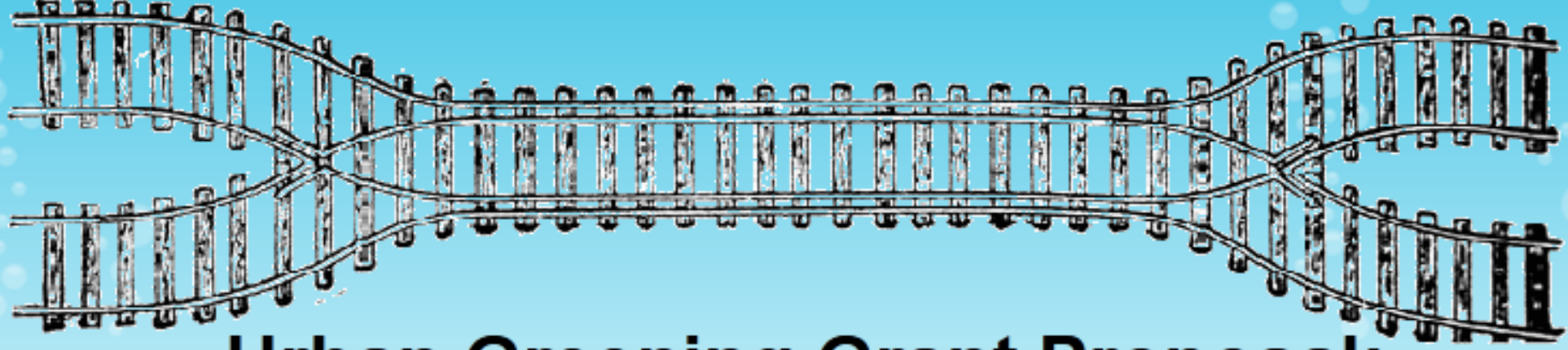

Urban Greening Grant Proposal:

Heat Energy via SEPTA Regional Rail

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Background, History of SEPTA, and the Significance of Sustainability to SEPTA

- Public transportation company created by Pennsylvania state charter on August 17, 1963
- In 2008, there were 35,454,000 riders
- 117 Bus Routes
- 8 Trolley (light rail) Lines
- 3 Trackless Trolley Routes
- 2 Subway/Elevated (heavy rail) Lines
- 1 Interurban High-Speed Line (heavy rail)
- 13 Regional Railroad (commuter rail) Lines

What is Sustainability for SEPTA?

"Sustainability is more than just 'going green.' It is a key component of our comprehensive corporate strategy as well as our regional responsibility. Sustainability, in short, is central to everything we do."

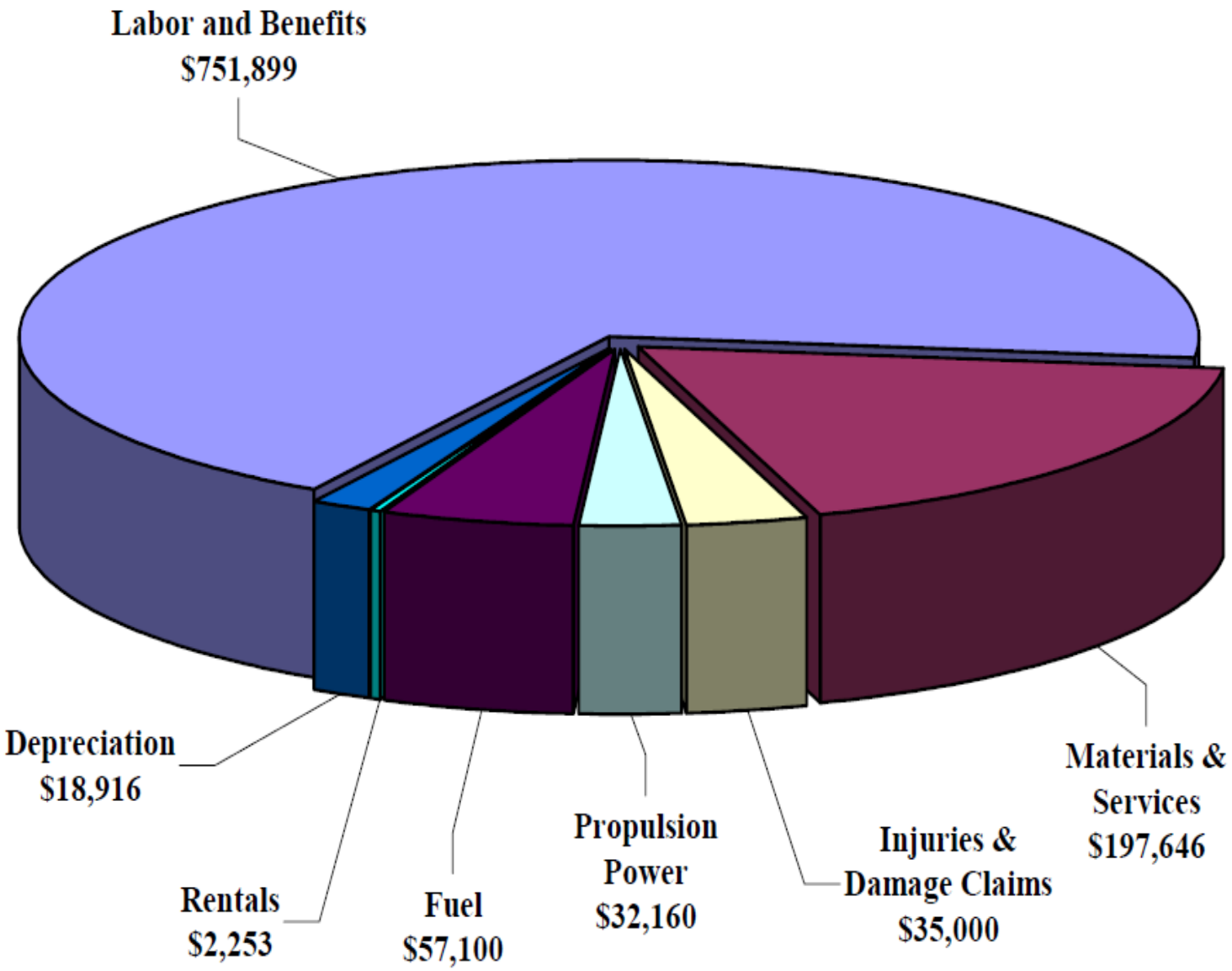
ps/pdf/click-map.pdf

SEPTA Statistics*

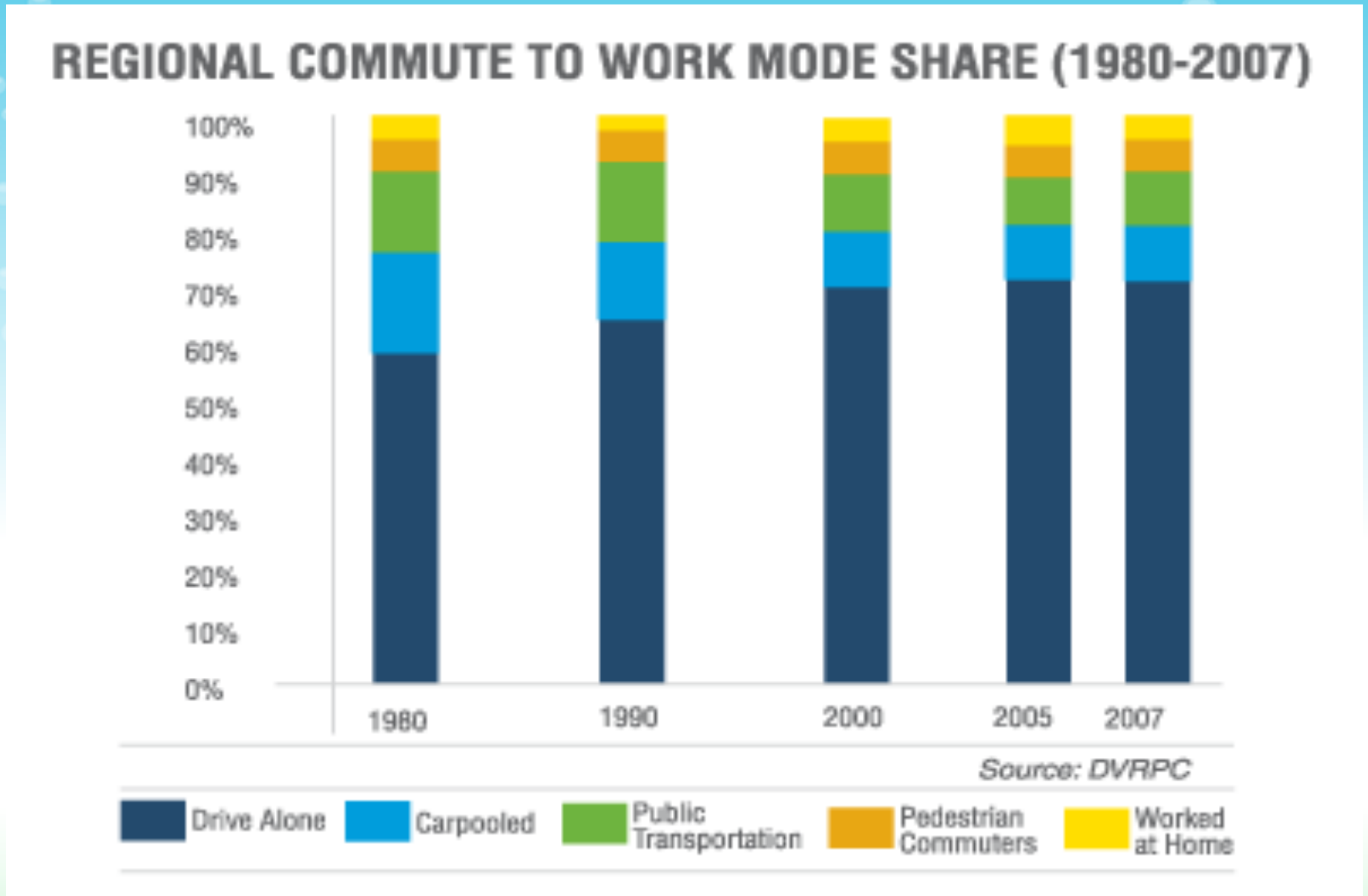
- Annual Unlinked Trips 325 Million
- Annual Passenger Miles 1.46 Billion
- Annual Vehicle Revenue Miles 93.7 Million
- Revenue Vehicles 2,668
- Fixed Routes 144
- Stations 280

*2008 figures

Total Equity: about $3 million
Revenue from passengers: About $390,000
Subsidies: about $640,000
Operating expenses: about $1,094,000 (detailed on next slide)



TOTAL EXPENSES = $ 1,094,974



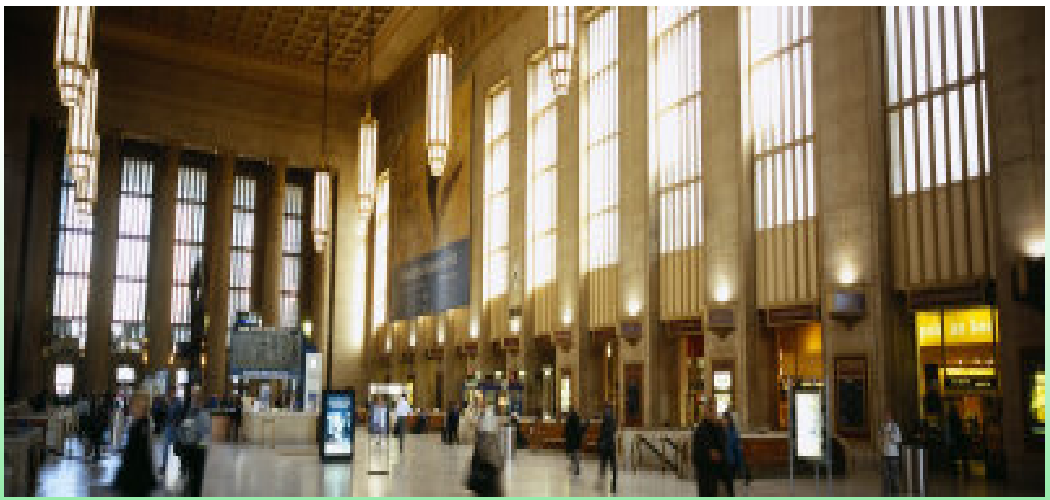
SEPTA's Goal for 2015 :

Reduce and Air Pollution & Energy use by 10%

Goals

In this project, we hope to create an alternative way of capturing energy by taking advantage of the SEPTA station's range and mass.

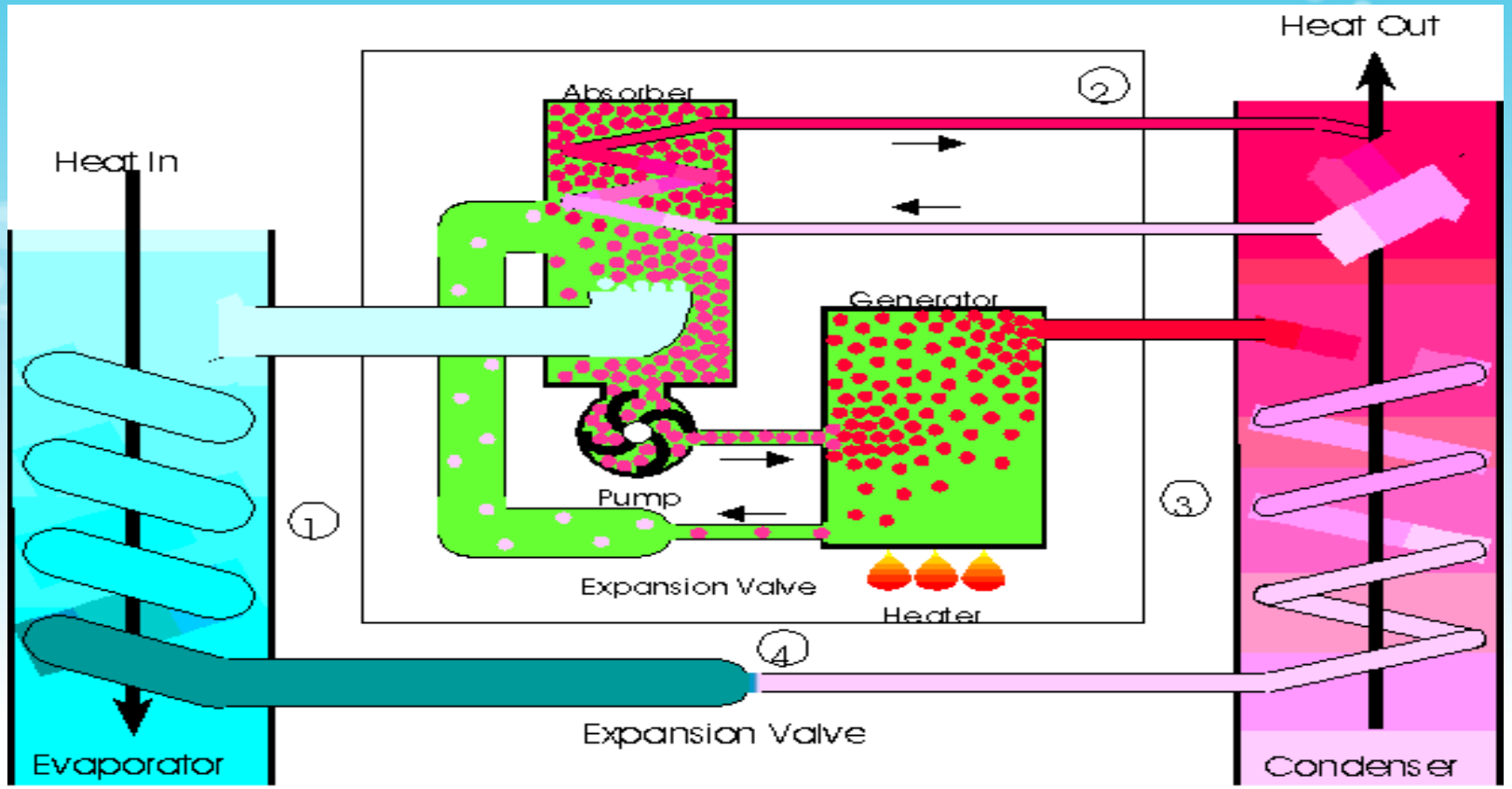
We are proposing the use of excess heat given off by indoor shops at stations, the trains' machinery, and from human heat to power surrounding buildings or stations themselves. In doing so, the public will benefit and SEPTA can reserve energy and costs.



Benefits of Installing Heat-Absorbing Vents:

- Constant sources of energy
- Reduces emissions of CO_2
- Reduce consumption of energy
- Reduce costs for SEPTA and home/building owners

http://thecareyadventures.com/blog/2009/photo-of-the-day-waiting-d-travis-north/



How it works:

To transfer heat from one building, given off by a crowd of people (and shops), the excess heat is converted into hot water.

Hot water is then pumped into the nearby heating system of a nearby building, and then that heat can be transfered to other buildings or cold stations.

Limits

- Effectiveness depends on location.
- Needs a large body of people who use the station constantly.
- The building heated from body heat must be close to the station.

Stockholm Central Station, Sweden

- 250,000 people pass through everyday.
- Excess heat goes through vents.
- Converted heat goes to office building across the street.
- Only cost $30,000.
- Saves 20-25% of heating bill annually.

http://en.wikipedia.org/wiki/Stockholm_Central_Station

Mall of America

" Green Before its Time"

- Been environmentally friendly since opening in 1992
- Incorporated elements: passive solar heating, an extensive recycling program, and 30,000 live plants act as natural air purifiers
- The Mall <u>does not use a central heating system!</u>
  - Comfortable 70 degrees is maintained with 1.2 miles of skylights for solar energy, residual heat from light fixtures and **body heat from more than 40 million annual visitors**. "

How does these two help us?

- Having vents placed inside stations with excess heat is possible
  - The indoor food shops area of the *Frankford Transportation Center* is an example of a potentially good source of body heat enegry

Helsinki, Finland

- Excess heat is absorbed from the data center (which is located under the Uspenksi Cathedral)
- Heats up to 500 homes
- Prevents data center from overheating
- Equals energy of one large wind turbine

How does this help us?

- Using the trains' excess heat is possible
- Heat can be forwarded to nearby buildings
  - Or to colder stations
- The produced energy could heat up more than a few surrounding buildings, cutting down their energy costs

Potential Site: 30th & Market Station

http://www.subwaynut.com/septa/30th/index.html

Estimation of Cost/Figures

Materials

- Ventilation for heat absorption
- Ventilation for heat absorption from machinery
- Heat converters

Vents (for 10)	$300,000
Heat converter	At least $5000
Man Power/Labor Cost	Depends on the company
Assessors	$5000 or less (Hopefully volunteers!)
Total cost	Approximately: $600,000

Process

- Obtain cooperation of SEPTA
  - Their sustainability office has listed goals which include:
    - "Implement wayside energy storage systems"
    - "Take advantage of natural lighting and ventilation"
- Hire surveyors to assess stations and trains for suitability
- Install ventilation system in approved stations
- Install system in approved trains

Assessments

Stations like 30th and Market Street are enclosed and full of people all the time, which makes them suitable for this program. However, other stations with little warmth simply cannot produce enough heat to be claimed as "excess."

Therefore, each station would have to be assessed individually to see if it is compatible. The same goes for all SEPTA trains.

Projected time to complete: 2-3 years.

Impact/Purpose/Hopes

What Will Happen Upon Completion, the Future

We will be taking advantage of a nearly abundant resource, there is no runoff or waste product from body heat. With the population increase, it seems a very sustainable resource.

Projected savings for SEPTA if *fully* implemented: Over $250,000/yr!

Thank You For Your Attention

Questions, comments, or concerns welcome!