

Feddersen Energy NYU/ITP

## "Energy is a very subtle concept... very, very difficult to get right... we have no knowledge of what energy is." <u>Richard Feynman</u>

#### **Energy is the only universal currency.** Vaclay Smil

https://youtu.be/80iWoUNZ8kM?t=747

Feddersen Energy NYU/ITP

# 2020 COVID



grist.com



## **AUGUST 2003**



#1 Song: Beyoncé's "Crazy in Love" On TV, "CSI" and "Arrested Development" debuted, "Colombo" ended, "Girlfriends" was midway through its run.

Top movies included the first Pirates of the Caribbean, the second Matrix, and the third Lord of the Rings.

September 11th 2001 was a close memory.

### **2003 BLACKOUT** Thursday, August 14, 4:10PM 55 million people affected for 24 - 48 hours

history.com







# 2003 BLACKOUTYATT







Third-largest power outage when it happened.

#### Largest [edit]

		1		
Article ÷	People affected (millions)	Location ÷	Date ÷	References
2012 India blackouts	620	India	July 30-31, 2012	[1][P
2023 Pakistan blackout	230(99% of population)	Pakistan	January 23, 2023	HAPF
2001 India blackout	230	India	January 2, 2001	[50
2022 Pakistan blackout	200	Pakistan	October 13, 2022	[6]
2021 Pakistan blackout	200 (90% population)	Pakistan	January 9, 2021	[7]
2014 Bangladesh blackout	150	Bangladesh	November 1, 2014	[8]
2015 Pakistan blackout	140	Pakistan	January 26, 2015	[9]
2019 Java blackout	120	Indonesia	August 4-5, 2019	[10][11][12][13]
2005 Java-Bali blackout	100	Indonesia	August 18, 2005	[14]
1999 Southern Brazil blackout	97	Brazil	March 11-June 22, 1999	[15]
2015 Turkey blackout	70	Turkey	March 31, 2015	[16]
2009 Brazil and Paraguay blackout	60	Brazil, Paraguay	November 10-20, 2009	[17]
2003 Italy blackout	56	Italy, Switzerland	September 28, 2003	[18]
Northeast blackout of 2003	55	Canada, United States	August 14-28, 2003	[19]
2019 Argentina, Paraguay and Uruguay blackout	48	Argentina, Paraguay, Uruguay	June 16, 2019	[20]
2002 Luzon blackout	40	Philippines	May 21, 2002	[21]
2001 Luzon blackout	35	Philippines	April 7, 2001	[22]
Northeast blackout of 1965	30	Canada, United States	November 9, 1965	(23)
2019 Venezuelan blackouts	30	Venezuela	March 7, 2019–July 23, 2019	[24][25][26][27]
2020 Sri Lankan blackouts	21	Sri Lanka	August 17, 2020	[26]
2016 Sri Lanka blackout	21	Sri Lanka	March 13, 2016	[29]

IAPPENING NOW

ABLE INFORMATION: 212.894.70 0

14TH



## **NYU's FIRST (?) SOLAR - 2004**

← → C a google.com/maps/@40.729578,-73.9936333,120m/data=I3m111e3

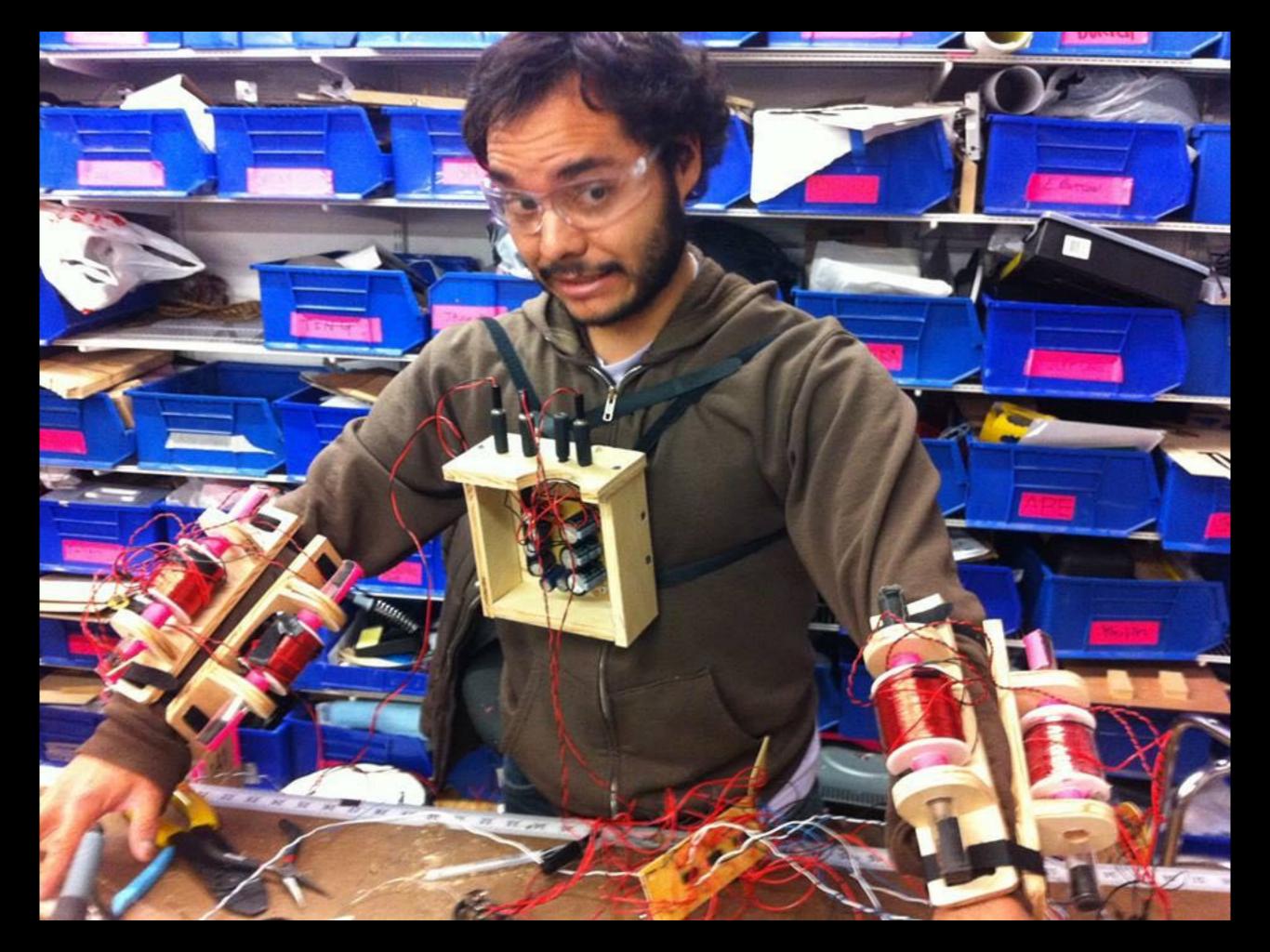
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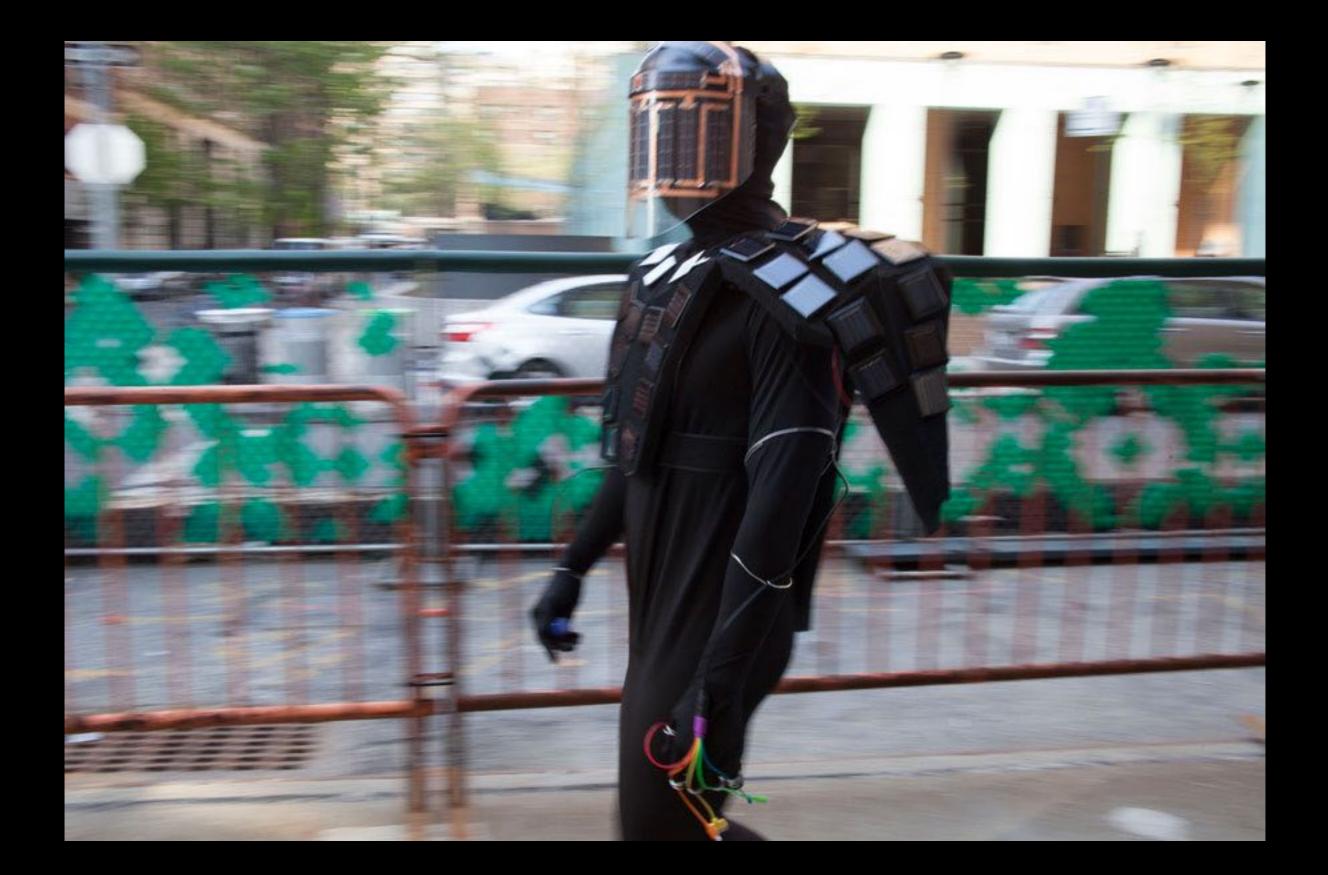
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# PNC BEACON

# 2004-2019



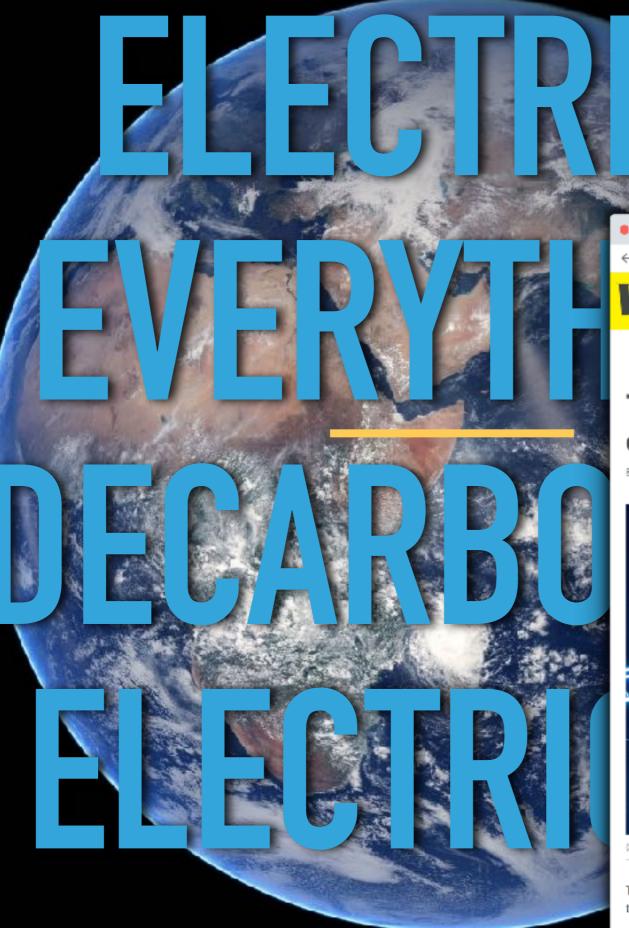
# **INDOOR SOLAR TEST EQUIPMENT**

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### Energy is the only universal currency. Vaclay Smil

Feddersen Energy NYU/ITP





#### ••• V The key to tackling dimate chools $\star$ + $\leftarrow \rightarrow \mathcal{O}$ (a) https://www.vox.com/2016/9/19/12938086/electrify-everything @ $\bigstar$ @ (a) Vox

#### The key to tackling climate change: electrify everything

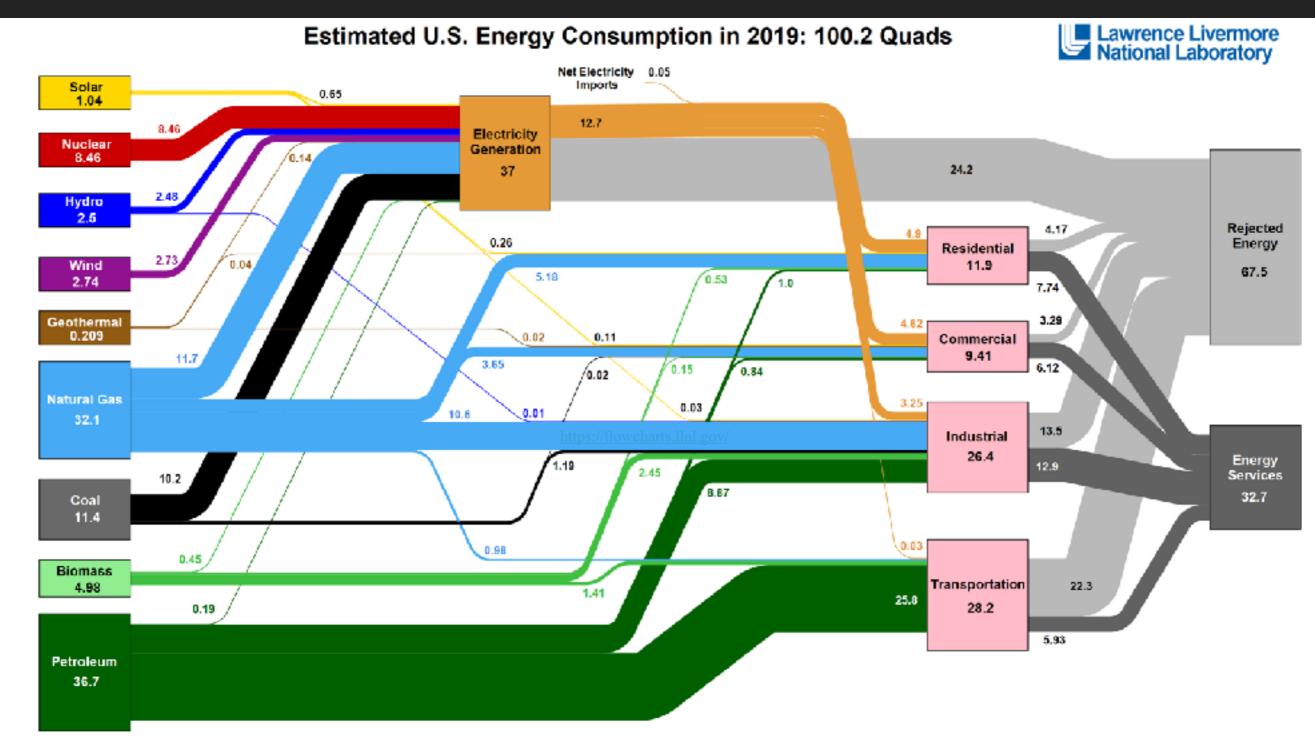
By David Roberts | @drvox | david@vox.com | Updated Oct 27, 2017, 8:48am EDT



Tackling climate change is a complicated undertaking, to say the least. But here's a good rule of thumb for how to get started:

Electrify everything.

Replace technologies that still run on combustion, like assoline vehicles and natural gas besting



Source: LINE March. 2020. Eats is based on DOE/EIA MER (2019). If this information or a reproduction of it is used, credit must be given to the Lawrence Livernore Mational Laboratory and the Department of Emergy, under whose supplies the vork was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant beat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary emergy input into electricity generation. End use efficiency is estimated as 65% for the residential sector, 65% for the connercial sector, 21% for the transportation sector and 45% for the industrial sector, which was updated in 2017 to reflect DOE's emalysis of manufacturing. Totals may not equal set of components due to independent rounding. ELME-MI=410527

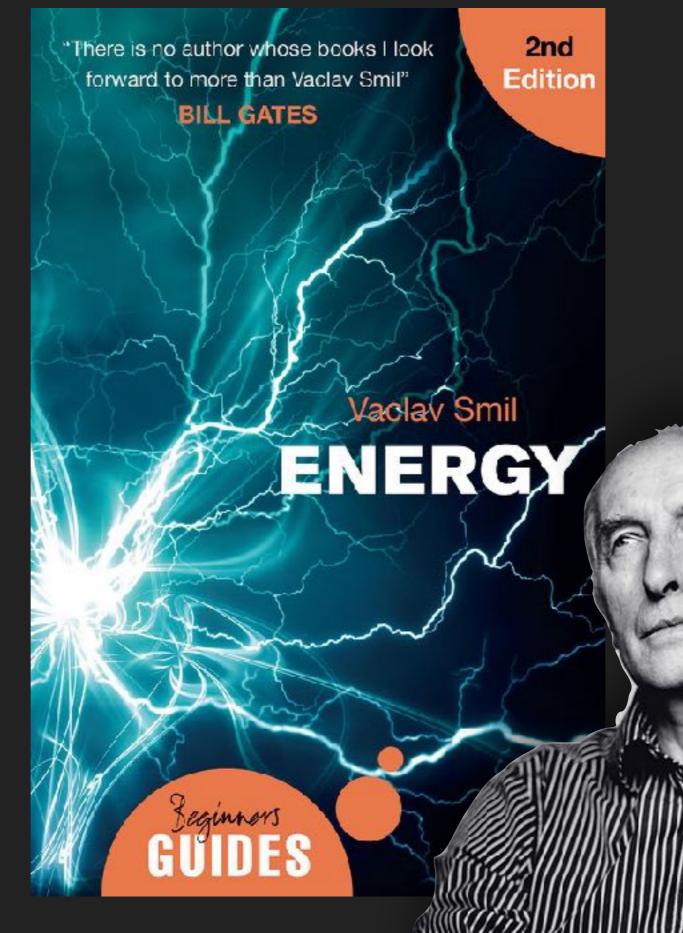
https://flowcharts.llnl.gov/

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https://www.otherlab.com/blog-posts/us-energy-flow-super-sankey http://energyliteracy.com/

## **COURSE TEXT**



More here: <u>https://www.fddrsn.net/teaching/energy/resources</u>



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