In August of 2012, a group of students from Northwestern's Architectural Engineering and Design Program attended an architectural workshop in the design studios of David Chipperfield Architects in Berlin, Germany. Along with funding from the Rise Group for helping us organize our mentored design experience with David Chipperfield Architects and funding from the Civil and Environmental Department of McCormick for helping us find and fund our housing during this intensive six day stay, we were also awarded a grant from ISEN for extending our experience in terms of sustainability in this city. There are many factors that contributed to Berlin's successful sustainability efforts. In the following examples, we will illustrate different attempts that the city of Berlin took on sustainability.

Chapel of Reconciliation

The Kapelle der Versöhnung, or Chapel of Reconciliation, is a small chapel built adjacent to the Berlin Wall Memorial. It was built to replace the former Church of Reconciliation that was torn down by the German Democratic Republic in the 1980s to “improve border security”. The building is a prime example of the use of sustainable materials in construction as it is made of rammed earth with a timber windscreen. The rammed earth walls contain clay, a local material,
and pieces of rubble (stone, pottery, and glass) from the church that used to exist on the site. In addition to being a local material, the clay is sustainable because, as opposed to concrete or masonry, it does not involve a long, energy intensive process, and is far more natural (in fact, there’s still dirt in the clay). There is a symbolic aspect too - a concrete structure would bring back memories of the wall, providing extra incentive to find another material to build the chapel out of.

**Plus Energy House**

The Plus-Energy House with Electromobility, located in the heart of Berlin, is a home designed to show the advancements in sustainable technology and how they can be used to reduce the impact on the environment. The concept for such a home began as a competition from the Germany Federal Ministry of Transport with several universities and architects collaborating together. Ultimately it was the design by Werner Sobek and the University of Stuttgart that was chosen. After completion the home was exhibited for a year to the residents of Berlin before a test family moved in. The cost for all of these cutting edge technologies was approximately €2 million.

The house itself is oriented in such a fashion on the site to take advantage of the direct sunlight. Because of this the light it maximized on the solar cells that comprise the exterior envelope of the house. The house produces not only enough energy for itself but any surplus can be fed back into the Berlin electric grid. At the same time the indirect sunlight is sufficient to light the home during the day. Additionally it is fitted with one of the most energy efficient heating systems that allow it to minimize the amount of energy that is needed to heat and cool the home. In
addition the home uses several sustainable modes of transport, such as the electric Smart Cars, BMW’s and Citroens, they also use electric bikes. All of these are charged off of the harvested energy as well.

Heinrich Böll Foundation

The Heinrich Böll Foundation headquarters in Berlin, Germany is home to the German Green Party and was opened in 1997. The headquarters has 7,000 square meters of building area which features modern office space for 185 employees and a 300-person capacity conference center. The building achieves an energy consumption of 55.7 kWh/m², less than half of the 130 kWh/m² maximum in Germany. The Heinrich Böll Foundation attains this low consumption by utilizing a photovoltaic roof system that provides 53,000 kWh/yr along with an adiabatic re-cooler and high performance heat exchangers that create a system that is about ten times more energy efficient than conventional air conditioning systems. The building takes the heat from their computer servers and distributes it throughout the building, creating an efficient and innovative heating system. Natural convection currents that come from the building’s atrium and internal courtyard ventilate the headquarters year round.

Apartment Block 6

Apartment Block 6 in Kreuzberg, Berlin was financed by federal and state funds and was originally developed as a project of the International Building Exhibition 1987 as well as a
model project of the Experimental Housing and Urban Development research program. The aim of the project is to conserve environmental and natural resources and to provide sustainable healthy living conditions while achieving a maximum level of environmental and social tolerance. The main components of the project are a greywater management facility that treats 10,000 liters a day and a man made wetland. The greywater, which has a high organic composition, comes from showers, hand basins, kitchens, and washing machines and undergoes a purely mechanical-biological treatment with a low energy input and without the addition of chemicals to yield service water that is hygienically safe.

Neues Museum

The Neues Museum, which contains artwork from the Egyptian period through the Renaissance, demonstrates a prime example of a recycled building. The original Neues Museum was severely damaged in World War II, and the remains stood until the reunification of Germany. When David Chipperfield started reconstruction work in the late 1990s, he incorporated the old remains into his design as much as possible. In addition to allowing the preservation of a historic building, this eliminated the time, cost, and energy that would have been needed to clear out the site and start over. An example of his restoration work is seen on an exterior walkway, where stone Doric columns destroyed in the war are replaced with square concrete columns, while damaged or intact columns are left in place. The contrast between old and new has many symbolic meanings, but it also shows the efficiency of using as much of the old building as possible.
Public Transportation

The City of Berlin makes a very strong effort to promote the use of public transportation. Developing a very complex network of trains, trams and buses, public transportation almost eliminated the need for a personal car. Additionally all of these vehicles are electrically powered. The buses make use of a hybrid engine drive system to reduce their carbon footprint. For locations that are difficult to reach by public transportation the use of bicycles is also heavily promoted. Dedicated bike lanes and directional signals at intersections are provided to promote the use and provide a safe path for travel. For those that require the use of a car, Berlin also boasts a very robust taxi system comprised of ecodrive cars. These are vehicles that not only use highly efficient engine technologies, such as diesel engines and turbochargers but also make use of ecodrive technology. This allows the engine to be stopped and started when the vehicle is idling. This greatly reduces its carbon footprint, as it is not burning unnecessary fuel. This promotion and development of public transportation and highly efficient vehicles and bicycling is just another way Berlin is leading the world on sustainable transportation architecture.

Throughout these examples, we were able to obtain a better understanding of the sustainability efforts of the city. The City of Berlin moved towards a greener city by the utilization of local materials, sponsorship of the government, experimentation after failure, recycling the old to create the new, and not focusing exclusively on buildings but also modes of transportation. One
of the main reasons why Berlin's sustainability efforts are successful is because it is built into the city's culture. Differing from a typical US city, Berlin's government is advocate about infusing the concept of sustainability into the lifestyle of the city. With the government's continuous support on sustainability, as opposed to it being solely a privately funded project, the rebuilding of the city in a sustainable fashion after the collapse of the Berlin wall has been demonstrated throughout our stay.