consider a proposed action or several alternative actions (*e.g.* alternative road alignments or building sites).

Key:

++ highly positive effect	-- highly negative effect
+ positive effect	- negative effect
0 no effect	? need more information
	n/a not applicable

Summary of Matrix “Factors”

1. Community: What effect will this action have on sense of community and the ability of residents to work together. Will one group receive the benefits while another pays disproportionate costs? Consider age, gender, race, income, and disability. What kind of environmental, social, or economic effect will this action have on less fortunate members of the community? Will it effect health, education, or security? How will effect the community as a whole?
2. Economy: Will the action effect local jobs, income, or savings? If it creates jobs, will they generate living wages? Will it lead to job losses elsewhere in the community? What effect will it have on existing businesses? Will it strengthen the community's economic diversity or make the community even more dependent on a few types of business? Will the community become more or less dependent on a single large employer or one type of business activity? Is it an all-or-nothing prospect, or can the strategy withstand partial failure while achieving overall success?
3. Growth and Throughput: Will this action make the community better or just bigger? If the action would make the community bigger, who will pay the public costs of the expansion? Might this action lead to, or be part of, a boom and bust cycle? Are there ways in which this same goal can be achieved without making the community larger?
Will this action increase throughput in certain areas of the economy without creating the means to pay for associated costs—financial, environmental and social? (Throughput is the rate at which the economy flows, the quantity and flow of resources that are processed, used, and turned into waste, for example, the GDP or the number of bushels, board-feet, or tourist days.) Has the community reached the point where increasing throughput in certain areas increases costs more than benefits?
4. Self-Reliance and Security: Will this action affect the community’s self-reliance and security? Will it strengthen or weaken local businesses? Will it make the community less or more vulnerable to outside influences (e.g. global trade, severe weather, economic downturns, terrorism, corporate or governmental decisions)? Will it enable local businesses or residents to produce or buy things locally, instead of outside the community?
5. Finances /Affordability: Will the action make the community more or less affordable? What is the net effect on private and public finances (revenues vs. long-term costs)? Will the action influence existing public services (schools, police, fire protection, roads, water, sewer, etc.)? If the outcome is negative, who is being affected by reduced quality of service? If the action leads to additional public service cost, who will pay those costs? Can the community afford this action? Can it afford to not to take this action?
6. Environment: Will this action effect the capacity of biological systems to deliver crucial services (e.g. soil erosion and flood control by plants, pest control by birds and bats, cooling by shade trees, water and air purification by plants)? Will it affect biological diversity? Will it influence habitat size or type, or number of plant and animal species? Will it pollute?

7. Resource use: Will this action effect the way resources are used in the community (energy, water, air, land, soil, buildings, infrastructure)? Will it use resources efficiently. Will it restore or deplete resources? If it will significantly reduce or exhaust a resource, what will the community do?
8. Long-Term Effects: Is this proposed action compatible with the community's stated goals—its vision or preferred future? What effects might the action have in ten or twenty years? How will it influence future generations? Will the costs of this action be imposed on future generations who receive less or none of its benefits?
9. Off-Site Effects: Will the action induce changes somewhere other than the place where the action will take place? These kinds of effects might be, for instance: next door, blocks away, in the next community, downstream or downwind. Consider how the action will effect people and places outside your jurisdiction or physical area of interest.
10. Waste: Will this action create significant amounts of waste or pollution? Is there a way to reduce, reuse, or recycle the wastes creating more jobs or income? What are the economic, community and environmental costs of disposing of the waste?
11. Unintended Consequences: Will the proposed action lead to changes other than those that are intended. Consider a wide, though realistic, range of possible outcomes, especially those that might occur outside the area of issues that the action is intended to influence.
12. Multiple Benefits: Does this action solve more than one problem? Does it offer more than one benefit? Can the proposed action be adapted or expanded so that it addresses more than one problem or benefit?

Impartial Analysis

The fact that you are using this tool means that you sincerely intend to take a hard look at a project, program, or proposal, and its alternatives to ensure that the final result makes sense from the standpoint of community, economy and environment.

But you're human and if you helped developed a certain project idea, you'll tend to advocate that project, whether it's in your personal interest or not. Unconsciously, you may gloss over potential problems and concerns and develop a sales pitch for your project rather than a careful review.

But if your first priority is your community, not a particular project, then make an extra effort to ensure that your use of this matrix is fair and impartial. As part of that effort, involve people with different points of view.

In using this tool, if you find that your project has problems, be honest about them. It's more effective to face them now, before significant time and money are spent and while improvements can still be made. Use this tool, not to rationalize a particular project, but rather to find the best ways to strengthen the community.

Appendix C: New and Old Water Paradigms

This chart compares “old school” approaches to water systems to emerging soft-path approaches.

The Old Paradigm	The Emerging Paradigm
<i>Human waste is a nuisance.</i> It is to be disposed of after the minimum required treatment to reduce its harmful properties.	<i>Human waste is a resource.</i> It should be captured and processed effectively, and put to use nourishing land and crops.
<i>Stormwater is a nuisance.</i> Convey stormwater away from urban areas as rapidly as possible.	<i>Stormwater is a resource.</i> Harvest stormwater as a water supply, and infiltrate or retain it to support urban aquifers, waterways, and vegetation.
<i>Build to demand.</i> It is necessary to build more capacity as demand increases.	<i>Manage demand.</i> Demand management opportunities are real and increasing. Take advantage of all cost-effective options before increasing infrastructure capacity.
<i>Demand is a matter of quantity.</i> The amount of water required or produced by water end-users is the only end-use parameter relevant to infrastructure choices. Treat all supply-side water to potable standards, and collect all wastewater for treatment in one system.	<i>Demand is multi-faceted.</i> Infrastructure choices should match the varying characteristics of water required or produced by different end-users: quantity, quality (biological, chemical, physical), level of reliability, etc.
<i>One use (throughput).</i> Water follows a one-way path from supply, to a single use, to treatment and disposal to the environment.	<i>Reuse and reclamation.</i> Water can be used multiple times, by cascading it from higher to lower-quality needs (e.g. using household graywater for irrigation), and by reclamation treatment for return to the supply side of the infrastructure.
<i>Gray infrastructure.</i> The only things we call infrastructure are made of concrete, metal and plastic.	<i>Green infrastructure.</i> Besides pipes and treatment plants, infrastructure includes the natural capacities of soil and vegetation to absorb and treat water.
<i>Bigger/centralized is better.</i> Larger systems, especially treatment plants, attain economies of scale.	<i>Small/decentralized is possible, often desirable.</i> Small scale systems are effective and can be economic, especially when diseconomies of scale in conventional distribution/collection networks are considered.
<i>Limit complexity: employ standard solutions.</i> A small number of technologies, well-know by urban water professionals, defines the range of responsible infrastructure choices.	<i>Allow diverse solutions.</i> A multiplicity of situation-tuned solutions is required in increasingly complex and resource-limited urban environments, and enabled by new management technologies and strategies.
<i>Integration by accident.</i> Water supply, stormwater, and wastewater systems may be managed by the same agency as a matter of local historic happenstance. Physically, however, the systems should be separated.	<i>Physical and institutional integration by design.</i> Important linkages can and should be made between physical infrastructures for water supply, stormwater, and wastewater management. Realizing the benefits of integration requires highly coordinated management.
<i>Collaboration = public relations.</i> Approach other agencies and the public when approval of pre-chosen solutions is required.	<i>Collaboration = engagement.</i> Enlist other agencies and the public in the search for effective, multi-benefit solutions.

21st Century Water Systems: Scenarios, Visions, and Drivers (1999) by Richard Pinkham, Research Scholar, Rocky Mountain Institute (http://www.rmi.org/images/PDFs/Water/W99-21_21CentWaterSys.pdf)

Appendix D: Smart Economic Development A Strong Economy Built on Community Assets

Growth? Development? What Are We Arguing About?

Across the continent, thousands of communities are torn by controversy surrounding “growth.” Whether it’s spiteful letters to the editor, vicious public hearings, or screaming matches at the post office, the debate over “growth” seems to engulf us all.

In the heat of controversy, it’s easy to forget that, without businesspeople who are willing to take risks, the local economy and jobs wouldn’t exist. But remember too that sincere and committed residents seek to preserve the non-monetary aspects of a community that make it livable.

One important reason for the controversy surrounding growth is the word itself. It is often used to talk about two very different things. We can help cool the arguments and focus on solutions by understanding this difference and saying what we mean. For example “development” can be used to describe the things that make a community better: living wage jobs, increased income and commerce, more savings and excellent quality of life.

The second concept might be called “expansion,” the things that make a community bigger (e.g., more people, infrastructure, buildings, subdivisions, malls, etc.).

Clearly, expansion doesn’t always improve a community. In fact, depending on the particular details, some expansion options can hurt it. However, that observation doesn’t help the typical business person or the community.

Here’s where the difference between development and expansion gets exciting: what advocates on both sides of the debate often don’t realize is that there are many development options that require little or no expansion. They create more business, jobs, income, and wealth without damaging quality of life. In fact, many of these options have positive effects on both the community and its environment. But before exploring this idea of development without expansion, let’s review what communities have been doing about expansion where it has become a problem.

Smart Growth: A Worthy But Often Incomplete Strategy

In the last few years, national attention has focused on the efforts of many communities who have been wrestling with expansion problems for decades. These communities have implemented ways to:

- Design expansion correctly by mixing land-uses, clustering development, infilling not sprawling, and by using traditional community design, multiple transportation modes and natural infrastructure (e.g. for drainage and sewage).
- Ensure that expansion pays its way: Tax revenues collected from subdivisions in previously undeveloped areas are virtually never sufficient to pay for the public services demanded by those subdivisions. As a result, taxpayers in rapidly expanding communities unknowingly subsidize sprawl unless impact or user fees are charged to those newly developing areas. Local governments that don’t know the full cost of expansion are rolling the fiscal dice.

- Restrict expansion through such means as meaningful zoning, urban growth boundaries, subdivision allotment systems (that control growth rate), community land trusts, and electing people who can actually say “No” to growth proposals that are incompatible with the community. Some suggest that this results in development by choice and not by chance.
- Build affordable housing through private, public, and nonprofit means and by requiring it as a large portion of every expansion proposal. Affordable housing is not worth building unless its affordability is permanently guaranteed through such mechanisms as deed restrictions.

Each of these four categories is an important part of any community’s response to expansion problems. Each has a rich history, including plenty of controversy, and each has been the subject of many books. However, as we see in many communities, these “smart growth” actions have to be wisely implemented or the smart growth program is just more expansion.

Though often justified by intense expansion pressures, restrictions on expansion often do little to help local businesses. As a result, businesspeople often see smart growth as an enemy.

The lesson? Smart growth as it’s currently applied is often incomplete. It repeatedly fails to achieve its own objectives, and it is unbalanced without compatible development activity. And that’s where natural capitalism comes in.

Fostering Natural Capitalism

Natural Capitalism offers a unique way to bring a community together. It’s attractive to business people because it offers ways to strengthen competitiveness, while enhancing livability and reducing environmental impacts. Innovative businesses can lead communities in adopting these principles and setting examples.

Natural Capitalism is a powerful strategy for economic development. Outlined on the next page, the principles of Natural Capitalism are a route to increased living-wage jobs, income, commerce, savings, and community well being without necessarily requiring community expansion. Because this kind of development proceeds independent of increases in the size of a community, it’s attractive to both booming and declining communities. This kind of development is also known as asset-based development.

Listed under each principle below are several representative community activities or programs. Many are well known, others innovative. They distribute benefits widely across the community. Most require little or no community expansion. While not all apply to every community, the length of this list indicates that there is an untapped wealth-generation potential in virtually every community.

Which of these activities or programs will make sense in your community? Many of these kinds of decisions are made behind the scenes. In contrast, Natural Capitalism is most effective when people from all walks of life choose their community’s future collaboratively and base their choices on practicality and compatibility with the community and its environment.

I. Invest in Resource Productivity by “plugging the leaks”

A local economy might be compared to a bucket that the community would like to keep full. Business recruitment and community expansion are attempts to pour more money into the bucket. While these strategies may have succeeded in the past, today they often fail or generate more costs than benefits to the community.

Focusing entirely on more ways to fill the bucket ignores vast opportunities for “plugging leaks.” Economic buckets invariably have holes through which dollars leak every time local resources are used inefficiently. Smart communities seek profitable ways to keep the bucket full by plugging unnecessary leaks through one of more of the techniques listed below. As a result their economies are more resilient and less vulnerable to the influences of the global economy.

This strategy is good news for communities that have little hope for expansion. It’s equally encouraging for those in which expansion is creating problems. Instead of relying on the hope of continuous expansion, that is also imposing large costs, rapidly expanding communities now have many alternatives.

As you read the following examples, think about similar or quite different ways to plug your community’s leaks. (For more business examples, see Rocky Mountain Institute’s new book *Natural Capitalism* or its website www.naturalcapitalism.org.)

1. Energy efficiency programs create local jobs and save millions of dollars in any community. Sacramento CA, invested \$59 million to save electricity. This enabled utility customers to save nearly that same amount. The program created 880 direct jobs, and increased regional income by \$124 million. Though energy is a small portion of total costs, saving energy will provide a significant contribution to profits and economic progress.
2. Local ownership increases the wealth-creating power of each local transaction. Land trusts, co-ops, and employee stock ownership can ensure permanent local ownership of many businesses by buying local buildings and renting only to residents (at cost). Example: The Green Bay Packers are owned by a corporation whose majority stockholders are from Wisconsin.
3. Import substitution replaces “imports” with local products and services. Simple example: Locally bottled water in Tropic, Utah, replaced imports and established a new business.
4. Local sourcing links local-business buyers with local suppliers. An early program in Eugene, Oregon created 100 jobs in its first year without any physical expansion of the city.
5. Water efficiency: The grassroots Mothers of East Los Angeles marketed a low-flush-toilet retrofit program that installed 270,000 toilets in three years, returned \$4 million to the neighborhoods in jobs, water-bill savings, and community programs, and saves over 3.4 billion gallons of water every year.
6. Downtown revitalization reduces economic leakage, builds pride, encourages infill, preserves culture, celebrates history, reuses resources, and reduces traffic.
7. Entrepreneurial training: Since 1993, the Nebraska EDGE training courses have assisted more than 1,250 individuals, entrepreneurs, small business owners and their partners start and improve their businesses.
8. Community supported agriculture: CSAs are local farms that increase productivity, reduce costs, and sell specialty crops direct to consumers and restaurants.

9. Business mentoring: Veteran business people “adopt” start-up businesses—giving rookie proprietors someone to talk with when things go wrong, helping them understand and avoid pitfalls. Such programs significantly reduce the high failure rate of start-ups.
10. Community cash flow can be captured through such community enterprise as locally based credit cards, debit cards and phone service. South Orange, New Jersey’s municipal credit card funds downtown revitalization.
11. Local currency: Ithaca, New York’s currency is accepted by 1,200 business and can’t be spent out of town.
12. Microcredit: Many low-income or impoverished people have the skills, but lack the credit to start a business. Tailored to very small, often home-based, start-up businesses, micro-loans are too small for conventional banks. Usually offered by nonprofit organizations in conjunction with basic business training, microcredit often provides a way out of poverty and off of welfare.
13. Business "visitation" programs enlist local leaders to visit businesses to determine needs and concerns. Proprietors get the chance to offer suggestions to local governments and organizations regarding changes that could benefit local business.

II. Shift to Biologically Inspired Economic Models (Biomimicry)

In the economic climate of the 21st Century, competitiveness requires lean business practices that, like biological systems, reduce and eventually eliminate waste. To be competitive, communities must pursue development strategies that analyze local material, energy, and waste streams; identify business opportunities; and match those opportunities with local businesses. Multiple benefits include more businesses and jobs, reduced resource inputs (and, therefore, lower costs), prolonged life of the local landfill, and reduced pollution. The transition to bio-entrepreneurship has begun:

14. Waste matching (or industrial symbiosis): Computer networks can make virtual industrial ecosystems by matching waste with potential buyers; examples under development include numerous state programs such as New Hampshire and Michigan. ReMaDe in Essex, England is a five-year project to create new markets and secondary uses for recycled materials.
15. Building salvage—Rather than demolish a building, dismantle and reuse its components. Southern California Gas saved \$3.2 million or 30% of construction costs on an office and education building by partly dismantling and reusing an existing building. The finished building was 80% made of recycled materials, keeping 350 tons of material out of the landfill.
16. Remanufacturing creates businesses and jobs and reduces resource inputs. This new “industry” is now larger than the steel industry. In Telford, England, old Ricoh photocopiers are reconditioned instead of being dumped in landfill sites. 90% of parts are reused.
17. Advanced business retention and expansion programs mimic biological systems by enhancing adaptation, competition, inter-relationships, and information flow. Littleton, Colorado’s program created jobs at six times the rate of its earlier recruitment efforts by offering such services as problem research, competitor analysis, industry trend monitoring, video conferencing, training, and market mapping. Such local policies enhance quality of life and intellectual infrastructure.
18. Flexible business networks: Several small businesses partner on contracts too big for any one of them, not unlike coyotes who usually hunt on their own, but run in packs when seeking larger game.
19. Storm-water capture saves money, recharges groundwater, and reduces pollution by helping rain soak in the ground where it falls rather than collecting it into expensive centralized systems, which,

in some areas, overwhelms sanitary sewage systems resulting in significant pollution. (Example: Permeable parking lot material.) .

III. Reinvest in Natural Capital

Everyone knows that living systems provide us with *products*—such as apparently essential resources as oil, water, trees, fish, soil, and air. Living systems also provide us with equally essential *services*. These ecosystem services include:

- Cooling (shade trees)
- Flood control (root systems)
- Purification of water and air (wetlands)
- Storage and recycling of nutrients (roots)
- Sequestration and detoxification of human and industrial waste (wetlands and ground filtration)
- Pest and disease control (by insects, birds, bats, and other organisms)
- Production of grasslands, fertilizers, and food
- Storage and cycling of fresh water
- Formation of topsoil and maintenance of soil fertility

These services are essential to doing business (and maintaining human life). Worldwide, however, these services are declining. Many of them have no known substitutes at any price. The future's strongest competitors will be businesses and communities that recognize these facts and invest accordingly:

20. Restore natural ecosystems: In Port Angeles, Washington, an estuary restoration project is saving the local lumber mill \$150,000 yearly through more efficient logistics. It created space for expanding the mill and improved the town's tourism.
21. Create urban ecosystems: Supported by these systems, birds, bats, and frogs eat pesky insects. Also, property values increase, for example near San Francisco's Golden Gate Park, by \$500 million to \$1 billion, which generates an additional \$5-\$10 million in property taxes. In inner city South Central Los Angeles, a park restored from an old industrial site is "like a grain of sand in an oyster, creating an economic development pearl."
22. Foster Eco-tourism to create local jobs while protecting important environmental values.
23. Maintain wetlands for waste treatment, storm-water retention, and wildlife habitat. Arcata CA restored 154 acres of wetlands and used it to treat City wastewater. The resulting marsh is now a wildlife habitat in which salmon are reared. The cost was a fraction of the costs for a conventional energy-intensive wastewater treatment system.
One researcher estimated the economic benefits generated by single acre of wetland: at \$150,000 to \$200,000. Barns Elms reservoirs near London, England, have been transformed from 43 hectares of concrete reservoirs into a diverse wetlands, which attract visitors.
24. Maintain watersheds for flood control and drinking water.
25. Reduce carbon dioxide emissions: Through energy and water efficiency in city operations, Regina, Saskatchewan reduced its CO₂ emissions by 10% while saving \$393,000.

Note: The list of ecosystem services on the previous page does not include such services as noise abatement and peaceful sanctuary because some may regard them as non-essential. Neither does it include such services as climate stabilization, protection against harmful cosmic radiation, distribution of fresh water, and regulation of the chemical composition of the atmosphere because some may argue that the depletion of these services is caused by factors too distant for community action. However, an increasing number of communities and businesses are implementing policies to make themselves “climate neutral” because doing so will save money and enhance shareholder value.

Growth, Throughput, and Practical Solutions

Throughput is an important, but little-understood concept used in examining such large systems as companies, communities, or ecosystems. To help understand how it informs a community’s growth dilemma, consider the story of the recently unemployed engineer: Undaunted by downsizing, he buys a truck and a load of vegetables to sell beside the highway. After a terrific day, he’s sold out. Back home, he gushes to his wife about his success.

"How much," she asks, "did you earn?"

"Eighteen hundred bucks," he crows.

"And how much did you pay for the veggies?"

Punching his calculator, he hesitantly announces, "Two thousand."

"Hmm," she says, "there seems to be a problem."

Dreamily, he says, "Yeah, *I need a bigger truck.*"

He’s intoxicated by revenue growth. But veteran businesspeople know what counts is profit. Increasing revenue is fine, until it’s outweighed by costs.

Ironically, the same smart businesspeople often neglect to calculate net gain when promoting economic development. They seek to spin the economy as fast as possible—harvesting more grain or trees, making more widgets, building more subdivisions, attracting more tourists. These are ways to increase throughput, the rate at which goods and services flow through an economy, and the rate at which resources are turned into waste. But increasing throughput does not necessarily lead to community prosperity or quality of life.

The growth debate should focus on whether increased throughput provides a net gain—that is, does it increase the well being of citizens and strengthen the community? And does continuously increasing throughput leave a viable economy for our children, or is it an illusion that, like selling more veggies, feels good in the short term but hurts later on? These are not simple questions. But answers can be found by soberly comparing the economic, community and environmental costs and benefits of specific growth proposals.

Unfortunately, community and environmental factors are seldom considered. Intoxicated by the prospect of an increase in throughput, growth boosters often ignore such costs as traffic congestion, declining schools, depleted soils or forests, increasing taxes, housing that residents can no longer afford, and groundwater pollution from chemicals that industrial agriculture substitutes for healthy soils. In a mature economy, each extra bushel, tree or tourist can create a net loss that boosters assume will be made up in volume.

"Smart growth" offers a valuable context for discussing this issue. But watch out, many unsustainable developments are dubbed "smart" in an attempt to "greenwash" projects that are not compatible with the community and its environment. In contrast, genuinely smart communities are using the strategies described in this paper to respond to growth. Communities develop more sustainably when they seek ways to create jobs, income and savings by doing more with what they already have, in addition to seeking to expand their export capacity. In these smart communities, the economy develops, the environment stays healthy, and the town remains a place where its residents want to live... and nobody needs a "bigger truck."

Appendix E: Collaborating for Healthy Communities

The path to a healthy community is not paved with charismatic leadership, increasing revenues, or technical expertise; it's not a series of big, quick fixes. Rather, it's a twisted and rocky path, found one step at a time by creative, open-minded residents who have a vision of a healthy future and a willingness to listen to those with whom they disagree.

When local issues are challenging, tensions often heighten as community decision-making pits one group against another and both against the local government. Each pushes its position instead of helping solve problems; neither takes responsible for a workable outcome.

Often, the results are anger, resentment, disrespect, distrust, delay, expense, and litigation. One side wins, the other loses, and adversaries become enemies. Local officials can hardly focus on the merits of a question before them; many just want to make the issue vanish. Their primary motivation become minimizing their own discomfort—not a recipe for a just and durable outcome.

In sharp contrast, more collaborative forms of decision-making build respect and trust. They involve all relevant parties and shift the responsibility to them. Results are neither easy nor quick, but ultimately faster and more sustainable than the alternative.

There's a far better chance that no one will lose and that everyone will be able to live with the results.

Though the appropriate mix of solutions for a given community must be carefully and systematically chosen, the primary challenge for a community is not technical (though technical aspects can be difficult). Rather, it's attitudinal; it's developing the capacity of residents — however passionate, committed, and outspoken — to work together for the common good.

The health care field offers an important lesson: After years of relying entirely on technical fixes, we finally learned that an individual's health requires not just a strong body kept that way by medical experts, but also a healthy mind and spirit, all driven by the individual's attitude.

Similarly, we're now learning that a healthy community is not based solely on an economy that moves lots of cash. Instead, it requires simultaneous attention to the environment, business, individual well-being, and community cohesiveness (of which collaborative decision-making is an important part.)

Community, economy, and environment are the three legs that keep a healthy community's stool from toppling. The challenge is not to "balance" social concerns against business issues, against environmental issues—taking a piece from one to benefit another—but rather to integrate the three — to regard all three as overlapping, inter-related factors that, when considered together, offer *solutions that are otherwise obscured when one factor is regarded as paramount* and the others subordinate. This is often called whole-system thinking or integrative design.

No single individual, however intelligent and well meaning, can integrate all necessary factors. Rather, sustainable solutions require many people with different skills and points of view to bring sufficient

wisdom to the conversation. Their wisdom is best exercised, not by imparting it on others, but by using it inquire deeply and to listen to those with different experiences.

Principles of Collaboration

1. Collaboration begins at the intersection of interests, where people find common interests upon which their different points of view are founded.
2. Collaboration occurs early, during the development of an idea or solution, rather than later, when the solution is chosen or implemented.
3. Collaboration does not necessarily require compromise. Working together intelligently, leaving dogma behind, people consistently find solutions beneficial to all parties.
4. Collaborators take responsibility for the outcome, even when they don't have the authority to make the decision.

Practical Collaboration for a Healthier Community

Say your community is confronted by a difficult and divisive problem that has deeply divided several community factions.

- Find a neutral convener and a neutral location for a discussion. Identify local groups that are interested in the problem, ensuring that economic, environmental and community concerns will be represented.
- Find one person within each group who is well informed, least contentious, and most willing to listen—the diplomats, not the warriors.
- Convene these diplomats and ask them to identify the primary issues and facts regarding the subject problem.
- Where there are disagreements on the facts, agree on objective sources of information for determining the facts.
- Once the facts are determined, reconvene the diplomats. Seek agreement on overarching community, environmental, and economic goals.
- Based on common goals and facts, begin an extended discussion of possible outcomes.

This approach often, not always, reveals solutions previously unknown. Also, it often results in a solution that all parties can live with. This may sound impossible in your particular, seemingly intractable circumstance, but it's more effective and practical than the alternative.

How to Collaborate

1. Employ active listening: empathize, validate, clarify, summarize
2. Hear their concerns and ideas before telling them yours
3. Understand their interests before describing yours
4. Describe your *interests* instead of defending your *position*
5. Set aside differences and disagreements to solve mutual problems
6. Pursue easiest issues first.
7. Identify common problems, needs, and interests before seeking solutions.
8. Join them in achieving their goals before asking them to join you

Smart Governance

As part of an emerging and creative worldwide trend, decision-makers in a variety of communities are linking their local economy, their community, and the environment. Instead of deciding, in effect, which will prevail—economy, community, or environment—they understand that each is a leg supporting the stool of community success. They're seeking ways to strengthen all three and to integrate solutions among them. Sometimes these efforts toward sustainable communities start with elected leaders, sometimes with businesses, and sometimes with faith-based efforts or grassroots citizen advocacy. Durable solutions are built on support from all three sectors—public, private, and nonprofit.

Effective Community Leadership

1. *Efficacy* to act; the sense that I can make a difference and I can lead.
2. *Sensitivity* to conduct meetings well. Great ideas die in rudderless meetings
3. *Commitment* to serve the community; the recognition that "I am not separate"
4. *Humility* to understand that "I don't have all the answers; I'm part of a team."
5. *Wisdom* to have a long-term vision that includes a sense of place and of community (see Kemmis, *Community and the Politics of Place*.)
6. *Intelligence* to understand inter-relationships; system thinking (see Meadows et. al., *Beyond the Limits* and Lovins/Hawken, *Natural Capitalism*)
7. *Courage* to carry out the vision by taking actions that may be unpopular and appear inane
8. *Self-confidence* to genuinely hear adversaries and to continually test the means to carry out the vision and question specific actions. See active listening below.)