FUSION ENERGY FLOW CHART

Sankey Flow-chart Style

Home

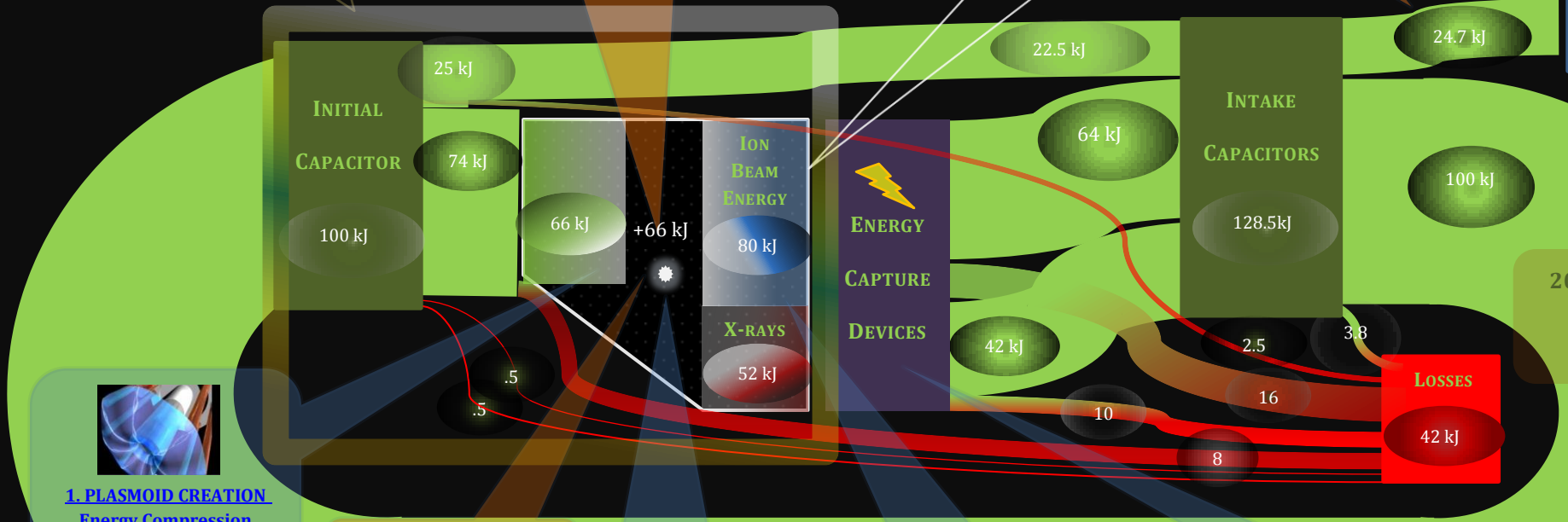
Dense Plasma Focus (DPF) Device ; (animation)

From the incoming 66 kJ into the plasmoid, nuclear fusion generates an additional energy, adding up to 132 kJ entering into capture devices!

DPF or Plasma Focus Device Vacuum Chamber

Net Energy

Distributed Grid



1. PLASMOID CREATION Energy Compression through the Pinch Effect

PLASMOID

2. NUCLEAR FUSION REACTION - Energy Production

3. ELECTROMAGNETIC COLLISIONS – En. Propagation

4. X-RAYS & ION BEAM - Energy Emission. Ion beam – positively charged, blue; Electron beam, red; X-rays not depicted here.

5. ENERGY CAPTURE – Conversion To Net Power

Energy Flow in a Dense Plasma Focus Generator

The energy flow is summarized in a chart called a Sankey diagram, in which the width of connecting lines represents the amount of energy. We want to emphasize that at this point in the research, there are large uncertainties in any net energy analysis, but it is important to illustrate what is meant by "net energy" from a Focus Fusion generator.

This analysis assumes 90% energy transfer to plasmoid; a ratio of fusion energy released to input plasmoid energy of 100%; and 80% energy efficiency recovery from the ion beam and X-ray pulse. If energy-recovery efficiency is only 70%, net energy is reduced to 14.6 kJ, but is still positive. If fusion energy is 120% of plasmoid energy instead of 100%, net energy yield is increased to 35 kJ. Net energy production occurs if gross fusion energy is above 35 kJ, the goal of our scientific feasibility demonstration.

While 80% efficiency of energy capture may sound high, for the ion beam such technology is well within reach. Devices that capture energy from an electron beam and put it into a circuit have been used for a long time. There are already designs for such devices with power outputs comparable to those that we need and with efficiency as high as 87%. Altering these designs for ions rather than electron beams is not trivial, but it is possible. The x-ray capture device is a new device, but is based on the well-studied photoelectric effect used throughout industry. For that, our 80% efficiency estimate is based on careful calculations.

In the baseline scenario of the diagram, cycling the device 200 times per second would provide 5MW to the grid.