

TECHNOLOGY

tion, usually with the help of the latest digital or green technology. Stockholm uses sensors, software, and computer networks to monitor traffic during peak periods. Shanghai boasts the world's first low-pollution magnetic railway that transports passengers at more than 100 mph. Massachusetts plans to install 300 wind turbines in its towns and cities.

GREEN TECH

San Francisco's major push has been the deployment of technology—high and low—to address environmental issues. For instance, residents of this green-conscious city can hop onto a low-carbon-emission bus tracked by a GPS system; the buses wirelessly feed data to a central computer. Analytical software sends estimated bus arrival times to low-power LED displays found at a handful of solar-powered bus stops. (The city plans eventually to build these solar shelters, designed by local architect Olle Lundberg, throughout the city.)

Riders can check e-mail at bus stops with free Wi-Fi. Even rubbish has gone high tech: San Francisco, with local media design company Haku Wale, built an application for Apple's

iPhone that gives users information on the nearest recycling or trash disposal facility.

San Francisco's techno-savvy—guided in part by neighboring Silicon Valley—has helped burnish its standing as smart city. (The Natural Resources Defense Council, an environmental group, ranks it as the nation's second-smartest large city, after Seattle.) But attacking urban inefficiencies also requires aggressive lawmaking—and shrewd political skills to win citizen support.

Under Mayor Gavin Newsom, San Francisco has enacted some of the nation's toughest regulations for recycling. Nonrecyclers face fines, while those who recycle get breaks on their trash pickup fees. As a result, San Franciscans now recycle 72% of their trash. The city also has targeted a reduction in greenhouse gas emissions to 20% below the levels in 1990—stricter than the levels called for in the year 2012 by the 1997 Kyoto Protocol—by reducing carbon dioxide output in city vehicles, enacting ultra-green building codes, and encouraging less driving.

The city has plans to expand a pilot program with rental service Zipcar, which has made hybrid vehicles available in the city. (For more on Zipcar, see "The Best New Idea in Business" on Fortune.com.) Newsom also ponied up for a scattering of charging stations for electric vehicles. The city plans to introduce smart cars, smart scooters, and motorized bicycles in a joint project with the Massachusetts Institute of Technology's Media Lab. These electric vehicles can supplement public transit by helping get people from their homes to bus stops and train stations, says Ryan Chin, a co-founder of the smart cities project at MIT's Media Lab.

PRIVATE PARTNERS

Going green isn't cheap. San Francisco is offsetting some of its expenses by partnering with corporations: Outdoor-advertising giant Clear

Channel is covering some of the costs for the solar bus shelters. But the city also dedicates ample tax dollars and city resources to green efforts. Jared Blumenfeld, director of the city's Department of the Environment, credits residents with giving the city the leeway and funds to experiment. "We are

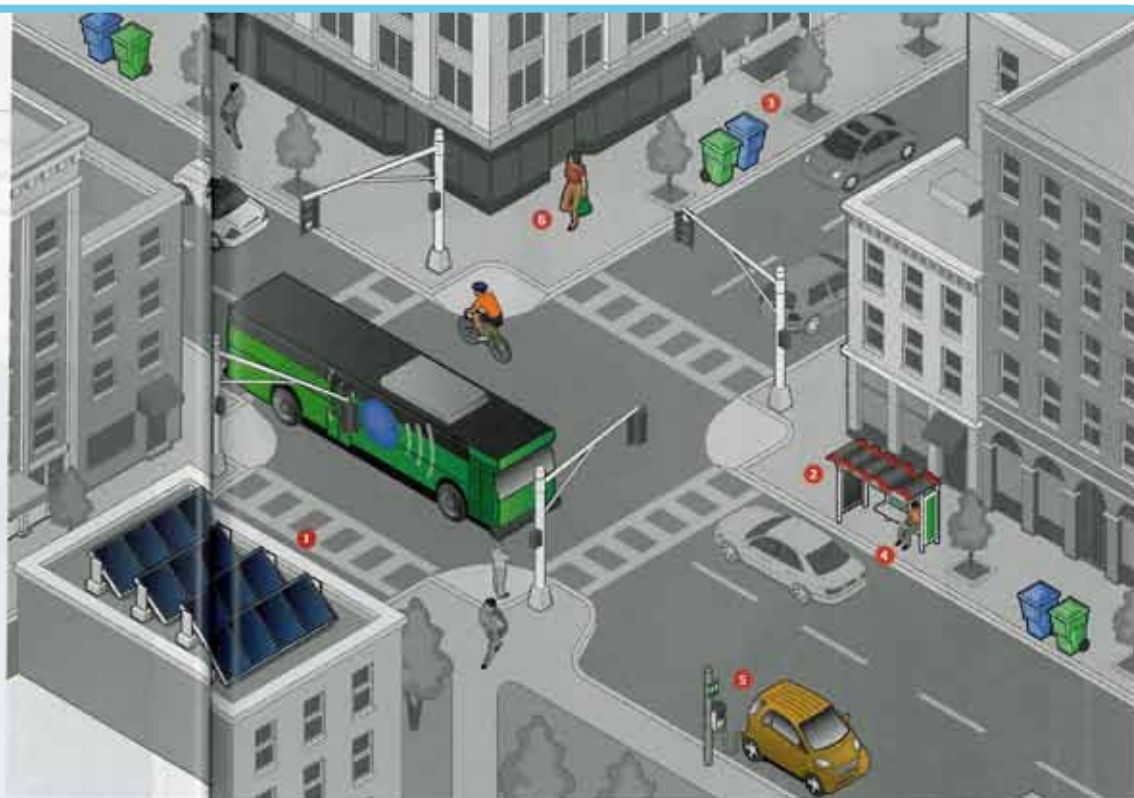
being asked to do these things by our citizens," he says. Still, not all of Newsom's grand plans have panned out. A public-private scheme to outfit the city with Wi-Fi flopped two years ago, partly because of political infighting.

Back at Pier 96, plant manager John Jurinek is greeting a new shift of workers arriving to operate the great recycling machine. It runs 16 hours a day—the rest of the day is devoted to cleaning and maintaining the mechanical gears and computing equipment that sort and package the recyclables.

Jurinek walks on catwalks high above the machine, checking mechanisms that separate paper from glass and tin from plastic. San Francisco sells those items to help recoup the cost of the program, and Jurinek says a major part of his job is to keep track of the shifting markets for the city's refuse. Right now he uses the usual tools—phones, e-mail, the Internet—to find customers and set prices. But if there's a smarter way to sell trash, there's a good chance San Francisco will find it. ■

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THANKS TO TOUGH NEW LAWS, SAN FRANCISCANS RECYCLE 72% OF TRASH.



LIVING ROOF

SMARTER BUILDING
A new museum, the Renzo Piano-designed California Academy of Sciences, is one of the most sustainable structures in the world. Its 2.5-acre "living roof" features local plants and a glass canopy of photovoltaic cells that produces energy for the building.



GET ON THE BUS

SMARTER TRANSIT
Solar-powered bus stops provide real-time information about the location of buses. The bus stops, nicknamed "waves" because of their stylized roofs (designed by Olle Lundberg), also offer free Wi-Fi connections so that riders can surf the Net on their laptops while they wait.



GREEN GARBAGE

SMARTER TRASH
Incentives and a go-green attitude induce San Franciscans to recycle 72% of their refuse. SF Recycling & Disposal, a unit of privately held Recology, sorts glass, plastic, and paper products at Pier 96 and presses the materials into compact cubes.



ECO APPS

SMARTER PHONES
The EcoFinder app for Apple's iPhone lets users locate where they can recycle or properly dispose of materials, based on their location. (There's also a web-based version for non-iPhone users.) The free application has been downloaded some 4,000 times.



IT'S ELECTRIC

SMARTER RENTALS
Zipcar, the car-sharing service, and the city have teamed up to promote hybrid vehicles. Zipcar has made a fleet of hybrids available for customers to use; the city installed charging stations in front of City Hall. Now the city wants to add electric scooters and bikes to the mix.



BAG IT

SMARTER TOTTING
Plastic bags have been banned at chain supermarkets and big supermarkets. In their place vendors use 100% recyclable paper bags, and some consumers simply bring their own bags to market. The city says plastic bag contamination in its compost program is down.