John L. Beaton, Sacramento, chairman

Workshop Topic 7
NEW PRODUCTS AND PROCEDURES POST-1985

The workshop objectives were to consider energy conservation by (a) identifying acceptable current practices and technology, (b) suggesting innovations, and (c) delineating applicable research needs. Participants in this discussion group decided that item a was not applicable to this topic. In addition, transportation construction was viewed in the broadest sense, covering the planning, design, building, operation, and maintenance of transportation construction. Another point of broad policy determined by the group was that, in the design of a highway, the energy requirements should be determined for the entire life of the project and not just for the construction phase. In other words, operational and maintenance energy requirements including vehicle operating needs should be considered. The following is a summary of the group discussions supplemented by the workshop chairman from other sources of information.

1. At present a great deal of general information has been published on the energy requirements of producing certain items of construction. Unfortunately, there is insufficient detailed information on which local discussion can be based. For instance, if a designer were to make a selection of materials for a roadway structural section on an energy basis rather than cost, he or she would have to know the exact energy use to produce each item used in that locality. Such information should be gathered on a local basis.
2. Any comprehensive transportation plan requires that decisions be made concerning the mode to best serve any particular corridor. For such decisions to be made on an energy basis, the basic energy demands or the factors involved should be determined for each mode of transportation.
3. Research should be initiated into the energy requirements of moving heavy loads by highway trucks to determine optimum energy versus load information. This should include data to determine the effects of varying load and speed. This systems research should include the effect on energy usage by both heavy and light vehicles of various degrees of pavement roughness.
4. Assuming that a pavement structure will transmit wheel loads to the earth well into the twenty-first century, then research should be initiated to discover a completely new binder to use with rock products to create hard surfaces for vehicular traffic. The structure should be distortion free, relatively inelastic, and water resistant; have no latent energy; and provide a surface with low maintenance requirements and good skid and tractive resistance. The materials should also provide a permanently smooth grade but be subject to grade adjustments.
5. Research should develop a low energy material with no latent energy for quick traveled-way maintenance repairs. This could either be precast or cast in place. Because of high energy losses during traffic delays, the material must minimize such interference.

6. Research is needed into the energy expenditures of the total transportation system. Such information is needed to make objective decisions. For instance, should a passenger train be subsidized in parallel competition with a highway, or should an industrial highway be built parallel to a railroad line?

7. Research should be done on the possibility of using asphalt pavements as solar cells to create transportable energy available at the roadside.

8. Management research should develop a procedure to optimize cooperation among those who are involved in the transportation industry: manufacturers, labor unions, government representatives, engineers, planners, teachers, and students. This is the only way that the use of energy can be minimized in the complete system.

9. Insufficient funding is available to complete the research needed to prepare for a petroleum-short society. Available funds should be markedly increased. Estimates vary from fourfold to tenfold.