



PLANNING COMMISSION STAFF REPORT
July 27, 2004

TO: Chairman and Planning Commissioners

FROM: Jenaye Shepherd – Management Intern

SUBJECT: **Agenda Item VIII #1, Discussion Item – Proposed Energy Resolution.**

Please find attached the proposed Energy Resolution and a Power Point Presentation.

The proposed Energy Resolution will require newly constructed homes to follow a number of energy efficient techniques and allow all new homes to be built to EPA Energy Star Standards, which in California is 15-percent less energy use than required by Title 24. Many of these energy saving strategies have rebates available and a short money return period. Implementing this resolution will not only save energy and money, but it will also increase the comfort ability for many residents in Winters.

Attachments:

1. Proposed Energy Resolution
2. Power Point Presentation

Planning Commission/Energy Efficiency Resolution PC Stf Rpt 27Jul04

PROPOSED ENERGY RESOLUTION

City of Winters, July 2004

PREFACE

This document is a proposal to improve the energy performance of all new single family homes by implementing measures that reduce their individual energy consumption and energy use related to their construction. The intent is to improve performance over Title 24 energy standards and to qualify homes for Energy Star ratings while insuring that the added cost can be amortized by energy savings. Implementation of these improvements would be through resolution or ordinance.

The State of California is increasingly facing limitations to its electric infrastructure, including both transmission and distribution systems and generation capacity, which will be worsened by the forecasted doubling of California's population by the year 2040¹. Most of this problem results from residential air conditioning, which is responsible for 40% of California's peak load. The California Energy Commission is responding to this problem by supporting development of technologies that reduce residential peak load, by introducing "time-dependent valuation" of energy into the 2005 energy standards, and by promoting photovoltaics through a "Zero Energy New Homes" program.

Two federal programs, Zero Energy Buildings, and Building America have been in operation for over three years to promote the construction of homes that are more energy efficient and that utilize renewable energy sources. The objective of these programs is to improve our energy independence and security. Research completed under these programs has demonstrated that energy efficiency and photovoltaics can be cost-effective, is well received by homebuyers, and has the current potential to reduce energy use by 70% or more.

With the support of the Building America program, Davis Energy Group compiled a list of efficiency measures that are proposed to be enacted by resolution of the Winters City Council. These measures are grouped under the major categories of Site Planning & Landscape; Building Envelope, Appliances, and HVAC; Photovoltaic Systems; and Waste Reduction. The primary objectives of this proposal are to:

- Utilize site planning principals to facilitate improved cooling performance of new homes and that reduce transportation energy use
- To employ a list of cost-effective energy efficiency measures that enable homes to qualify under the Energy Star label, and that result in a positive cash flow for the buyers
- To require photovoltaics for those homes for which the systems will be readily affordable

Rather than allow builders to employ a performance approach to verify Energy Star ratings, we propose that a prescriptive list of measures that have been predetermined to

¹ CALTRANS Office of Community Planning

be cost-effective be required be required on all homes. This approach greatly reduces the burden of verification on plan checkers and building inspectors.

The following sections define the proposed measures and provide background, justification, and detail on each. Appendix F of the California Environmental Quality Act pertaining to energy conservation is also attached for reference.

1 SITE PLANNING & LANDSCAPE

1.1 Subdivision maps shall comply with Section 66473.1 of the California Subdivision Map Act by providing lots that allow homes to be sited with their fronts facing either north or south, to the maximum extent feasible.

Section 66473.1 of the Subdivision Map Act states: "The design of a subdivision for which a tentative map is required pursuant to Section 66426 shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision. Examples of passive or natural heating opportunities in subdivision design, include design of lot size and configuration to permit orientation of a structure in an east-west alignment for southern exposure." When it was drafted almost 30 years ago the act did not anticipate the need to reduce air conditioning peak load, nor the development of photovoltaics for residential applications. However, the principals on which was based still apply. Most streets must be orientated east-west in order to facilitate siting homes so that they use less cooling energy.

When windows are exposed to direct sunlight in summer, the resulting solar heat gain increases air conditioning energy use and compromises comfort. Since most windows are located in the front or back of homes, homes oriented with their fronts facing east or west can use over 50% more energy for cooling than homes facing north or south. East and west-facing windows are very difficult to shade. Comfort problems are particularly apparent on the second floor of two-story homes, because heat added by the sun rises to the upper floor. South-facing windows can be shaded by roof overhangs in summer and allow sunlight into the house in winter, thereby reducing heating bills.

Photovoltaic systems and solar water heaters perform much more efficiently when modules are located on south-facing roofs. Also, facing the majority of windows to the south can reduce winter heating energy use.

1.2 Deciduous street trees shall be provided by the developer, spacing and species to be approved by Planning Commission and/or listed on the City of Winters approved tree list.

Trees reduce local temperatures in summer by shading streets and roofs, and by evaporating moisture. On warm summer days urban areas can be 6-8% warmer than the surrounding agricultural areas. Street trees also improve the appearance of neighborhoods and contribute to higher property values. The City adopted an approved tree list but some new colorful varieties are available that are not on the list, such as the Chinese Tallow Tree (*Sapium sebiferum*) and the Autumn Fantasy maple (*Acer Fremanii* x). The City should also designate specific trees that are suitable for various street applications (primary feeder, secondary feeder, etc.)

1.3 Residential streets that provide access to dwellings shall not be wider than the City's adopted street standard.

Streets absorb the sun's rays and give off heat, increasing the need for air conditioning. Narrower streets are easier to shade with trees and tend to slow traffic down, improving neighborhood safety, are less expensive to build, and reduce rainwater run-off. Currently, the minimum street width is 35'. The Village Homes development in Davis has 20' and 26' street widths and provides off-street parking areas. It is recommended that the City review the current street guidelines and encourage developers to build narrower streets with off-street visitor parking areas. Alleys, such as those provided in Putah Creek Hamlet, are another alternative to parking areas.

1.4 Paved paths shall be provided to facilitate bike/pedestrian traffic to schools. Paths shall not cross secondary collectors.

Winters Highlands and Callahan Estates developments will be within easy walking distance of Shirley Rominger School, but current street layouts do not provide for easy pedestrian access, and require several streets to be crossed that are primary or secondary collectors. As a result, parents are likely to drive students to school. The auto exhaust will degrade local and regional air quality, and the children will be deprived of exercise. Obesity is becoming an enormous problem, which making provisions for increased pedestrian and bicycle activity can help solve.

2 BUILDING ENVELOPE, APPLIANCES, AND HVAC

2.1 All houses shall be built to EPA Energy Star standards.

The top builders in the country are building whole developments to EPA Energy Star standards, which in California is 15% less annual energy use than required by Title 24 energy standards. The added costs of improvements needed to meet the Energy Star rating when amortized over 30 years is more than offset by annual energy savings, so the buyer typically experiences a positive cash flow, even if the builder marks up these improvements. Thus, the buyer saves money and the builder makes more on the sale of the house. Studies have also shown that energy efficient homes have a higher resale value. Efficient neighborhoods are quieter (less air conditioner noise), and there is less air pollution from combusted natural gas.

The utilities and California at large benefits because most measures that save energy also reduce peak electricity load, meaning that utilities are not as pressed to add generating capacity and transmission-distribution systems to serve the loads added by new development. Because of the high cost of building new power-plants, and of running inefficient "peaker" plants, the costs that utilities would pass on to ratepayers is not as great. Everyone benefits.

Improvements that are implemented now are likely to yield much bigger payoffs to homeowners in the future. Last year Alan Greenspan gave testimony before the House Committee on Energy and Commerce that "Canada, our major source of imported natural gas, has had little room to expand shipments to the United States, and our limited capacity to import liquefied natural gas (LNG) effectively restricts our access to the

world's abundant supplies of gas." He also said "We are not apt to return to earlier periods of relative abundance and low prices anytime soon." Dwindling supplies resulted in an increase in the market price for natural gas of nearly 73% since the previous year. Regulation of energy prices will not protect consumers from these price hikes for long, and there is nothing in the near future that is likely to improve this scenario. Since most of California's electricity is generated by natural gas plants, the price of electricity is certain to be affected as well.

Analysis Davis Energy Group has completed under the Department of Energy sponsored Zero Energy Home and Building America programs has identified specific measures that are particularly cost-effective, market ready, and currently being used by many builders. If made mandatory, the following measures will assure that homes meet Energy Star standards:

- **High performance windows.** Most windows that are now installed by production builders are treated with a special "Low E" coating that reduces the amount of heat that is transmitted by the glass, and that reduces the amount of light transmitted in the non-visible spectrum. This property reduces solar heat gain without making the windows appear dark. Builders should only install windows that have a U-value of 0.36 and solar heat gain coefficient (SHGF) of 0.36 or lower.
- **Energy Star roof tiles.** Several companies, including Hanson Roof Tile in Dixon, are producing concrete roof tiles using pigments that reflect sunlight, even in darker colors. This higher reflectivity reduces summer attic temperatures and cooling loads, and helps keep neighborhood temperatures lower. Composition shingles with higher reflectivity are expected to be on the market soon.
- **Minimum R-38 ceiling insulation.** Deeper ceiling insulation results in better performance of buried ducts, as well as reducing heat gain and loss through the attic. The added cost for R-38 compared to the minimum standard R-30 is minimal.
- **Insulated headers.** Solid wood headers waste wood and degrade wall thermal performance. Insulated headers are similar to web trusses except they include two webs which sandwich foam insulation. Experience has shown they are less expensive than solid wood, don't cause cracking due to shrinkage, and since they are lighter, make walls easier to stand.
- **Air conditioners that meet the 2006 DOE minimum efficiency standard of 13 SEER.** Currently air conditioner manufacturers are not allowed to sell units that have a "SEER" rating of under 10. The U.S. Department of Energy proposed, and congress approved, a minimum rating of 13, effective in 2006. Since the proposed development will be required to install 13 SEER air conditioners on part of the homes (due to the build-out schedule), they should be installed on all new homes. The DOE standards are based on cost-effectiveness to the buyer.
- **Duct leakage HERS-certified to be not more than 6%.** Duct leakage can substantially degrade heating and air conditioning efficiency, and proper sealing is very inexpensive if done during construction. Since many ducts are not accessible after the houses are built, proper sealing can only be done during construction. The Energy Commission provides for independent Home Energy Rating System (HERS)

raters to test ducts when Title 24 credit is taken for tight ducts. This testing is necessary to assure proper installation.

- **Ducts installed in accordance with the California Energy Commission's 2005 Standards "Buried Duct" compliance option.** The 2005 energy standards will allow credit to be taken for ducts that are buried in attic insulation instead of suspended from roof trusses. According to a large Sacramento HVAC contractor, there is no added cost to install ducts in this fashion.
- **Pilotless, tankless gas water heaters.** Depending on how much hot water is used, these appliances reduce natural gas use by about 30 to 90% compared to storage type water heaters. They are available from several manufacturers and are seen increasingly in production homes. Since they heat water instantaneously they do not run out of hot water, and they do not take up valuable floor space.
- **Engineered "home run" hot water distribution systems using PEX pipe.** With conventional piping systems, it is not uncommon to have half of the hot water generated by the water heater lost in the piping, and a substantial amount of water is wasted while waiting for hot water to arrive at the tap. "Home run" piping that is properly designed saves energy and shortens hot water waiting times, thereby saving water. The cost for these systems is becoming comparable to that of conventional copper systems.
- **Energy Star approved dishwashers.** These are widely available in all popular brands, and save water as well as energy. Since dishwashers are permanently installed by the builder, they are not subject to easy replacement like refrigerators and clothes washers.
- **Fluorescent lights provided in all ceiling can fixtures and bathroom fixtures.** Fluorescent lights provide the same light output at less than a third of the electricity use and heat generation of incandescent lights, and last many times longer. The size, configuration options, cost, reliability, and color rendition of compact fluorescent lights (CFL's) have improved to the point that they are acceptable substitutes for incandescent lamps in most applications. Fixture manufacturers are beginning to introduce more fixtures designed for fluorescent lamps. The prolific use of ceiling can lights by builders provides a good opportunity to improve lighting efficiency by installing only CFL flood lamps, which can be screwed in to the conventional fixtures. Globe CFL's are good substitutes for incandescent lamps in most fixtures installed at bathroom mirrors. Efficient linear T8 lamps with electronic ballasts also provide very high quality light when used above kitchen cabinets for indirect lighting, and T5's provide excellent light for under counter applications.

3 PHOTOVOLTAIC SYSTEMS

Solar photovoltaic systems are becoming more economical every year, and there are new breakthroughs in technology that are likely to make these systems more competitive with conventionally generated electricity as time goes on. Currently, the California Energy Commission offers a \$3.00 per Watt rebate for residential systems that are grid-connected, that is they feed excess power into the utility's power lines rather than storing

it in batteries. PG&E also offers a time-of-use rate that allows homeowners to "sell" power to PG&E at a higher price during the day (12-6 PM) than they purchase it for during night and morning hours. California also offers a 15% tax credit to purchasers of PV systems.

In addition, the DOE sponsored Zero Energy Homes and Building America programs offers assistance to builders to who combine energy efficiency improvements with photovoltaic (PV) systems. The reason that states and the federal government are supporting PV systems is that they are seen as a solution to both local electricity supply problems and a contributor to our national energy security.

Recent studies have shown that these incentives combine to make PV marginally cost-effective at current electric prices, which are likely to increase significantly over the 20 year life of the systems. PV systems are becoming increasingly common on production homes, and manufacturers such as General Electric and Sharp Electronics are aggressively marketing systems to residential builders. PV modules are now available that are easy to install and blend in with concrete roof tiles and other roofing materials.

3.1 All new homes shall be constructed with a minimum of 240 ft² of south roof area that is free of vents, chimneys, and other obstructions to facilitate future installation of solar electric systems.

Making homes easier to retrofit with PV systems reduces the future cost of installing these systems while not adding significantly to the construction cost. Allowing for 200 ft² of PV module area will assure that future systems can have a significant impact on reducing electric use.

3.2 All new homes having a conditioned floor area of 2500 ft² or greater shall be equipped with 1" minimum size conduit between the attic space and the main electrical panel to facilitate wiring for future photovoltaic systems.

Conduit is inexpensive to install while homes are under construction. Pre-installing conduit will further reduce the cost of installing PV systems, especially in larger two-story homes.

3.3 All new homes having a conditioned floor area of 3500 ft² or greater shall be equipped with a functioning photovoltaic system with an STC rating of 1.5 kW or greater.

On larger, less affordable, homes a small PV system may constitute only 1% of the selling price and the cost is more easily borne by the buyer. Also, energy savings are greater in larger homes because the PV system typically offsets higher tier rates. Experiences from other builders offering PV systems show that the cost for systems is lower when some or all of the homes are scheduled to have PV systems (instead of offered as buyer options), and that the added cost rarely discourages buyers. Providing PV systems on 100% of the larger homes will help mitigate the added electricity load contributed by the new developments, and will reduce carbon and other emissions from natural gas combustion by electricity generation plants.

4 WASTE REDUCTION

Construction projects contribute substantial waste to landfill sites. Much of this waste can be eliminated by implementing simple recycling measures that can reduce the builders' disposal costs.

4.1 All construction waste shall be separated to allow recycling of wood, steel, and gypsum products.

This is a measure that has been adopted by several "green building" programs, including the Alameda County Waste Management Board's Green Builder Program. Energy savings resulting from this measure include reduced fuel costs for waste transport and landfill vehicles, reduction of the energy required for extraction of raw materials, and the potential use of wood waste in plants that generate electricity from biomass.