The Neo-Renaissance building was designed by Paul Wallot and the original design was completed in 1894. It was home of the Reichstag from 1894 to 1933, but was caught in a fire that nearly demolished the building one month after Adolf Hitler assumed chancellorship. The disused building sustained additional damage from an allied bombing taking place during World War II. Neglect from post war years lead to deterioration and by the 1970’s it had been partially restored and was now known as the Museum of German History. The building under went further renovation under the British Architect Norman Foster, during the 1990’s. The buildings huge glass dome, once the most recognizable feature, was rebuilt. An interior ramp spirals to the top of the dome, giving excellent views of the surrounding city. After the restoration was completed the building became one of Berlin’s most prominent attractions to tourists.
### Site Description

- **Location:** Berlin, Germany
  - Reichstag is the meeting place of the Bundestag “federal Assembly”, the lower house of Germany’s national legislation.
  - One of Berlin’s most famous landmarks, it is situated at the northern end of the Ebertstrasse and near the south bank of the Spree River.
  - Tietgarten park is directly west of the building, and the Brandenburg gate is to the south.
  - There is a parking lot located on the East side of the site.
  - And a giant lawn with a rose garden to the west side of the site.

### Building Description: Current

**Environmental Systems**
The building was designed to optimize the use of passive systems whilst minimizing active systems. Both the artificial lighting and ventilation are controlled by a central BMS system and a heat exchanger recovers waste heat from the exhaust air.

**Passive Design**
The solar collector brings natural lighting into the heart of the building, whilst an automated solar shade protects against unwanted, direct solar gain. The main chamber of parliament is naturally ventilated via the cupola.

**Water**
Inside the building low flow fixtures and fittings were selected to help reduce the potable water requirements. All landscaping is either low maintenance or landscaping, to minimize water usage.

**Renewable Energy**
A biofuel powered, Combined Heat and Power (CHP) provides approximately 80% of the annual electricity and 90% of the heat load of the building. A large Ground Source Heat Pump (GSHP) acts as a seasonal store of both heat and cools. Photovoltaic’s on the roof power the solar shade within the light sculpture.

**Materials + Waste**
The design aimed to protect and maintain the masonry shell of the heritage building, whilst redeveloping some of the core areas. By retaining most of the original building structure, construction and demolition waste was significantly reduced.

**Energy Infrastructure**
The CHP and GSHP units, at peak operation, provide energy to both the Reichstag and surrounding government buildings.
Energy Performance Certificate

- Public building that is a leading example for energy efficiency
- Excellent energy performance rating
- Optimum use of passive systems and minimal use of active.
- Dome provides natural day lighting and ventilation into center of building and interior glass walls allow light to penetrate through building. Roof PV panels power moving sun shield which blocks solar gain and glare.
- Modest energy requirements ~270,9 kWh/m²a total primary energy use for heating, hot water, ventilation, cooling and lighting, 57% less energy than typical existing building (624.6 kWh/m³a) and 39% less than new building requirement (446.1 kWh/m³a).
- Cogenerator (combined heat and power) powered by biofuel provides 80% annual electricity and 90% heat load of the building. Provides energy to both the Reichstag and surrounding government buildings at peak operation.
- A ground source heat pump stores excess heat as hot water and chilled water underground for winter heating and summer cooling.
- Biofuel is grown and produced locally, is renewable, and is a cleaner fuel – 94% reduced CO2 emission.
- CO2 emissions for building is 24.9 kg/m².
- Central building management system controls artificial light and ventilation. Heat exchanger recovers waste heat from exhaust air.

LEED Certification

- LEED Certification was not initially sought after, so no documentation was composed.
- However, there was evidence of some sustainability initiatives that enabled the Reichstag to be award points.
- Initial LEED Points according to our calculations totaled 43pts which is LEED certified.
Problematic Areas

- No rain water collection
- Building size and hardscape create a large amount of water runoff.
- No reuse or treatment of grey water.
- On site café has no recycling strategies (to the best of our knowledge)
- 0 Green space within the structure.
- Due to the age of the building maintenance and repair are necessary

Key:
- Hardscape With Heat retention Properties contributing to the Heat Island Effect
- Hardscape roof space with Heat absorbing and reflective material

Redesign Strategies

- **Storm Water Collection**
  - Cisterns providing water for the additional gardens and green spaces.

- **Gardens & Green Roofs**
  - Gardens provide additional food source for the café.
  - Green Roofs reduce the ambient heat, increase the air quality of the site, adds diversity and interest to the roof top, and creates shade for pedestrians.

- **Additional Harnessed Solar Energy**
  - By adding additional solar panels we have increased energy intake while reducing the heat island effect of the parking lot.

- **Grey Water Treatment Systems.**
  - Bio swale in the parking lot allows for excess storm water treatment and increases the habitat for natural wildlife.

- **Replacement at appropriate times with New sustainable materials as necessary**
  - Windows, paint, carpets etc.

- **CO2 Monitoring**
  - Allows for monitoring of CO2 inside and outside of the building.
Redesign Strategies Continued...

That makes for 600 point increase!

LEED Redesign

With our redesign we were able to obtain 53pts! Compared to our original score of 43pts. This now makes the Reichstag a LEED Silver Building.
Conclusion

With our redesign we found that there was very little improvement that was needed with the building itself. Foster took great initiative in designing the Reichstag to be sustainable as far as energy conservation and production and passive design for day lighting and ventilation.

However, the site itself neglected to address storm water treatment and heat island effects. With our redesign we were able to mitigate these issues bringing the Reichstag from a LEED Certified building to a LEED Silver. Our Malcolm-Wells checklist went from 450 pt. total to 1,050pts.

Citations


- 2200 pv arra'y's for visitor parking at the springs preserve, with a bio-swale in the foreground.. (2014). Retrieved from http://media-cache-ec0.pinimg.com/originals/db/ea/11/dbea11039dd0b1f6b865ee1efdee9d4.jpg