



tesla project

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What is Tesla?

- Tool for capturing both the power consumption, carbon footprint of computer systems over time.
 - Power draw changes based off of both *how* we use computers and *what* computers we use (i.e.: the components within them)

Tesla is designed to empower **individuals** and **organizations** with the information they need to **minimize** their computing carbon footprint and **maximize** their computing power efficiency.

So, Why Should I Care?

- [Power] is [money]
 - 10-30% of IT expenses utility costs for electricity (Oliver Wyman / Mercer Consulting) – HVAC, direct power
 - Electricity costs -> Reduced productive output
 - Examples of \$ in power cost optimization: NetApp
 - Simple measures saved 41,184 KWh per mo.
 - Result: \$58,000 in OPEX savings per mo.
- And soon CO2 is too...
 - Movement to make Carbon Dioxide criteria pollutant under EPA definition.
 - Firms *need* to care about how much CO2 they produce.
 - Carbon dioxide credits: reality for corporations, speculation opportunities for internatl. finance - Kyoto



Market Dynamics: Welcome to the Wild West.

- **Plenty** of market opportunities in this area.
 - Hardware tools are accurate but expensive.
 - Software:
 - Proprietary: (\$\$\$\$\$, hardware specific)
 - ACPI Utils: (free, Linux/Unix only)
 - No Windows consumer level applications out there.
 - None that capture carbon footprint.



Why Tesla is the fastest gun in the west:



- Hardware-agnostic Windows client (later OSX + Linux w/ Mono)
- Captures point-in-time statistics for BOTH CO2 and W/h as a **function of usage**.
- Creates meaningful web-based statistics, graphical trending analysis, exportable to .csv.
 - Use with Stata/SPSS/SAS for powerful regression analysis (se more later)

Technology: A Tale of Two Components



Client

- C# .NET
- WMI
- SQL
- Win. Services
- Httprequest



Server

- Silverlight
- C# XAML
- PHP (Cake PHP RC 1.3)
- Croogo 1.3 Beta
- LiquidCanvas + Excanvas
- JQuery
- MySQL

How It Works: The Client

- Use proxies to determine power consumption
 - Example: Processors
 - Power consumption = $F(\text{Utilization}, \text{Thermal Design Power (TDP)})$.
- Capture point in time vars to determine wattage.
 - E.g.: processor - Get processor utilization via WMI
 - Cross-ref. TDP w/ utilization, frequency (overclocking and underclocking)
 - TDP data from vendor, testing in gaming and enthusiast blogs (*techreport.com*, *anandtech.com*, even *wikipedia*). Cooling.
- Service report findings to server.
 - Runs in background invisible to user, controlled by GUI
 - Report carbon footprint as $F(\text{Wattage})$.
 - Send it off to the server!
 - HttpRequest sent on timer from Windows service.
- Modularity: everything can be customized or independent
 - GUI
 - Windows Service or Daemon
 - Win API calls

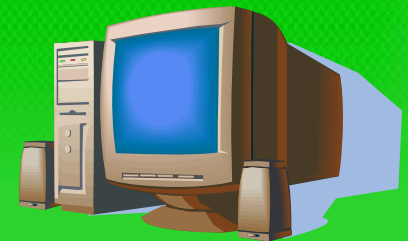


How It Works: TeslaProject.com

- User accounts, and the ability to track machines via graphs or CSV files
 - With access control features!
- Blogging and community interaction
- Community Awards/Badges offered to leading users
 - To drive users to come back
- A gateway to post data
 - The data is held in a database and will periodically be rearranged in order to simplify charting
 - Old data will be held in CSV files for regression analysis
- Modularity
 - The features of Tesla can be imported into almost any web application (with some tweaking of course).
 - Web Service for TDP

Business Applications of Tesla

- See how a computer contributes to network power consumption, carbon footprint.
- Regression Analysis for cost optimization
 - Integrate Tesla data into economic models
 - Impact of electricity on production factors, optimal levels of output (modify Cobb Douglas Prod. Fcn.)
 - Feature enhancement: Correlation analysis to determine how certain processes affect power util. and production capabilities.
 - Financial impact of optimized vs. non-opt. programs



Biz. Reactions to Tesla's Value Prop.

- “ [Tesla] is a remarkable achievement, as most programs that address this sustainability need operate only for very large organizations and [are] implemented at a very high cost. ”

– Joe Capella, VP of Marketing at Yoh



- “Very cool. The industry needs something like this.”

– Peter Perrault, Prog. Man. Env. Sustainability at NetApp



- Several smaller companies want to try beta testing Tesla.

From Niche to Product

- Completely free to individual users
- Users with install bases of over 50 need to “go premium”
 - Offers more statistical analysis and tools
 - Host their own copy of Tesla
 - Maximizing their internal security
 - Modularity allows for customizing to their own business needs
 - Hosting or Summaries at teslaproject.com
- Tax Incentives for using Tesla?

Questions?