<u>Conducting a Local Energy Inventory</u>
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Any energy inventory of a community, town or city is at best an approximation. Hopefully, with proper attention to the data sources and the use of statistical sampling, the resulting inventory will be a good representation of the actual energy used for your area of consideration. This means examining all data critically to see if it makes sense – don't accept data blindly!

So how do you start? First and most importantly, you need to define <u>the area of interest</u>. It can be by size, by township, etc., but most data is available by zip code and that is a convenient method that comes with specific definitions of size and population. Once you define this area, go to the internet and request demographics (I used Google and asked for demographics by zip code). This will give you the size, population, income, etc. which will be useful when you start looking at per-capita consumption.

Next you need to determine <u>the types and sources of the energy used</u> in your area (e.g. distributors, wholesalers and retailers). *Note that this energy inventory does not take into account the embodied energy of products we buy, just the direct purchase and use of energy products themselves.*

In our case, the main types of energy used in our area were defined as: natural gas, electricity, gasoline, other transportation fuels (e.g. diesel), propane and firewood.

Sources of these products were then defined as follows:
- Natural Gas – gas pipeline distribution (and billing) by Pacific Gas & Electric (PG&E)
- Electricity – high voltage distribution lines (and billing) by PG&E. *Note that off-grid installations were not considered in our work* (they've already been 'liberated' <grin>).
- Gasoline – Wholesale distributors transporting fuel by trucks for distribution by local retailers (gas stations) on a scheduled basis
- Other Transportation Fuels (diesel, kerosene) – as above
- Propane – as above
- Firewood – Generally individuals cut either from private or open public lands or purchase from others who do.

The next step is to determine <u>how these fuels are employed</u>. Is it for private consumption (home heating, transportation, etc.), commercial businesses, or public entities? This step helps us to determine how stable the use is and what alternative (locally-produced) fuels can be used to replace those currently imported.

Up to this point, everything we have discussed in the local energy inventory process could take place sitting around a table. Now the real work begins.

One of the more complex pieces of data to obtain is that of natural gas and electricity usage for your defined area. While there are ways of obtaining this yourself, to obtain accurate statistics from an electric company (like Pacific Gas & Electric) you will need to enlist the assistance of someone in city, state or Federal office. They will need to make the call and request the information, most likely receiving it by email. For the Willits area audit, we had the benefit of a City council member as a member of our group who took the time to place the call to PG&E. He was able to get zip code specific data. As an alternative (if you have no one to represent you), contacting the Public Utilities Commission will get you electricity usage for your area but perhaps not specific to the area you have defined (they generally have it by county). For California, here is a starting contact I used: Andrea Gough, California Energy Commission, 1516 9th Street, MS-22, Sacramento, CA 95814, ph 916.654.4928 fax 916.654.4901, email agough@energy.state.ca.us. She ended up sending county-wide data which was a good benchmark for checking the final data set we received directly from PG&E (e.g. total consumption->average per household x #households in your defined area).

Transportation fuels (gasoline, diesel, etc) brings with it their own problems. Specifically, the local stations sell fuel not just to residents and local businesses but also to those traveling through. What needs to happen here is to locate department of transportation (e.g. CalTrans) statistics on the vehicles on the road in your area and what the percent of local traffic versus pass-through traffic is. In addition, the US Department of Transportation has statistics on the mix of vehicles (compact cars, SUVs, trucks and freight) that inhabit the road as well as their average fuel economy. An alternative is to employ stats from the state Energy Commission and the US Department of Transportation as to the transportation fuel use per capita as well as the ratio of cars to trucks for the state in general. Using your demographical data, the total # of local vehicles and the fuel economy for each vehicle class can be derived and the local defined area stats can be calculated.

Propane consumption is a bit easier. For our inventory, we contacted the local retailers (wholesalers, if present in your area, may also work) and queried them as to the total sales for the past year.

That leaves us with firewood consumption. In larger areas (mid to large towns and cities), firewood consumption is more of an aesthetic than a need and you might want to discount it altogether. However, if your area includes rural or parts of a community not served by natural gas, then the consumption of firewood is relevant in that it s used (at least to some degree) for heating of residences. Statistical approximation from firewood dealers and forestry service permits is one approach. For our inventory, the County Air Quality Management Board was able to provide stats on wood burning equipment and use (including whether it was used for primary or auxiliary heating), that allowed us to derive a reasonable figure for firewood consumption.

Now you are down to compiling the figures and adding through the total consumption for your area. When you do so, we recommend selecting a standard unit of energy (e.g. Therms, megawatts, or BTUs. This will help compare different fuels as well as to assess potential (local) replacements. Also, don't forget the current value of the fuels (by unit consumed) since this will be important in assessing total funds expended per-capita as well as total revenues leaving the community to pay for such (non-local) energy. Most importantly, examine your data sets critically – if one seems too large (or small), recheck your calculations. If that still returns the same result, try finding another way to assess that fuel's use and see if the figures agree within a reasonable margin of error.

Regarding the potential energy of fuels as well as emissions from specific fuel usage (should you wish to include such in your local inventory), there are many sources available out there. However, you may just want to use the data we have already collected in our (Willits) inventory. That work was done in Microsoft Excel and the formulas for potential energy and emissions are already plugged in. A copy may be viewed at http://www.greentransitions.org/WEL/WillitsEconLoc.htm. Contact us if you would like a copy of the actual spreadsheet for your own use.

Some relevant links that might be of interest:

California Energy Sources: http://www.energy.ca.gov/html/energysources.html
US Census Quick Facts: http://quickfacts.census.gov/qfd/states/
Energy Information Administration: http://www.eia.doe.gov

Thoughts on other Inventories that may play a role in your Group's Work

Health & Medicine Inventories
How many people are treated from our local population, at what level (in or out patient and if in-patient, avg. length of stay), and what are the common supplies used (aspirin, morphine, penicillin, sutures, etc.). From this, the number of treating physicians, nurses and other medical professionals, and given the population figure for the area of concern, the needs can be established (inventory). The vision phase can then determine local supplies, alternatives (e.g., acupuncture, etc.) or means of local creation (e.g., willow, opium, penicillin, suitable suture fibers, etc).

Water Inventories
A standard of 160 gallons/day/person is the industry-wide accepted figure used by water companies. Add to that an irrigation figure (or keep that separately under the food heading) of roughly 500 gallons/day/quarter acre/household. Combined, the water inventory could be completed, at least at a rudimentary level. This can be balanced against usage figures out of the area's reservoir and storage tank system, as well as the State Water Resources Control Board (SWRCB) and county well records. The end goal should be the amount of water consumed and the potential amount available.

Food Inventories
A simplistic approach to the inventory needs could be based on a standard caloric

intake/person/day, with the vision phase being what crops can be raised here and their associated caloric value. True, knowing how many pounds of meat, grains, fruit, vegetables, eggs, milk (not to mention coffee, chocolate, etc. <grin>) are consumed by the target population would be nice but I suspect this could take us into such extremes as how much fast food is consumed, etc.). So back to the caloric intake – from this one can calculate how many pounds of grain are needed per person and the amount of land (water and fertilizer) required to raise that quantity. Parallel to this is how much arable land is available -- this information, at least initially -- could be taken from the county in terms of land zoned agricultural.

Social Organization Inventory

What are the social services available in the area (food banks, soup kitchens, clothing sources, etc.)? How many people use them annually? What are the emergency services available (police, sheriff, etc.)? Are food and water stockpiles available and of sufficient quantity to last how long?

Shelter Inventory

What is the average household size and what does the typical house consist of (appliances, bedrooms, bathrooms, etc.)? How many houses are substandard (multiple families, insufficient facilities, etc.)? Is there low-income housing, and if so, what quantity? Are there shelters for those without homes (including transients)? Is there an emergency shelter, and if so, what is its capacity?

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