
Google™
10

Knowledge is (less) Power: Exploring the Google PowerMeter API

Rus Heywood, Lead Engineer, Powermeter
Srikanth Rajagopalan, Product Manager, PowerMeter

May 19, 2010

View live notes and ask questions about this session on Google Wave:

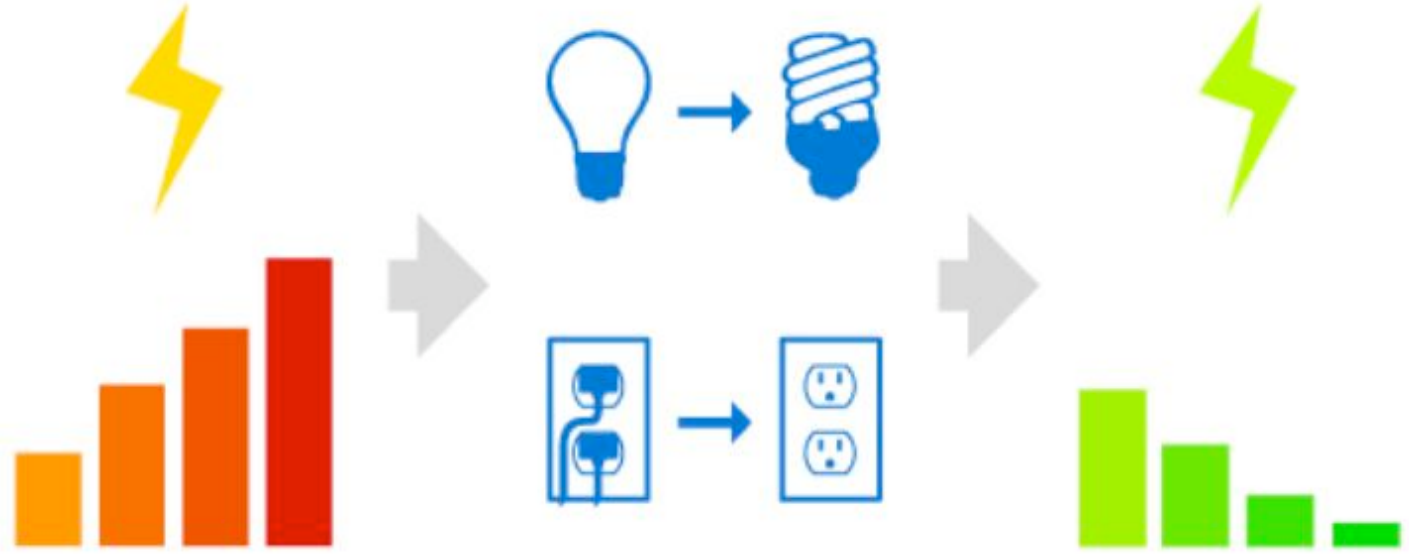
http://bit.ly/9xqdsj

Agenda

- What is Google PowerMeter
- Design Concepts
- Using the API
- Q&A

What is Google PowerMeter?

What is Google PowerMeter?



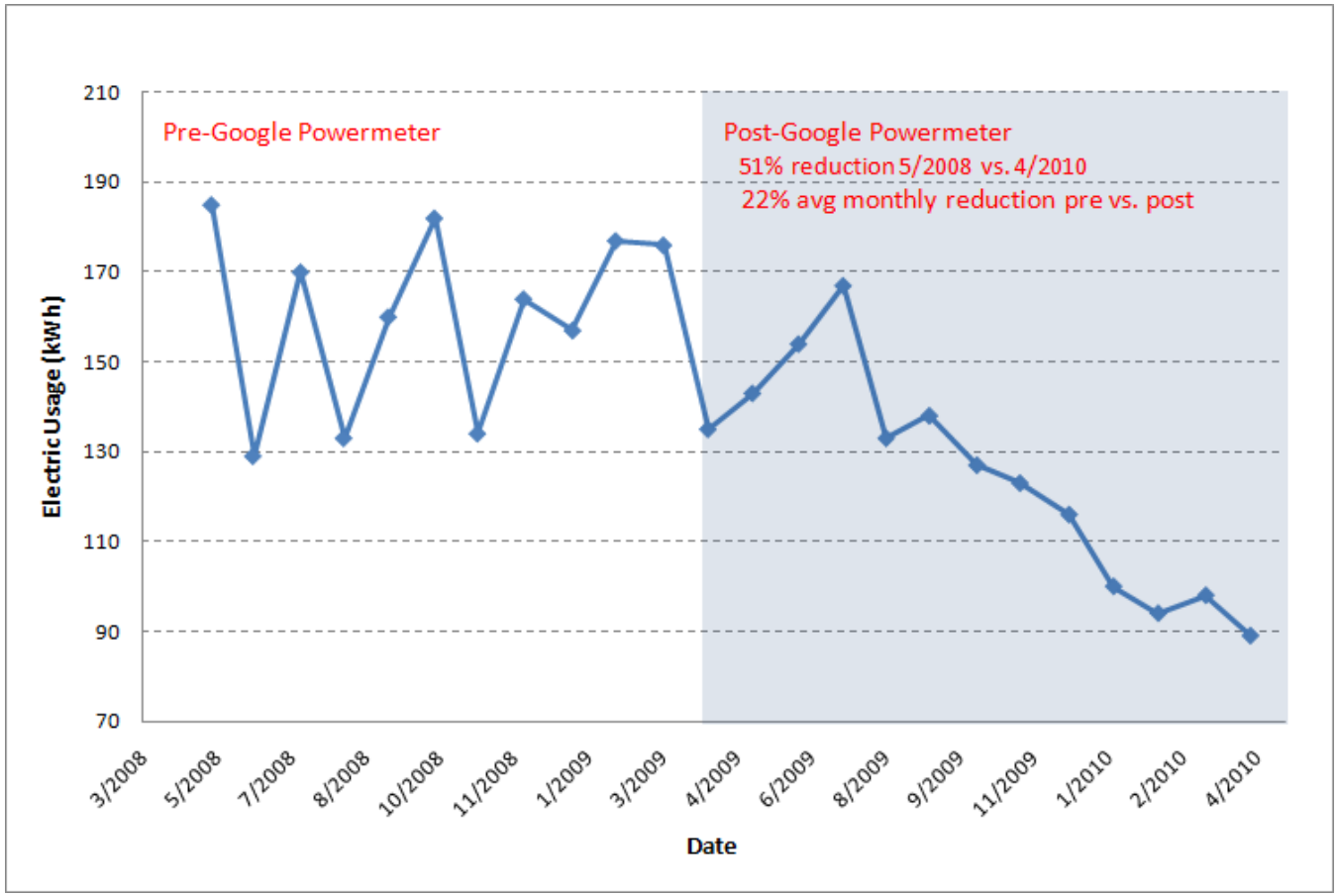
Track your energy

Use less

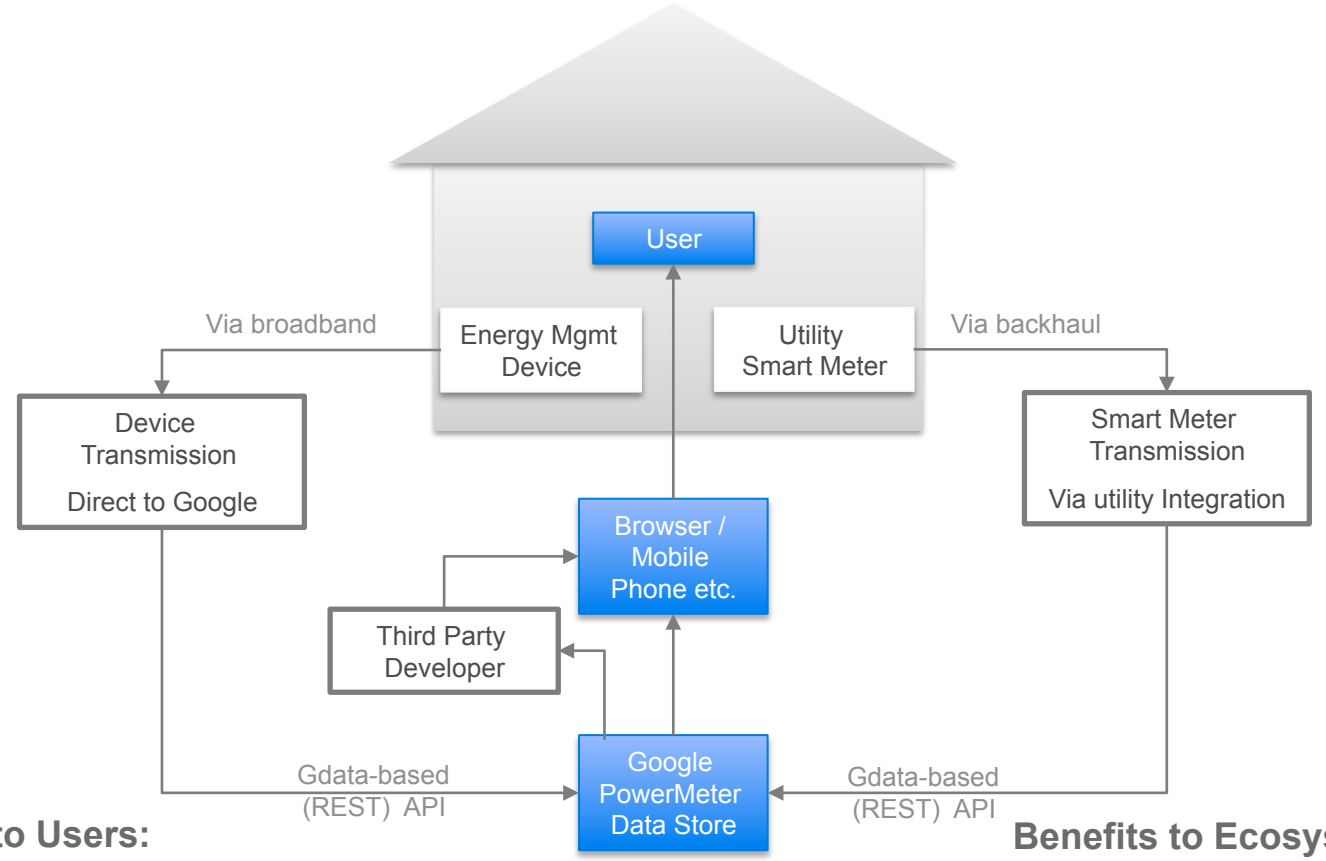
Save energy & money

- See your home's energy consumption anywhere online
- A project of Google.org

Google PowerMeter – Awareness drives Action



How Google PowerMeter Works



Benefits to Users:

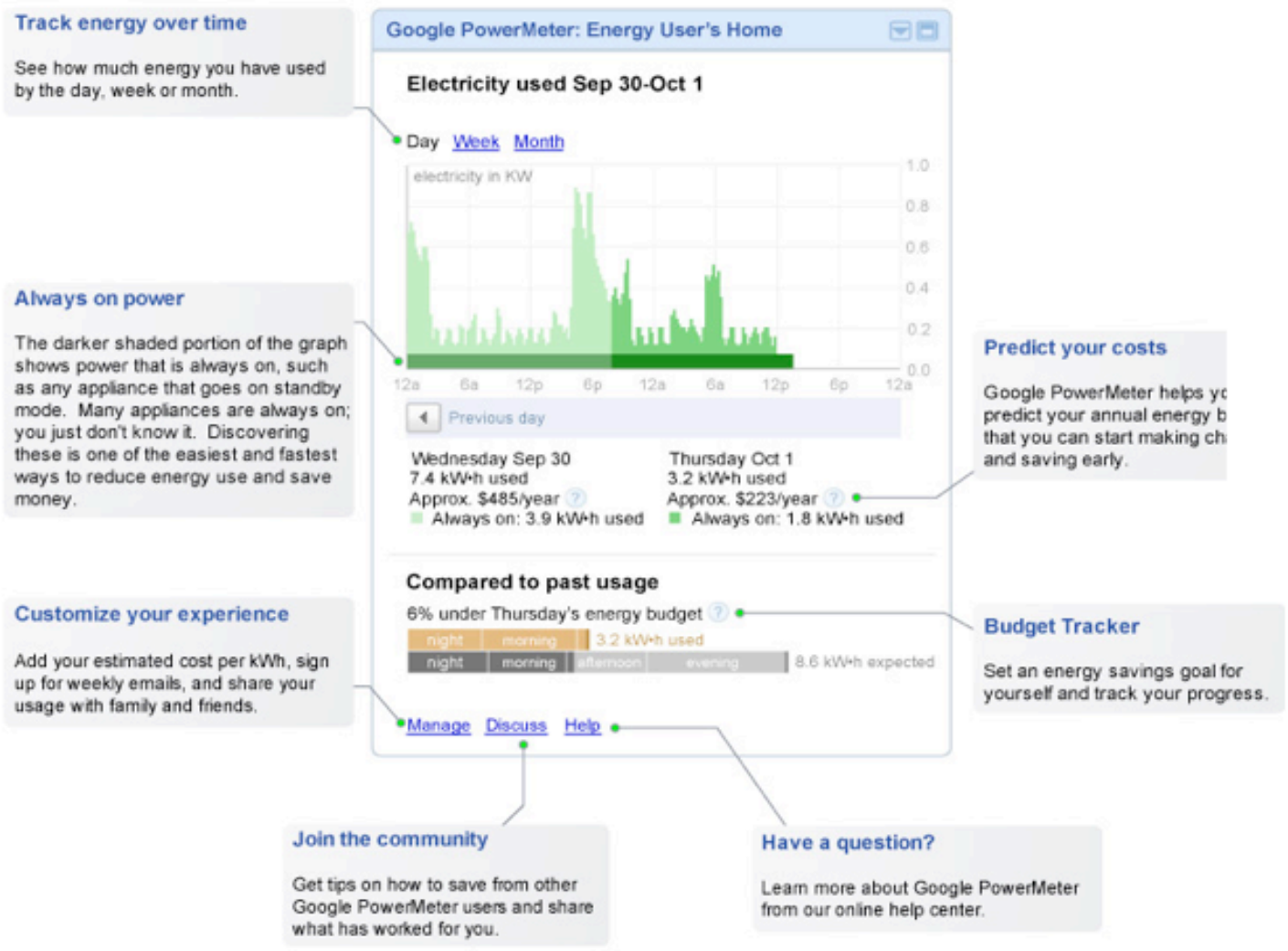
- Near real-time feedback
- Understand your impact
- Lower electricity bills

Benefits to Ecosystem:

- Accelerate smartgrid deployment
- Platform to expose devices
- Drive innovation towards active management

Google I/O 10

Making Users Aware



Design Concepts

Google I/O 10

Design Principles

- Flexibility
  - Many variables, many sources
  - Random access too all measurements and metadata
  - Highly available service
- Privacy and Data Ownership
  - Explicit consent / full control on data (dataliberation.org)
  - Authentication and auditing
  - Data isolation

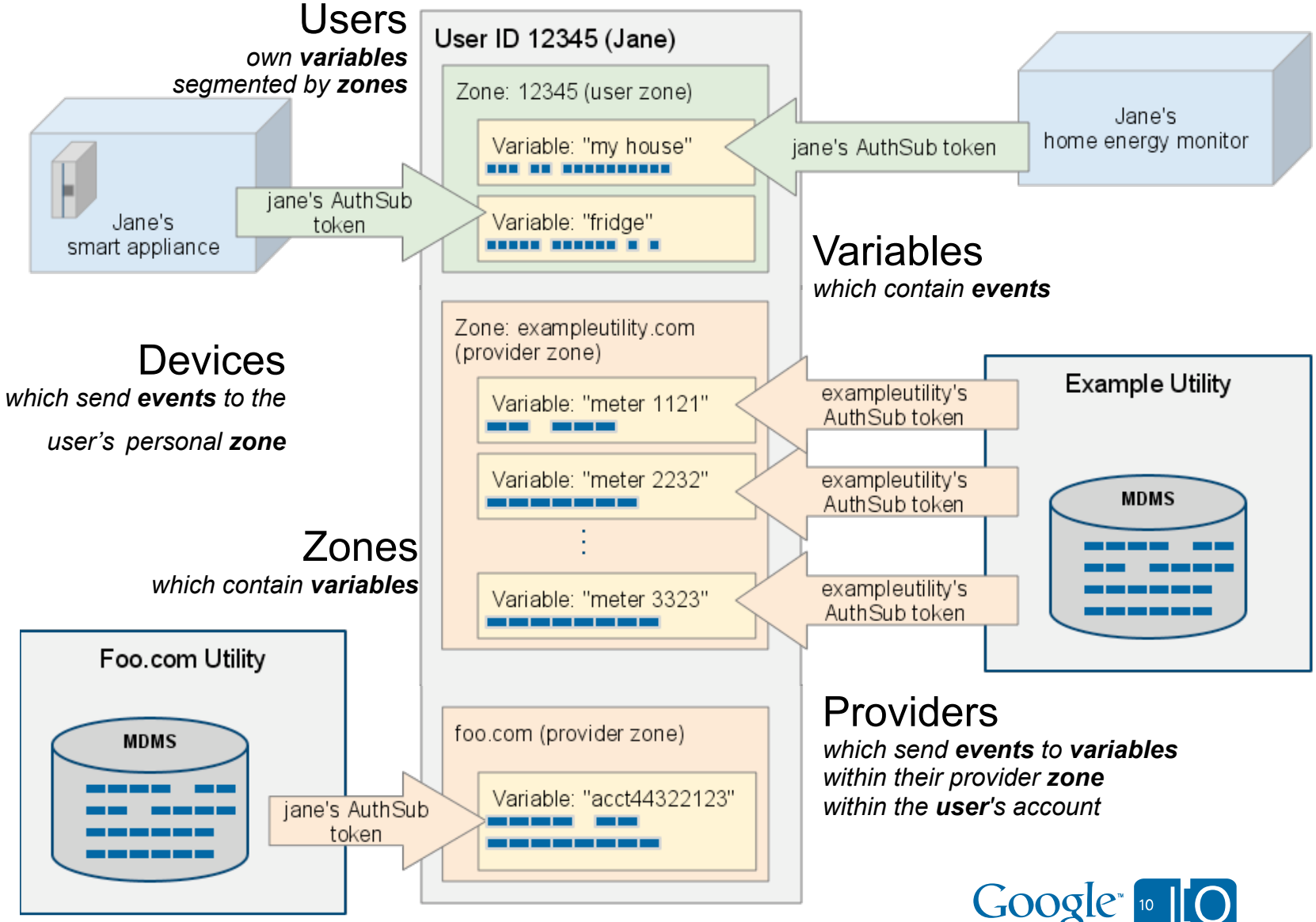
You can always get back anything you put in.

Design Principles

- Security
  - API is secured with AuthSub, no exceptions
  - Providers and users have Google accounts
  - Clients use permanent (revocable) AuthSub tokens
  - OAuth support on roadmap

- Personally identifying information
  - Users have an anonymized PowerMeter-specific obfuscated ID
  - Providers receives only obfuscated ID for user on authorization
  - No real names, account numbers, street addresses, etc.

PowerMeter Storage Model



Using the Google PowerMeter API

Google I/O 10

Google PowerMeter API: Overview

API for users & devices (zone is user ID)

URI Purpose	URI (after https://www.google.com/powermeter/feeds)
user entry	/user/12345
variable feed	/user/12345/12345/variable
variable entry	/user/12345/12345/variable/v1
instantaneous measurement feed	/user/12345/12345/variable/v1/instMeasurement/2009-01-01T15:13:00.000Z
variable entry	/user/12345/12345/variable/v2
durational measurement feed	/user/12345/12345/variable/v2/durMeasurement/2009-01-01T15:13:00.000Z

API for providers (zone is provider domain)

URI Purpose	URI (after https://www.google.com/powermeter/feeds)
user entry	/user/12345
variable feed	/user/12345/exampleutility.com/variable
variable entry	/user/12345/exampleutility.com/variable/v1
instantaneous measurement feed	/user/12345/exampleutility.com/variable/v1/instMeasurement/2009-01-01T15:13:00.000
variable entry	/user/12345/exampleutility.com/variable/v2
durational measurement feed	/user/12345/exampleutility.com/variable/v2/durMeasurement/2009-01-01T15:13:00.000

Activation

- Activation / Authorization
  - Secure activation handshake to transfer AuthToken
  - Explicit user opt-in necessary for activation
  - Separate handshakes for:
    - Provider enrollment
    - Device activation
    - App delegation (coming soon)

Abuse

- Throttling
  - Providers and devices must stay under our maximum resolution and frequency (6 measurements per hour)
  - Applications (coming soon) must make reasonable efforts to defer computation
- Storage quota
  - Years of data per user

We want to handle all legitimate energy usage data

Sending Data into PowerMeter

- Types of Feeds
  - Accumulator reads (instMeasurement):
    <entry><occurTime><value><isInitial></entry>
    <entry><occurTime><value></entry>
    <entry><occurTime><value></entry>
  - Interval reads (durMeasurement):
    <entry><startTime><endTime><value><entry>
    <entry><startTime><endTime><value><entry>
    <entry><startTime><endTime><value><entry>
  - Batch upload
  - Meta-data (user feed, provider feed, variable feed)
  - Coming soon: computations

Reading Data from PowerMeter

Read-only tokens

Allow users to authorize third party apps without giving away the farm

Token scopes

Restrict devices to only a subset of users' data

Data feeds

Offer access to the same raw data that the API received

Sample code

Reference code includes Python programs that demonstrate reading from the API

More to come

Future APIs will offer much more--- smoothing, analysis, charting, etc.

Examples and references

Check out

http://code.google.com/apis/powermeter

http://www.google.org/powermeter/partners.html

for more

Questions?

View live notes and ask questions about this session on Google Wave:

http://bit.ly/9xqdsj


Google™
10