

Linux Idle Power Checkup

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Agenda

- intel_idle
- Idle power measurements

Catalyst for developing intel_idle

- At Intel Core i7 Processor Introduction
 - OEM ACPI BIOS bugs increased idle power to 100W from 85W
 - OEM ACPI BIOS bugs decreased max to clock 2.9 from 3.2 GHz

Issues with acpi_idle

- BIOS blunders
- Inaccurate C-state latencies
- No concept of C-state energy break-even
 - `acpi.latency_factor=2` (2.6.25) - was 6
- No concept of core vs package C-states

Issues with intel_idle

- OS must manage platform/device latency limitations
 - No ACPI BM_STS bit...
 - Exactly what PM_QOS is for...
- OS must manage AC/DC C-state policy (if any)
 - No ACPI _CST re-evaluation upon AC/DC transition
 - PM_QOS useful here?
- OS must handle any hardware/platform bugs
 - No bug workarounds via ACPI BIOS update
 - We do this already...

More Issues with intel_idle

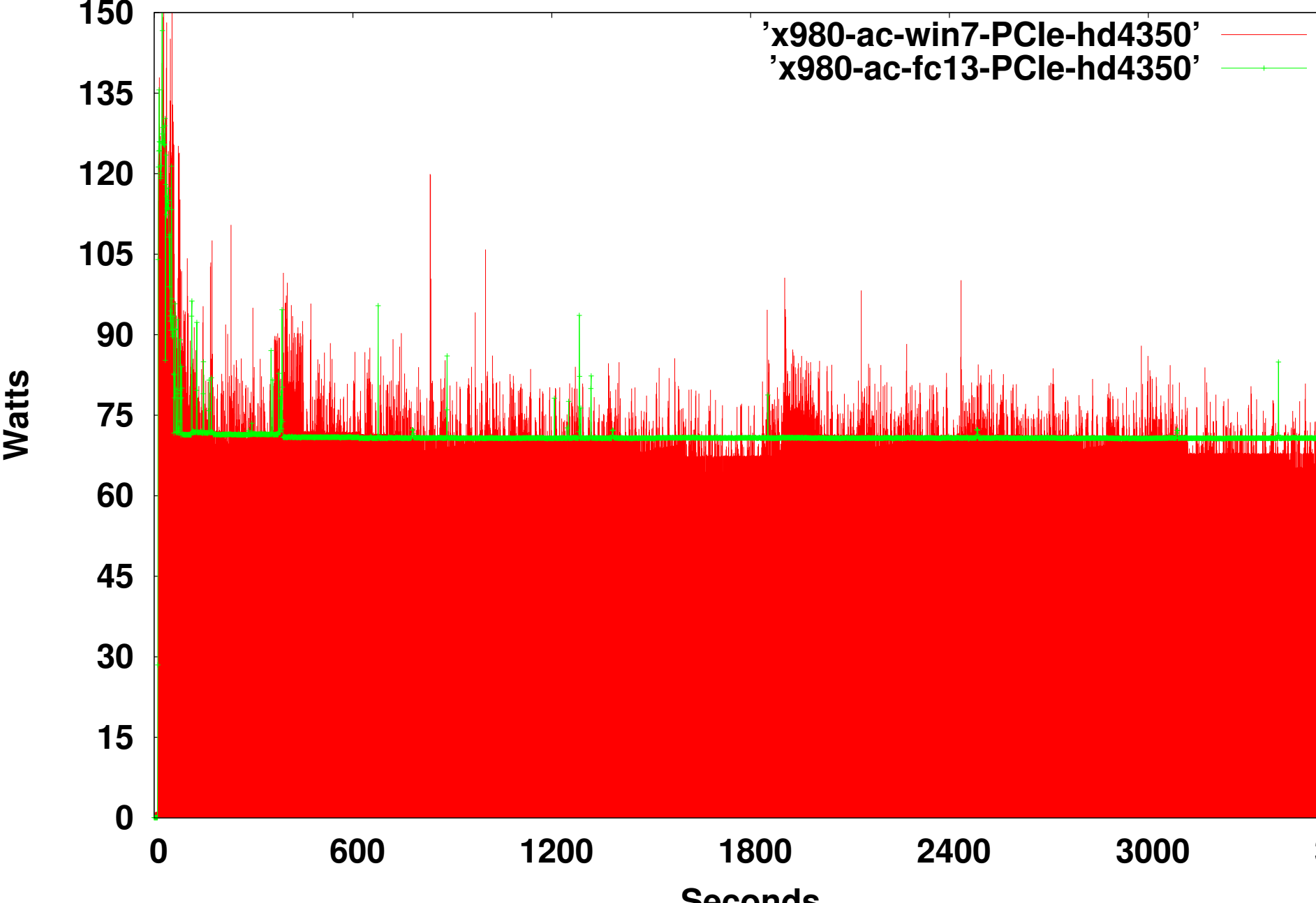
- intel_idle must be taught about new HW
 - acpi_idle loads if intel_idle does not
- Table proliferation
 - non-issue b/c small and much sharing

Idle Measurements

- Methodology: "as shipped"
- Configuration:
 - Wired-Ethernet live
 - WiFi, BT disabled
 - DT w/ USB KBD/mouse, monitor not included
 - Notebook display bright
- Cold Power-on, log-in, walk away
- AC Power meter: Yokogawa WT210, 1-sec interval

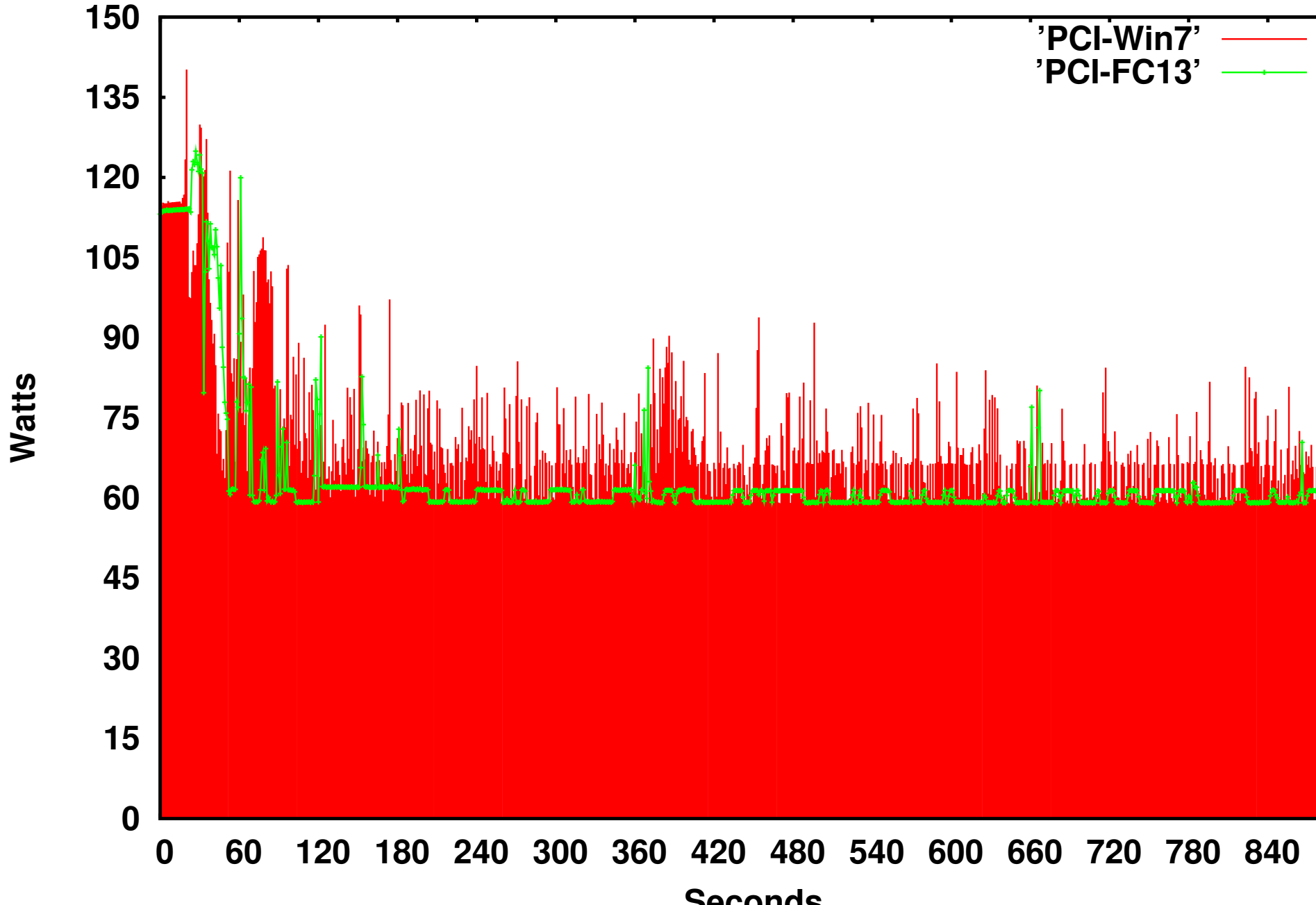
Desktop - FC13 v. Win7

Intel Core i7 x980 Processor on Intel DX58SO - boot/login/60-minutes Idle



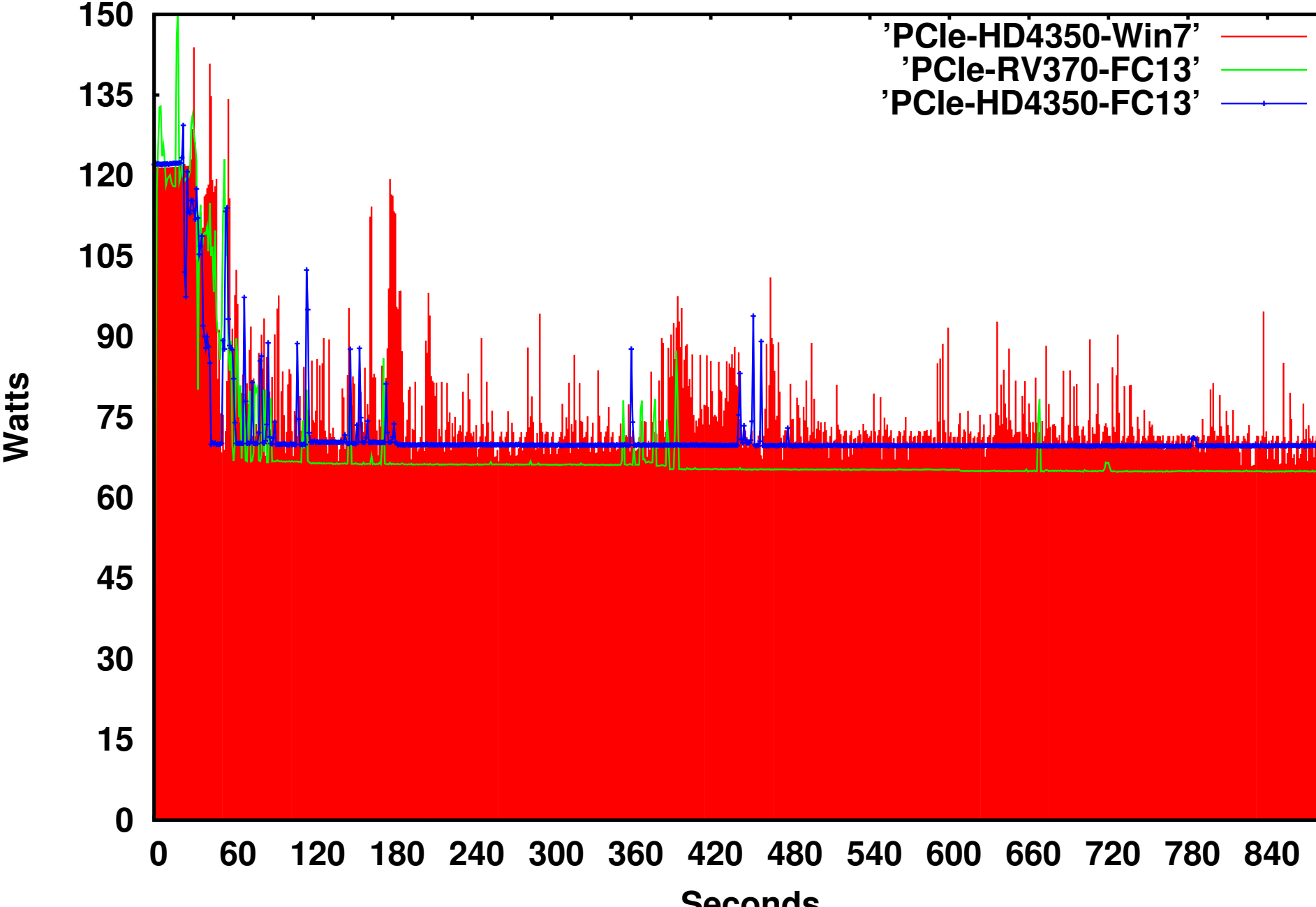
Desktop w/ PCI graphics - FC13 v. Win7

Intel Core i7 x980 Processor, Intel DX58SO Motherboard - boot/login/15-minut



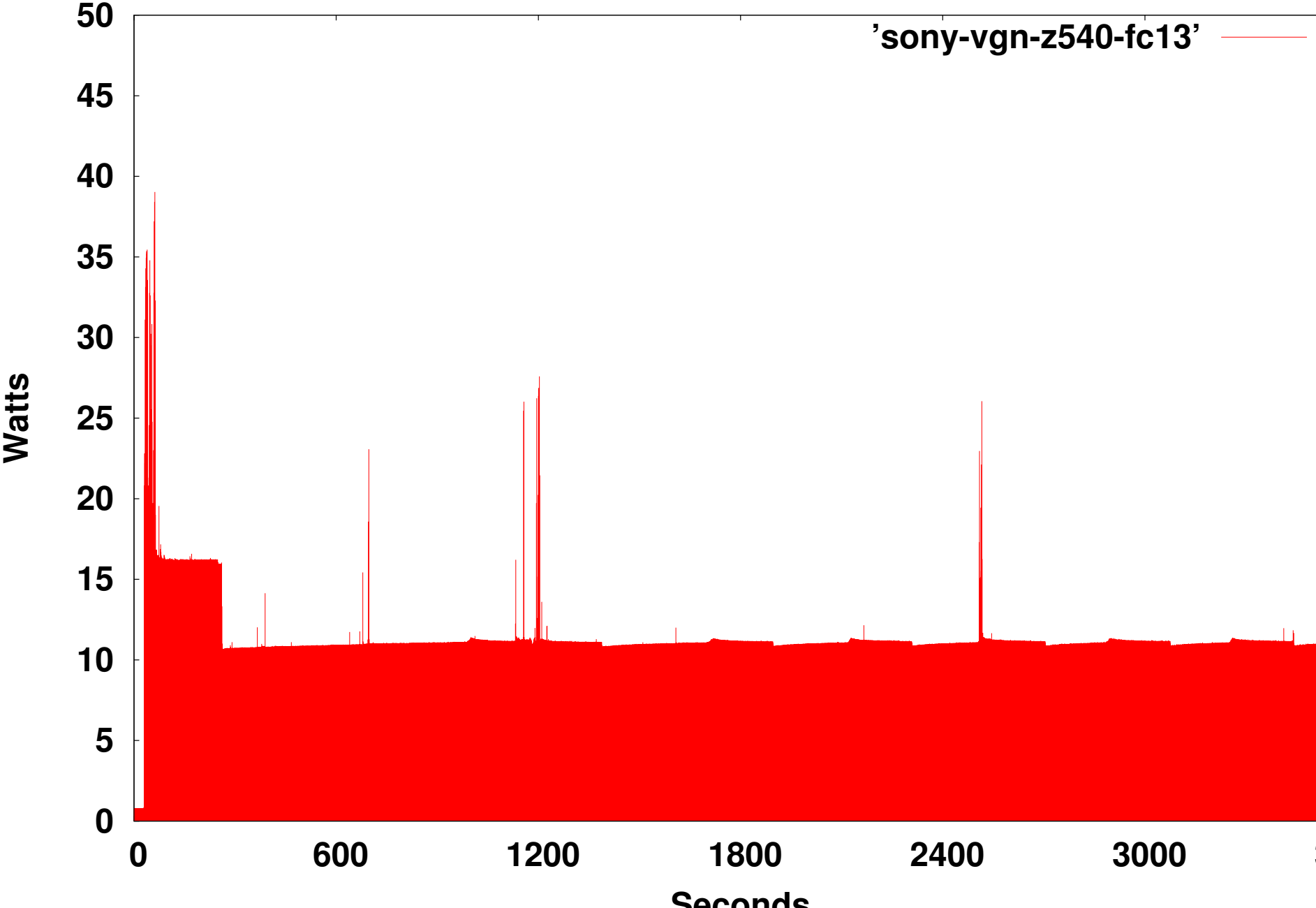
Desktop w/ PCIe graphics - FC13 v. Win7

Intel Core i7 x980 Processor, Intel DX58SO Motherboard - boot/login/15-minut



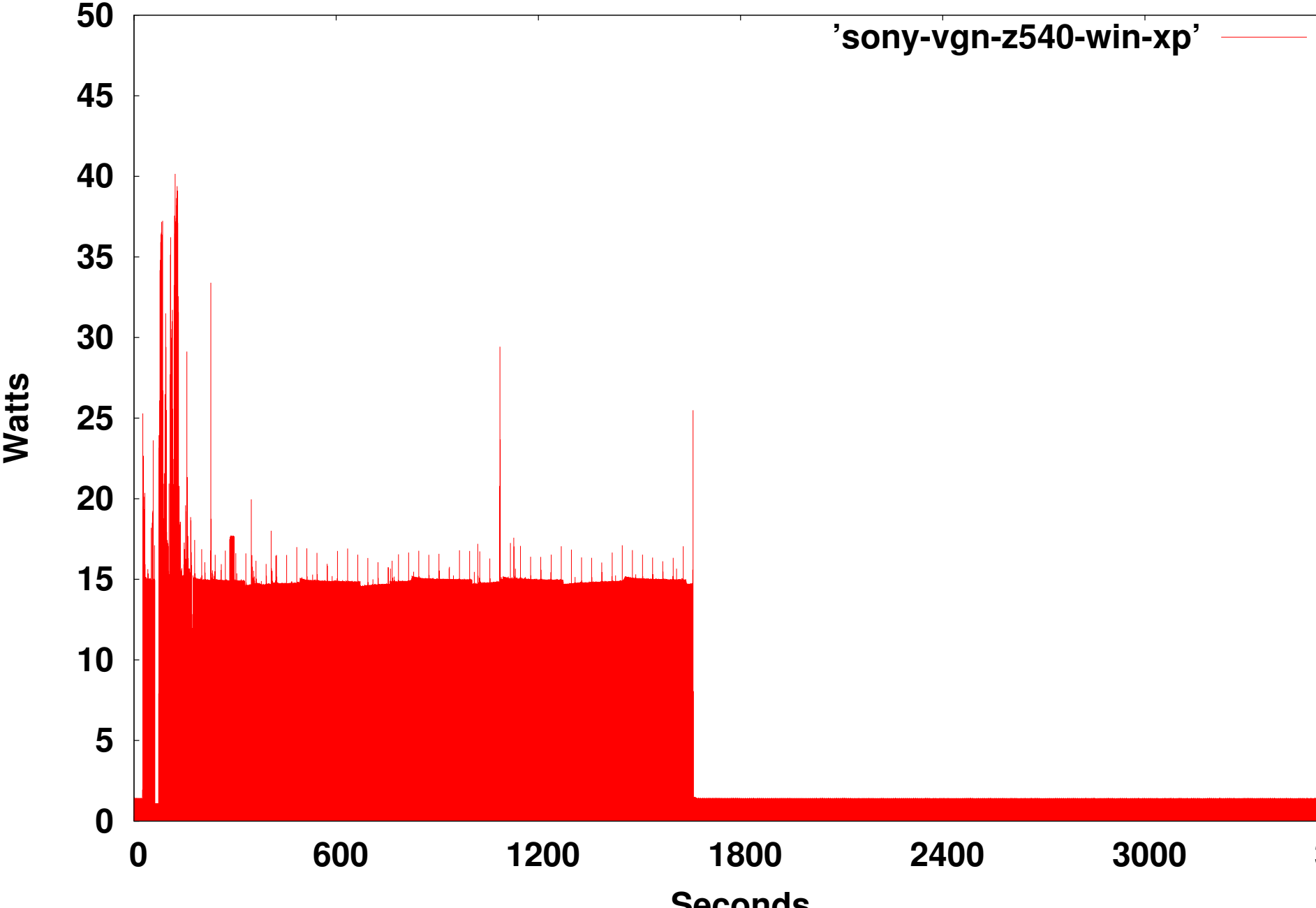
Sony Vaio Notebook - Fedora 13

Boot/login/60-minutes Idle



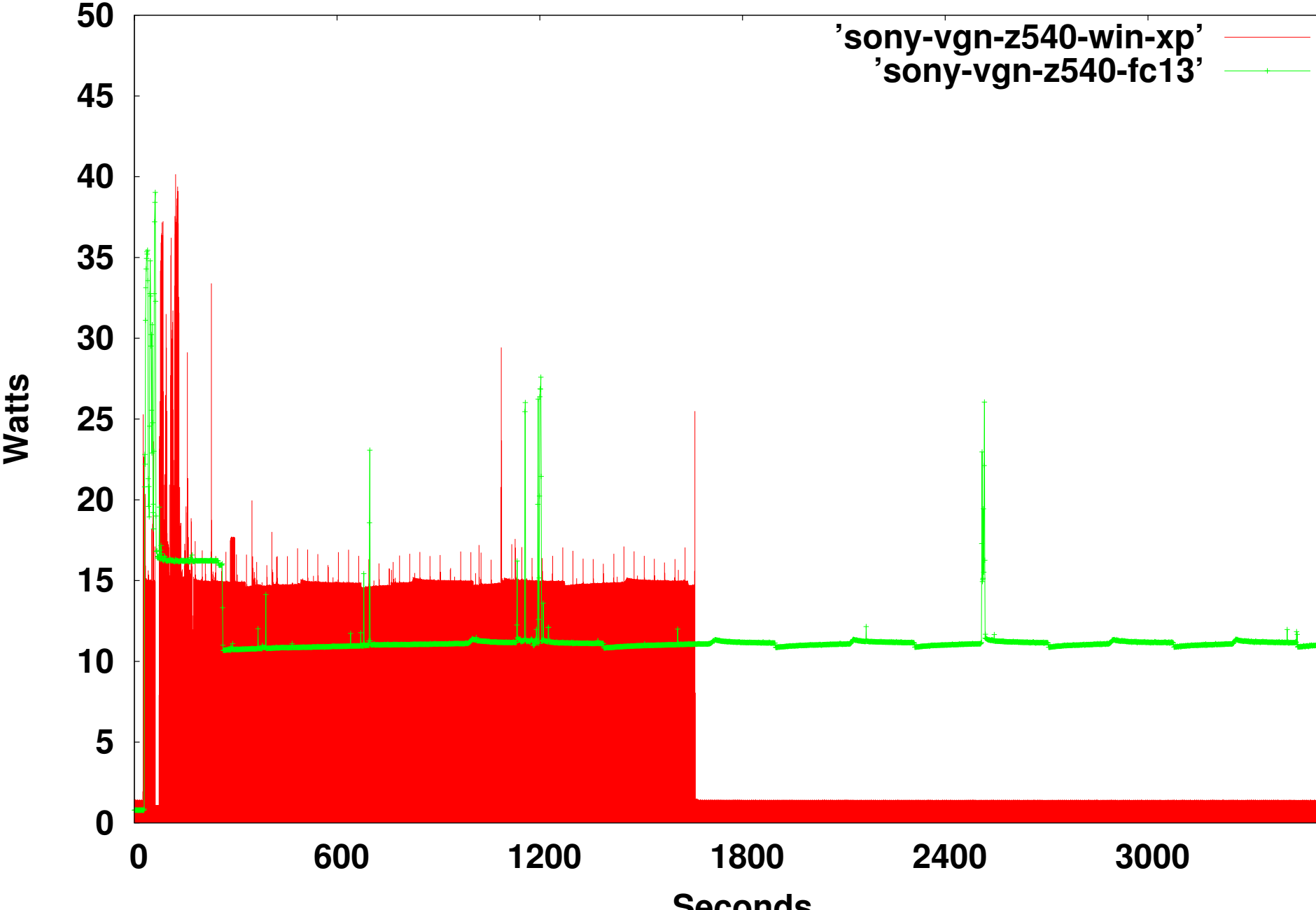
Sony Vaio Notebook - Windows XP

Boot/login/60-minutes Idle



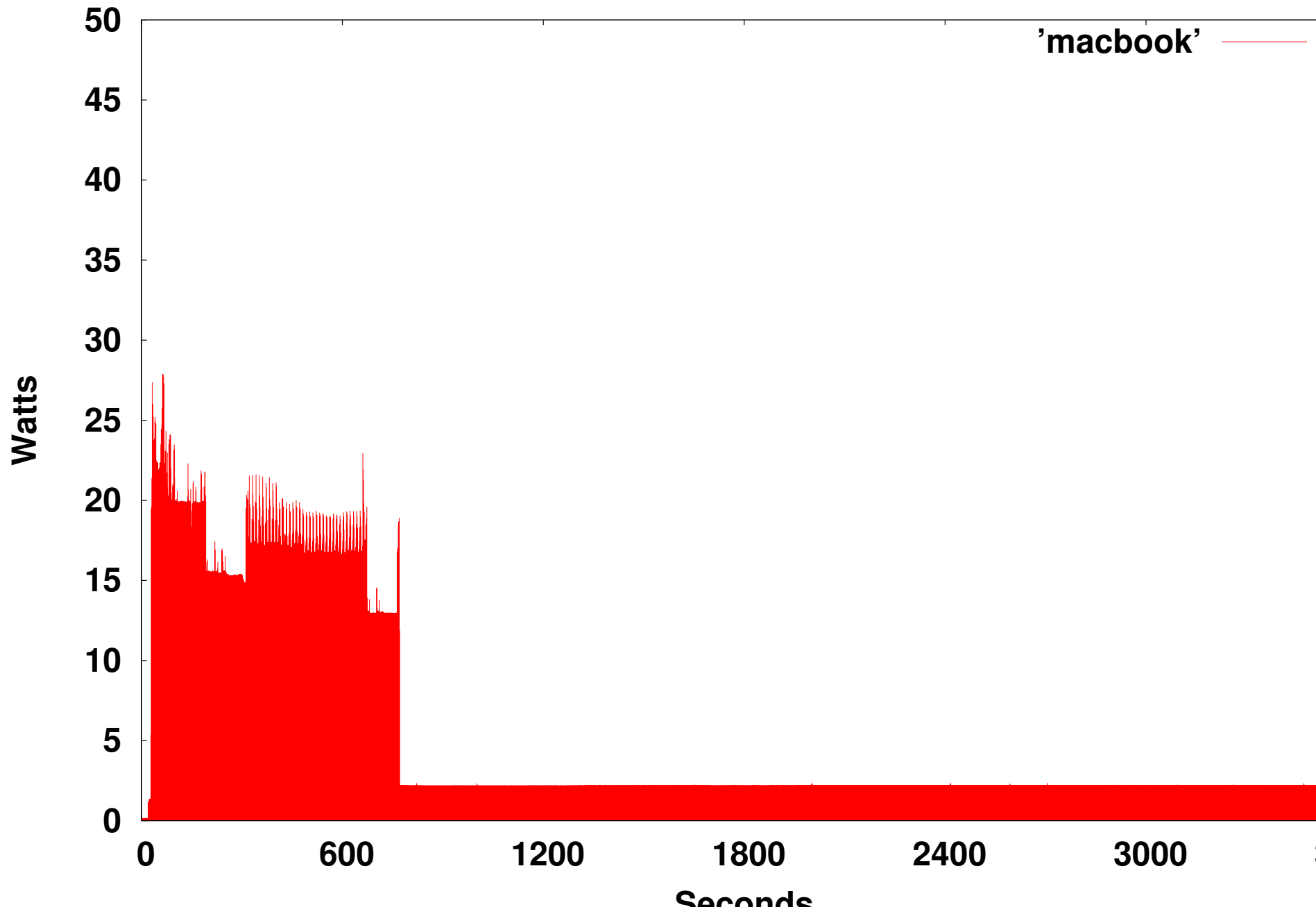
Sony Vaio Notebook - WinXP v. FC13

Boot/login/60-minutes Idle



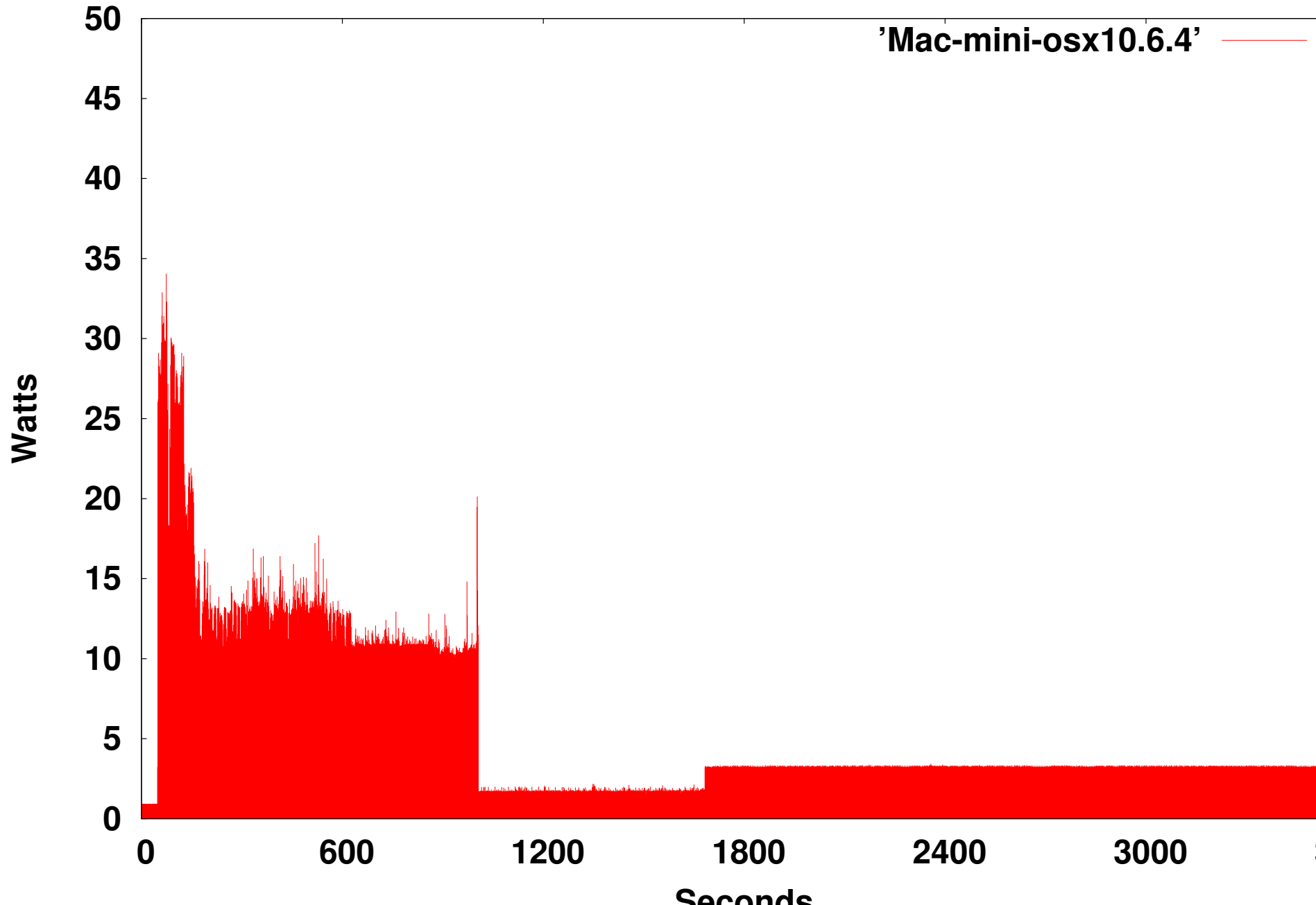
Apple Macbook - Leopard (circa 2006)

Boot/login/60-minutes Idle



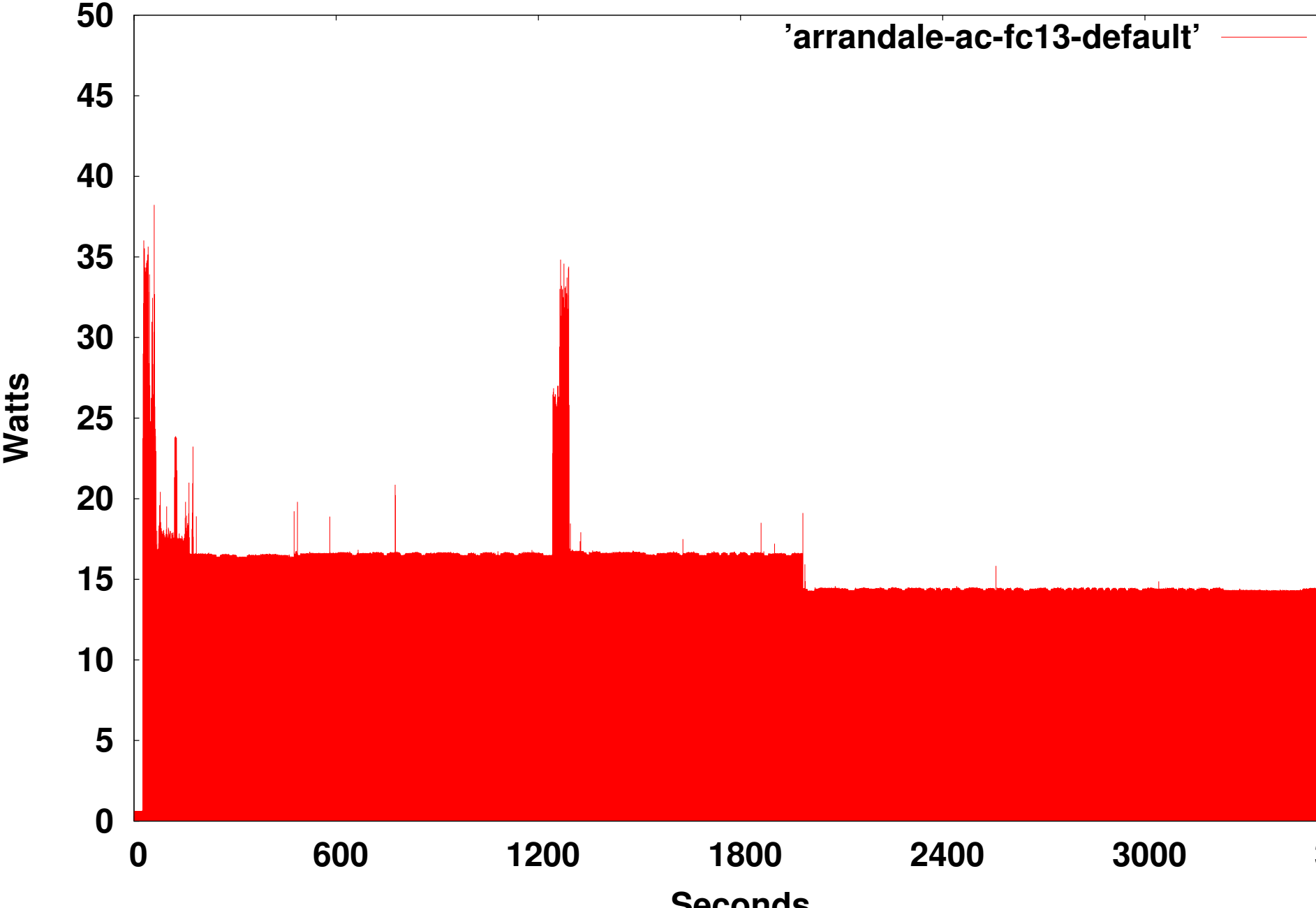
Apple Mac mini 3,1 - Snow Leopard

Intel Core2 Duo, Apple Mac Mini, OSX 10.6.4 - boot/login/60-minutes Idle



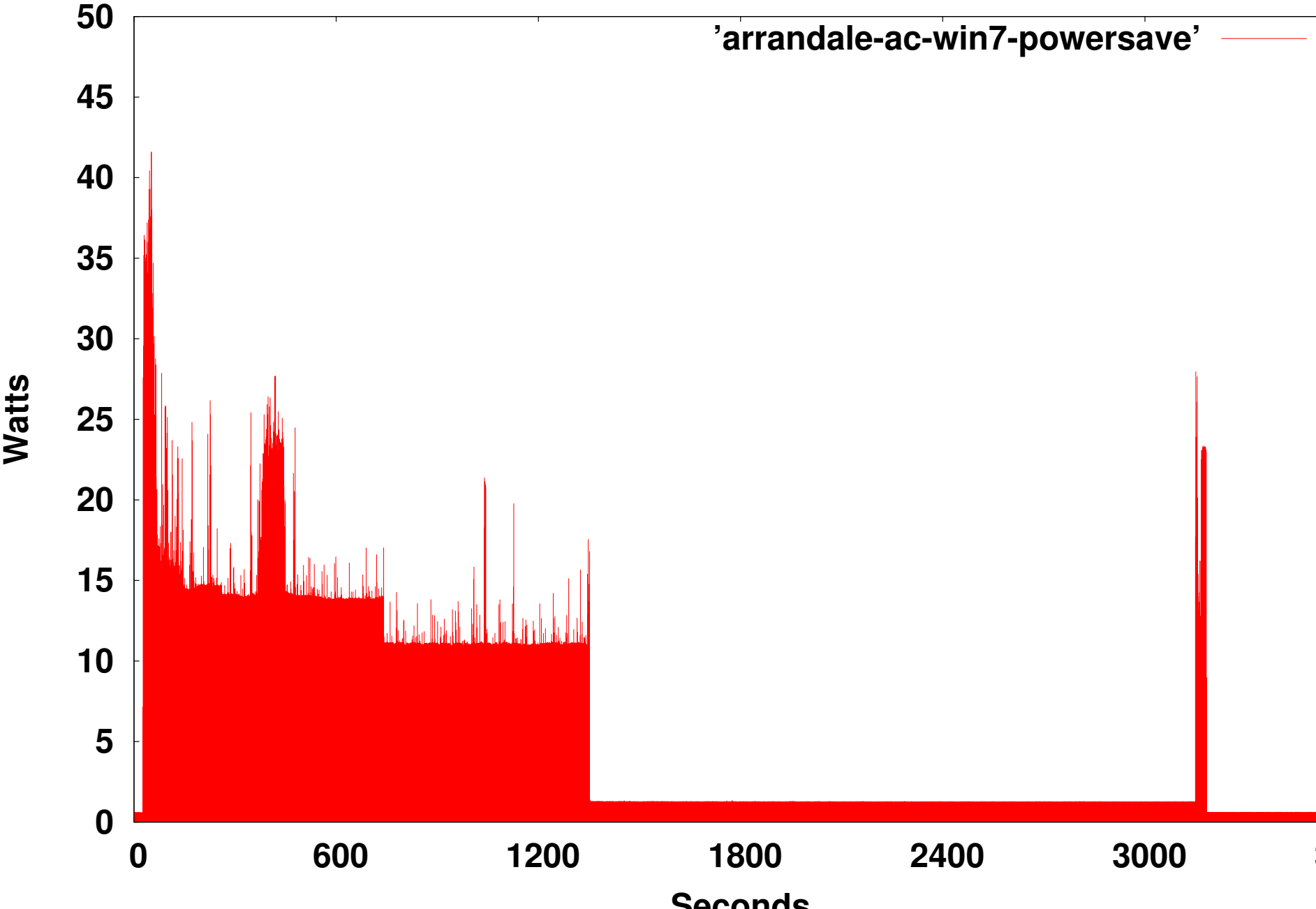
Notebook - Fedora 13

Intel Westmere - boot/login/60-minutes Idle



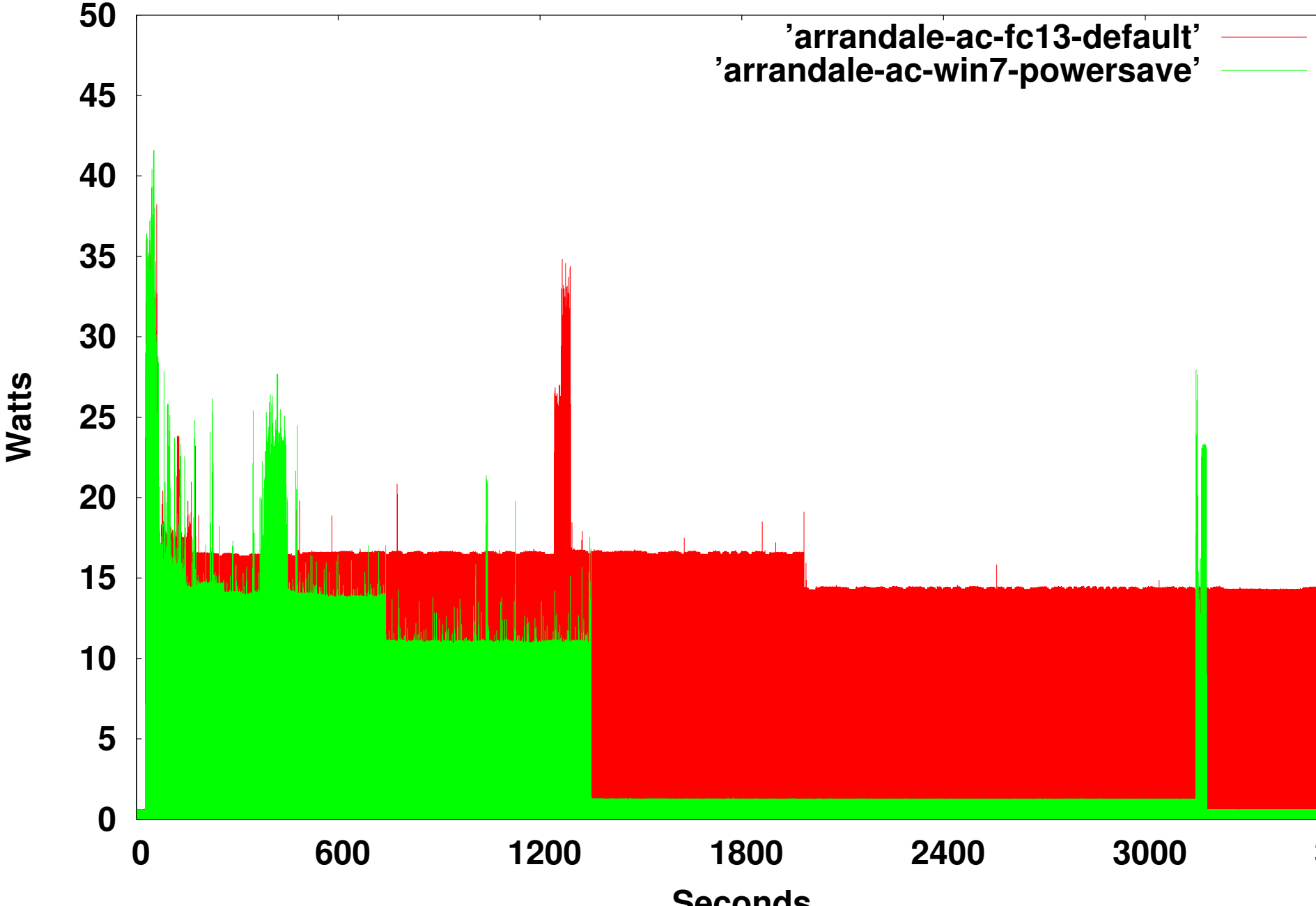
Notebook - Windows 7

Intel Westmere - boot/login/60-minutes Idle



Notebook - FC13 v. Win7

Intel Westmere - boot/login/60-minutes Idle

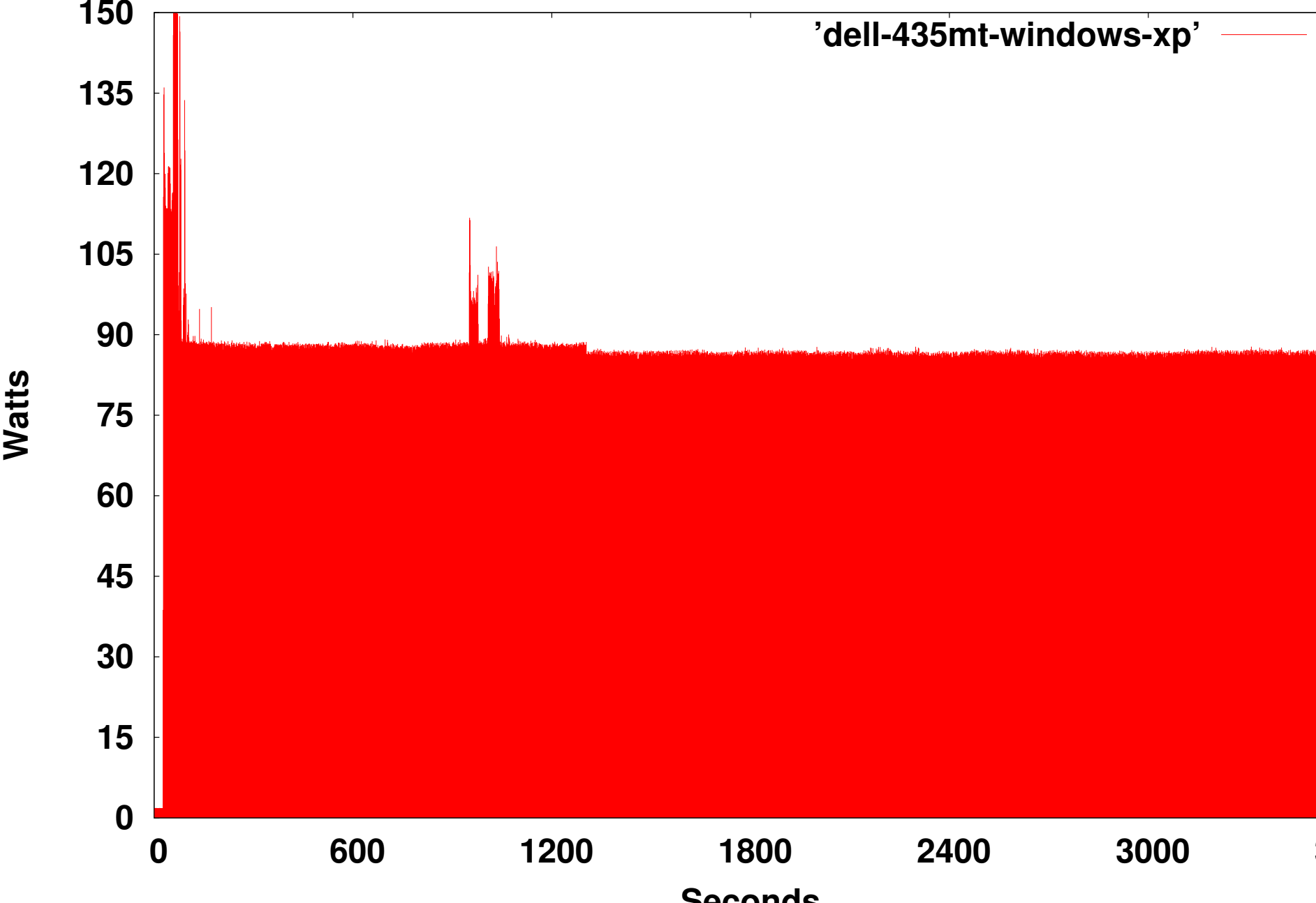


Summary

- Aggressive suspend is a game-changer
 - Apple benefits from system integration
- Linux is competitive on Desktop Idle Power
 - Unless competition suspends...
- Linux trails on notebook Idle Power
 - Both Core2 and Core i7 generations

Dell 435MT Desktop - Windows XP

Boot/login/60-minutes Idle



Dell 435MT Desktop - Fedora 13

Boot/login/60-minutes Idle

