

## Appendix E: An Overview of Toyota Motor Sales USA – South Campus Facility’s High-Performance Green Principles



### Energy Efficiency



The solar panel roof system also serves as a cooling effect to reduce the “heat island effect,” in which dark, heat-absorbing buildings and paved areas make the air in urban areas hotter and smoggier. A central plant system with a natural gas-powered system that circulates hot or cold water through pipes in the ceilings generates heat and A/C. Although slightly more costly compared to a traditional rooftop heating and cooling unit, it uses significantly less energy and helps eliminate the use of hydrochloro-fluorocarbons (HCFCs), which are thought to contribute to the greenhouse effect. Windows on the south side of the building are glazed with low-emission glass<sup>70</sup> and slightly inset into the concrete wall to provide interior shade. Other features include a utility metering system and a thermally insulated, double-paned glazing.

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<sup>70</sup> A clear glass with a thin coating of metal oxide that allows the sun’s heat and light to pass through the glass into the building. At the same time it blocks heat from leaving the room, reducing heat loss.



## Water Efficiency



The West Basin Municipal Water District and the city of Torrance collaborated to extend the existing recycled water lines one half-mile to the South Campus for use in toilets, the central plant’s cooling towers and landscaping irrigation. Potable water consumption is reduced by 81% by using low-flow fixtures and recycled water. Waterless urinals will save about 70,000 gallons of water annually. The complex is expected to conserve more than 11 million gallons of drinking water per year.<sup>71</sup>

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<sup>71</sup> Toyota Motor Sales, U.S.A., Inc. Press Release. “South Campus Facts for Publication”.



## Materials



With the production of cement for concrete accounting for 2% of the world's annual total energy resources, Toyota chose to use materials with recycled content. During construction, Toyota recycled 96% of the waste generated from the project. In addition, more than 80% of the construction materials contain

recycled content. For instance, all structural steel is made from recycled materials, mostly from automobiles. Materials used to build the office – from the foundation to the ceiling tiles – have a recycled content of approximately 50%. Recycled carpet and other low-emitting materials such as paints, adhesives and wood composites were selected to avoid “off-gassing” (the release of chemicals from non-metallic substances under ambient or greater pressure conditions) from new fabrics and plastics. Composite wood products are free of urea-formaldehyde resins. Carpeting meets or exceeds the Carpet and Rug Institute's Green Label Indoor Air Quality Test Program that limits off-gassing from those interior features. Sixty-two percent of the wood used in construction and interior finishes such as doors was crafted from Forestry Stewardship Council (FSC) certified wood. Elevator hydraulic fluid is non-petroleum-based, derived from vegetable oil. Lobby seating is furnished with chairs made of recycled automotive seat belts. In addition, 20% of the materials used were manufactured locally, cutting down on shipping and distribution expenses.



## Landscape Design



Water-efficient landscaping such as drip irrigation, wider plant spacing, and the use of low maintenance drought-resistant native plants and trees reduce the overall water demand by 60% over a traditional system. The campus wide drip irrigation system uses reclaimed water rather than potable water. The parking lots and garden court walking paths were paved with recycled concrete slabs used as casts for building walls. The site's perimeter is heavily planted with trees to provide shade for pedestrians and minimize heat islands. For associates, a campus-wide jogging trail was created, and outdoor spaces were incorporated into the landscaping to hold typical indoor functions outside and help unite the north and south areas of the campus.



## Indoor Environment

Lobby-based glass stairwells were built to encourage workers to use them more frequently over the use of elevators. Amenities such as bike racks for 106 bicycles and 14 showers encourage staff to bike to work. Toyota selected paints and adhesives that meet the volatile organic compounds set by the South Coast Air Quality Management District. Adhesives, carpeting and paints contain zero or low emissions.

The buildings are free of formaldehydes and HCFCs. Housed in separate rooms, copy machines are equipped with separate ventilation systems to keep toner fumes out of the workplace. Janitorial facilities are also separated and have their own ventilation systems to keep chemical contaminants from affecting the interior air quality. Over 90% of the associates have exposure to natural daylight and views of the outdoors. These green improvements contribute to better indoor air quality, temperature, acoustics and work environment lighting and translate into tangible results in terms of staff comfort, greater job satisfaction and morale.

### Appendix F: Overview of Case Study Loan Programs

|                              | Iowa  | New York  | Oregon  |
|------------------------------|---|---|---|
| <b>Administrator</b>         | Iowa Energy Center                              | NYSERDA   | Oregon Office of Energy   |
| <b>Funding Mechanism</b>     | Revolving Loan                                  | Public-Benefits Fund  | Bond Issue  |
| <b>Lending Organization</b>  | Participating private lenders                   | Participating private lenders   | Oregon Office of Energy   |
| <b>Eligible Technologies</b> | Solar, Biomass, Wind, Small Hydroelectric       | Solar, Wind, Energy Efficiency  | Solar, Wind, Biomass, Hydro, Alt. Transportation Fuels, Geothermal, Waste, Cogen, Waste Heat Recovery, Recycling, Energy Conservation |
| <b>Eligible Recipients</b>   | All sectors except nonregulated utilities       | Residential, Multifamily, Commercial, Industrial, Agricultural, Nonprofit | Residential, Commercial and Industrial, Schools, Government, Utilities, Tribes, and Nonprofits  |
| <b>Incentive Amount</b>      | 50% of the project cost financed at 0%; 20 yrs. | 4.5% below market rate; 5-year term                                       | \$20,000 - \$20 million; 10 - 15 yrs  |
| <b>Maximum Limit</b>         | \$250,000                                       | \$500,000 (\$5 million for multifamily projects)                          | No Limit  |
| <b>Effective Date</b>        | 1996  | 2000  | 1981  |
| <b>Expiration Date</b>       | None  | 6/30/03   | None  |
| <b>Funding</b>               | \$5.9 M initial funding; revolving account      | \$1.9 M per year  | \$100 M bond authority/ biennium  |
| <b>Amt. Disbursed</b>        | \$3.3 M   | \$1.2 M (–\$10K for PV)   | \$291 M (\$180 M for renewables)  |
| <b># of Loans</b>            | 22  | 260 (4 for renewables)  | 530 (175 for renewables)  |
| <b>Renewables Installed</b>  | ~477,000 MWh annual generation                  | ~8 kW   | 446 GWh annual generation; million MMBTU saved  |

Source: North Carolina State University, National Renewable Energy Laboratory

<http://www.nrel.gov/docs/fy02osti/32819.pdf>

### Appendix G: Overview of Case Study Buy-Down Programs

|                                | Florida   | Illinois  | New York  |
|--------------------------------|---|---|---|
| <b>Administrator</b>           | FL Solar Energy Center  | IL Dept. of Commerce and Community Affairs                                | Two individual PV distributors contracted by NY State Energy Research & Development Authority |
| <b>Eligible Technologies</b>   | PV  | Solar Thermal, PV, (grant also includes Wind, Biomass, Hydro, Fuel Cells) | PV  |
| <b>Eligible Recipients</b>     | Commercial, Residential, Construction, Utilities, Schools, Government | Commercial, Industrial, Residential, Nonprofit, Schools, Local Government | Residential   |
| <b>Buy-down Amount</b>         | \$4/watt; additional \$2,000 for builders                             | 50% - 60% (\$6/watt for PV)   | \$3/watt up to 50%  |
| <b>Maximum Limit</b>           | \$16,000 residents; \$40,000 comm./public facilities                  | Rebate: \$5,000<br>Grant: \$150,000 - \$2,750,000                         | \$7,500   |
| <b>Effective Date</b>          | 1999  | 1999  | 1999  |
| <b>Expiration Date</b>         | 1/2002; currently inactive  | 12/2007 undergoes review  | 12/31/02  |
| <b>Program Funding</b>         | \$600,000 for 3 years   | ~\$5M per year through '07  | \$1M for 3 years  |
| <b>Buy-down \$ Distributed</b> | \$525,000 in rebates  | \$8M (\$4.25M for PV)   | Not available   |
| <b>Capacity Installed</b>      | 173 kW  | 24 MW (693 kW for PV, ~130 kW for resid./comm.)                           | 70 kW (+130 kW planned for summer 2002)   |

Source: North Carolina State University, National Renewable Energy Laboratory

<http://www.nrel.gov/docs/fy02osti/32819.pdf>

## Appendix H: Overview of Case Study Tax-Credit Programs

|                                 | <b>New York</b>                        | <b>North Carolina</b>                                  | <b>Oregon (Personal)</b>  | <b>Oregon (Corporate)</b>   |
|---------------------------------|--|--|---|---|
| <b>Type</b>                     | Personal                               | Personal and Corporate                                 | Personal  | Corporate   |
| <b>Administrator</b>            | NY State Dept. of Taxation and Finance | NC Dept. of Revenue                                    | OR Office of Energy   | OR Office of Energy   |
| <b>Eligible Technologies</b>    | PV                                     | Passive and Active Solar, Wind, Biomass, Hydroelectric | Solar, Wind, Renewable Fuel Vehicles and Charging/Refueling, Geothermal Electric, Fuel Cells, Energy-Efficient Appliances, Duct Systems, Heat Pumps, Condensing Furnaces, and Boilers | Solar, Wind, Biomass, Hydro, Geothermal, Renewable Transportation Fuels, Energy Conservation, Weatherization, Recycling, Less-polluting Transportation Fuels, and Sustainable Buildings |
| <b>Eligible Recipients</b>      | Residential                            | Residential Commercial Industrial                      | Residential   | Commercial  |
| <b>Credit Amount</b>            | 25%                                    | 35%  | Varies by technology  | 35% of costs above conventional technology  |
| <b>Maximum Limit</b>            | Lesser of \$1.50/watt and \$3,750      | \$1,400 – \$250,000                                    | \$1,500   | \$10,000,000  |
| <b>Enacted Date</b>             | 1997                                   | 1977; revised 1994, 1999                               | 1977  | 1979  |
| <b>Effective Date</b>           | 1998                                   | 2000 (current program)                                 | 1978  | 1980  |
| <b>Expiration Date</b>          | None                                   | 1/1/06   | None  | None  |
| <b>Legislation</b>              | 1997 NY Statutes 8660A                 | NC General Statutes 105-129.16A                        | OAR 330-070-0010 to 330-070-0097  | OAR 330-090-0105 to 330-090-0150  |
| <b>Avg. # of Claims/yr.</b>     | 95                                     | 50 in year 2000  | 871 (renewables)  | 25 (renewables)   |
| <b>Total Amount Claimed/yr.</b> | \$124,000                              | \$53,261 in year 2000                                  | \$931,000 (renewables)  | Not available   |

Source: North Carolina State University, National Renewable Energy Laboratory

<http://www.nrel.gov/docs/fy02osti/32819.pdf>

### Interview

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Mr. Paul Hilton. September 28, 2004. Dreyfus Corporation. Portfolio Manager. New York City, New York.

Ms. Michelle Moore, Vice President of Operations and Strategic Planning for U.S. Green Building Council. November 30, 2004.

Ms. Evelyne Slavin. August 20, 2004. Natural Resources Defense Council. Environmental Action Center Associate. Santa Monica, California.

Mr. Sandford L. Smith, A.I.A. August 17, 2004. Toyota Motor Sales, U.S.A., Inc. Corporate Manager Real Estate and Facilities. Torrance, California.

Mr. Robert K. Watson. August 20, 2004. Natural Resources Defense Council. Director, International Energy Project. Santa Monica, California.

Mr. Mark Yamauchi. August 17, 2004. Toyota Motor Sales, U.S.A., Inc. Facilities Operations Manager. Torrance, California.

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