Modded Minecraft Energy Research

By Erik Malone (AKA: RavynousHunter)

Started on 19 March 2014

Preface

Herein, I shall record all the data I've gathered about various forms of Minecraft energy, especially noting any cross-mod interactions that might yield useful fruits. The main purpose of this research, as well as this document as a whole, is to provide readers with as thorough grounding as possible in the various energy mechanics and interactions available in mods, as well as in such mod packs as the Feed the Beast family of mod packs.

Misc. Notes

- According to Direwolf20, Alumentum from Thaumcraft has roughly quadruple the energy of vanilla coal; both in terms of its use as a fuel for furnaces, and most especially for the purposes of Railcraft boiler fuel.
- Alumentum can, with the requisite research, be made renewable with the combination of a charcoal farm and cobblestone generators, using the crucible automation machines available in said mod, and siphoning off (and storing) the extra Essentia Saxum accumulated during the process.
- One automated Alumentum setup is enough, according to S6E50 of Direwolf20's Let's Play series, to power a 36HP boiler at max temperature with leftovers to run the automation setup.
- 1 RF = 2.5 Mekanism Joules; 1 EU = 10 Mekanism Joules.
- **IMPORTANT:** Unless otherwise stated, the values used here are those found in the mods' **DEFAULT** configuration.
- [According to Reika](), the default conversion rate between RF and shaft power is thus: 1 RF/t = 5,628 Watts, and vice versa for converting shaft power to RF. The tables below will be using this default conversion, which can be edited in the RotaryCraft config.
- All Thermal Expansion dynamos output 80 RF/t, or 450.24 kW/t in RotaryCraft power. More details are found below,

where I convert fuels for Thermal Expansion into RotaryCraft kilowattage.

RotaryCraft Converted Engine Outputs

RotaryCraft is a mod whose power transmission is quite different from what most users are likely comfortable with. However, the mod does come with its own set of conversion machines, turning shaft power into Redstone Flux (from Thermal Expansion) and steam (from Railcraft), amongst others. Below is a table of conversion ratios for various power generation devices in RotaryCraft when converted using a Rotational Dynamo and Mekanism ultimate universal cables, being put into a Mekanism ultimate energy cube.

Engine	Converted Output	Notes
Steam Engine	2.91 RF/t	Requires lit netherrack underneath and a constant supply of water. Two EnderIO reservoirs can easily keep up with the demands of 16 Steam Engines.
Microturbine	372.60 RF/t	Requires jet fuel. Has a massive internal buffer, at least the size of an Extra Utilities liquid drum. Once full, it has enough fuel to last 90 minutes of operation. Fuel is inserted thru the BOTTOM of the engine. Requires 2.225 mB/t* of jet fuel.
Gas Turbine	11,924.13 RF/t	Requires jet fuel. The suction effect can be easily, and stylishly, mitigated with iron bars placed at the front of the engine. Place the iron bars BEFORE allowing fuel to flow into the engine, for safety. Has a massive internal buffer, at least as large as an Extra Utilities fluid drum. Once full, the engine can last 45 minutes of operation. Fuel is inserted thru the BOTTOM of the engine. Requires 4.45 mB/t of jet fuel.
Wind Turbine	0.73 RF/t	As with the DC Electric Engine, multiple of this engine are required to begin transmitting Redstone Flux, as

		Thermal Expansion truncates any fractions of a RF/t during transmission. However, these are far more practical, requiring only a minimum of two to begin transmitting noticeable power.
Gasoline Engine	11.65 RF/t	One stack of ethanol crystals lasts roughly 64 minutes, or 1 minute per crystal.
AC Electric Engine	23.29 RF/t	Requires a magnetized shaft core. Readings fluctuate depending on the speed of redstone clock used; two-clock is optimal.
Performance Engine	46.58 RF/t	Each ethanol crystal adds 30s of run time to the engine. Additive values unknown, however, blaze powder appears to be optimal. Requires a constant water source; for this test, an EnderIO reservoir was used. (Note: Engine failed violently with this water supply, more is likely needed.)
Hydrokinetic Engine	93.16 RF/t	Reading acquired when water has fallen optimal distance (64 blocks). Requires a constant source of lubricant, however, it is used slowly at a rate of approx. 1 mB every 5 seconds.
DC Electric Engine	0.18 RF/t	Any fractions of a RF/t are truncated by Thermal Expansion, therefore, these engines are a highly impractical method of Redstone Flux generation beyond a minor trickle.

* - This value is currently untested and based on the assumption that the microturbine consumes fuel half as fast as a gas turbine, since an equal amount of fuel in the former lasts twice as long as it does in the latter.

Mekanism Power Sources

Mekanism has some of the best passive power generation abilities of any mod across which I've come. While not quite as powerful as more involved mods like Big Reactors, RotaryCraft, or Thermal Expansion, they have the advantage of being "set and

forget," more times than not. I'm converting their outputs here to Redstone Flux (RF) and Wattage (RotaryCraft, rounded to kilowatt resolution to prevent crowding), in addition to listing their Mekanism Joule (J) output to give readers a better idea of what kind of power they're dealing with when given a given Mekanism generator with which to work.

Generator	Output	Notes
Solar Panel	50 J/t, 20 RF/t, 112.56 kW	Only operational during the day.
Advanced Solar Panel	400 J/t, 160 RF/t, 900.48 kW	Only operational during the day.
Heat Generator	150 J/t, 60 RF/t, 337.68 kW (passive) 360 J/t, 144 RF/t, 810.43 kW (active)*	Passively generates power if lava source blocks are nearby. Actively generates power when given solid fuel, such as coal.
Bio-Fuel Generator	250 J/t, 100 RF/t, 562.8 kW	Bio-Fuel produced by crushing various forms of organic matter, such as saplings and apples.
Hydrogen Generator	400 J/t, 160 RF/t, 900.48 kW	Requires hydrogen from an Electrolytic Separator.
Wind Generator	100 J/t, 40 RF/t, 225.12 kW	Output depends on height of generator above bedrock. Each Y level above Y = 0 translates to 1 J/t, maxing out at 100 J/t at Y = 100.
Redstone	10,000 J/item, 4,000 RF/item, 22,512 kW/item	Redstone can be placed into the energy slot of any machine or Mekanism energy storage device for immediate gains.

* – Needs testing.

Mekanism Cable Transfer Rates

As of 20 March 2014 (perhaps earlier), Mekanism has ditched the "one cable to rule them all" approach to its universal cables. Instead, we have 4 tiers of cable, each with a better transfer rate than the last, and each being more expensive than the last.

Cable	Throughput	Notes
Basic Universal Cable	500 J/t, 200 RF/t	Uses the old universal cable recipe. (8 cables/crafting)
Advanced Universal Cable	2,000 J/t, 800 RF/t	Basic cable + 2 enriched alloy (1 cable/crafting)
Elite Universal Cable	8,000 J/t, 3,200 RF/t	Basic cable + 2 circuits (1 cable/crafting)
Ultimate Universal Cable	32,000 J/t, 12,800 RF/t	Basic cable + 2 atomic cores (1 cable/crafting)

Thermal Expansion to RotaryCraft Conversions

Due to the fact that all Thermal Expansion dynamos output 80 RF/t, with the only difference being the duration and required fuels, readings here will be given in total wattage (in kilowatts, to save space) per unit of fuel, in a given engine.

Fuel	Power Generated	Notes
Coal	28,000 RF, 159,040 kW (Steam Dynamo)	Fuel lasts 17.5 seconds in a Steam Dynamo.
Charcoal	20,000 RF, 112,560 kW (Steam Dynamo)	Fuel lasts 12.5 seconds in a Steam Dynamo.
Coal Coke	44,000 RF, 247,632 kW (Steam Dynamo)	Requires Railcraft. Fuel lasts 27.5 seconds in a Steam Dynamo.
Wood Log	560 RF, 3,151.68 kW (Steam Dynamo)	Oak wood log was used. Fuel lasts 0.35 seconds in a Steam Dynamo.
Wood Plank	560 RF, 3,151.68 kW (Steam Dynamo)	Oak wood plank was used. Fuel lasts 0.35 seconds in a Steam Dynamo.
Block of Coal	316,000 RF, 1,778,448 kW (Steam Dynamo)	Fuel lasts 197.5 seconds in a Steam Dynamo.
Charcoal Block	212,000 RF, 1,193,136 kW (Steam Dynamo)	Mekanism variant used. Fuel lasts 132.5 seconds in a Steam Dynamo.
Block of Coal Coke	428,000 RF, 2,408,784 kW (Steam Dynamo)	Requires Railcraft. Fuel lasts 267.5 seconds in a Steam Dynamo.