MEASURING RETURN ON CAPITAL INVESTMENTS- NEW EFFORTS AT THE CITY OF BOSTON

PRESENTED BY:

MARK MELNIK

DEPUTY DIRECTOR FOR RESEARCH

BOSTON REDEVELOPMENT AUTHORITY

Presentation Overview

- Discuss new ways the BRA and COB are measuring return on investment for capital projects
  - Tracking and projecting
    - The City's efforts in managing and tracking ARRA investments
      - Sustainable Return on Investment (SROI) project
      - Dorchester Ave Analysis
  - Policy and strategic investment decisions
    - Current USDN Project
      - Triple Bottom Line Calculator

American Recovery and Reinvestment Act

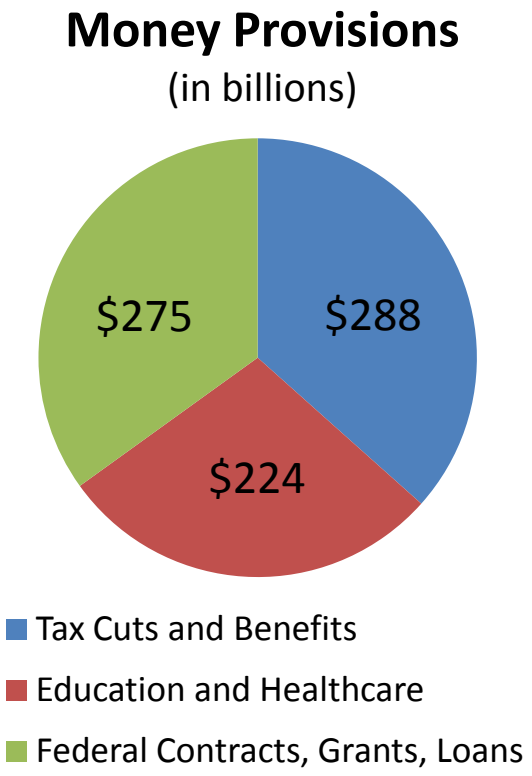
The American Recovery and Reinvestment Act of 2009 had two primary purposes:

- Near-term **economic stimulus** and **job creation**
- Investments in infrastructure and innovation to generate longer-term **productivity** and **energy efficiency**

American Recovery and Reinvestment Act

Provisions of the Act

- Create new jobs as well as save existing ones
- Spur economic activity and invest in long-term economic growth
- Foster unprecedented levels of accountability and transparency in government spending.

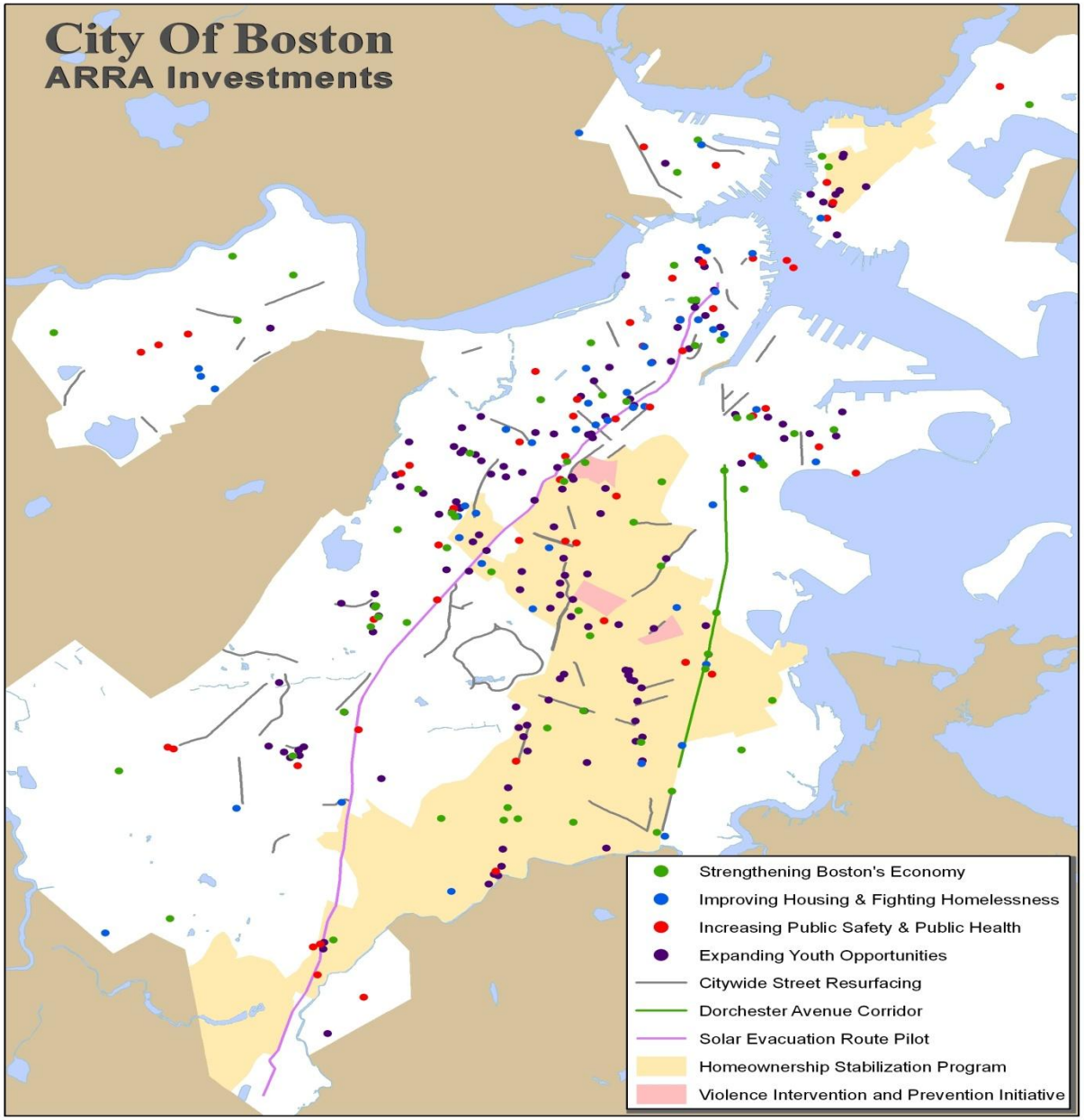


Source: http://www.recovery.gov/About/Pages/The_Act.aspx

ARRA in Boston Overview

Objective	Examples
Strengthening Boston's Economy (Creating New Jobs)	•Transportation Infrastructure Investments •Broadband Technologies Opportunities Program •Job Training Disadvantaged and Dislocated Adults
Improving Housing and Fighting Homelessness	•Public Housing Modernization •Stabilizing Neighborhood Community •Homelessness Prevention and Rapid Re-Housing
Expanding Youth Opportunities	•Title1 •IDEA •Summer and Year-Round Jobs
Greening the City	•Renew Boston •Solar Market Transformation Pilot
Increasing Public Safety and Public Health	•Community Orienting Policing Services •Boston Senior Health and Nutrition

ARRA In Boston Overview



ARRA Funding by City Department

Department	Projects	Investment
Boston Fire Department	1	$1,384,000
Boston Housing Authority	17	$70,106,821
Boston Police Department	4	$17,530,000
Boston Public Health Commission	1	$602,290
Boston Public Schools	5	$86,108,401
Boston Redevelopment Authority	2	$27,620,000
Boston Transportation Department	5	$43,062,524
Boston Youth Opportunity	1	$249,980
Department of Neighborhood Development	6	$26,934,151
Elderly Commission	2	$347,211
Emergency Preparedness	1	$1,259,820
Energy and Environmental Block Grant	11	$7,503,020
Jobs and Community Services	2	$4,400,000
Management Information Systems	1	$1,900,000
Administration and Finance	1	20,000,000
TOTAL	**60**	**$309,008,218**

Sustainability Analysis

The sustainability analysis focused on:

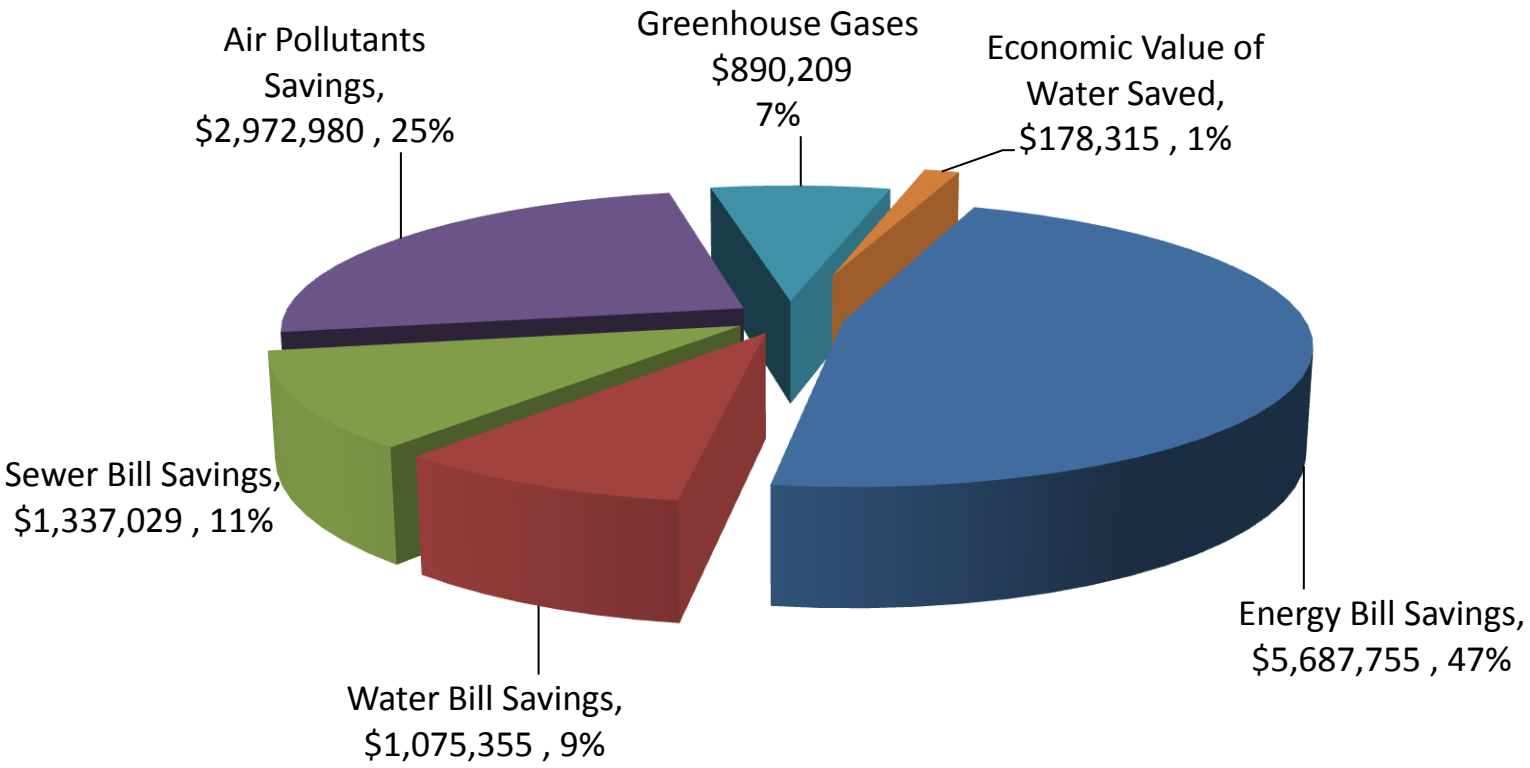
- Energy and Environmental Department (EE)
- Boston Transportation Department (BTD) and Public Works (PW)
- Department of Neighborhood Development (DND)
- Boston Housing Authority (BHA)

Sustainable Return on Investment (SROI)

Direct sustainability benefits are estimated to be substantial over time, with annual benefits in 2015 of:

- 34.4 million fewer kWh of electricity consumed
- 277,000 reduction of therms of gas used
- 23,750 HCF (hundreds of cubic feet) of water preserved
- 25,150 fewer tons of greenhouse gas emissions (CO_2)

Annual Energy and Environmental Benefits and Cost Savings in 2015



Sustainable Return on Investment Results

Department	Net Present Value	Discounted Payback Period (Years)	Internal Rate of Return	Benefit-Cost Ratio
EE	$ 52,394,089	4	35%	3.0
BTD & PW	$ 111,398,447	4	38%	6.8
DND	$ 1,114,915	13	10%	1.6
BHA	$ 43,746,959	2	63%	9.2
TOTAL	**$ 208,654,409**	**5**	**38%**	**4.5**

- The aggregate Net Present Value (NPV) is over $208 million with a 4.5 discounted payback period of about 5 years
- Benefit-cost ratios are estimated to be greater than 1.0 for all departments evaluated, ranging from 1.6 to 9.2
- The total Internal Rate of Return (IRR) is estimated to be 38%

Economic Impact Results

	Boston	Massachusetts
Over project span of 4 years:		
Total Jobs (Direct, Indirect, and Induced)	2,126	2,861
Gross State Product (2009 dollars)	$ 174,253,457	$ 245,947,611
Personal Income (2009 dollars)	$ 66,111,927	$ 199,150,693
Total Output (2009 dollars)	$ 261,340,716	$ 460,247,615
Personal Consumption Expenditures (2009 dollars)	$ 39,043,480	$ 115,863,657
Total State Tax Revenue over 4 years (2009 dollars)	$ 3,439,645	$ 10,334,019

The economic impact of the $327.6 million investment[1] translates into:

- 2,126 direct, indirect and induced full-time equivalent (FTEs) jobs in Boston (includes 1,276 direct jobs)
- $174.3 million increase in Gross State Product
- $66.1 million of total personal income statewide

[1] SROI analysis of the $327.6 million investment includes $241.2 million from ARRA funds and $86.4 million from leveraged investments.

DOT Avenue Project

$16.5 million project upgrading Dorchester Avenue corridor:

- 4 major and 11 minor intersections along corridor
  - Improving sight lines for motorists/pedestrians
  - curb-control signage
  - re-timing of existing signals to improve traffic flow
  - improved bicycle and pedestrian accommodations
- No reduction to number of travel lanes
- Upgrades to major intersections, including Andrew Square, Glover's Corner, Fields Corner, and Peabody Square

Return on Investment: Boston Transportation Department – Dorchester Avenue

SROI	Expected	Notes
Annual Value of Benefits	$19,962,371	The total value of the benefits in the fifth year
Utility Savings	$1,855	Direct
Total Green House Gas Savings	$275,550	Externality
Total Criteria Air Contaminant Savings	$507,712	Externality
Travel Time Savings	$19,424,809	Congestion Relief
Accident Reduction Savings	$27,996	Congestion Relief
Net Present Value	$166,623,311	PV Benefits - PV All Costs
Return on Investment	28%	Arithmetic Average Rate of Return on Capital Investment
Discounted Payback Period	6	Time in years till positive discounted cash flow
Internal Rate of Return (%)	40%	Discount rate which would make NPV = 0
Benefit to Cost Ratio	9.3	PV Benefits / PV Costs

USDN Opportunity Grant-TBL Calculator Project

- The purpose of the model is to provide USDN members a tool to:
  - Help understand and be strategic about capital investments in their respective cities
  - Calculate the impact of strategic investment
  - Monetize the environmental and social benefits of capital investments

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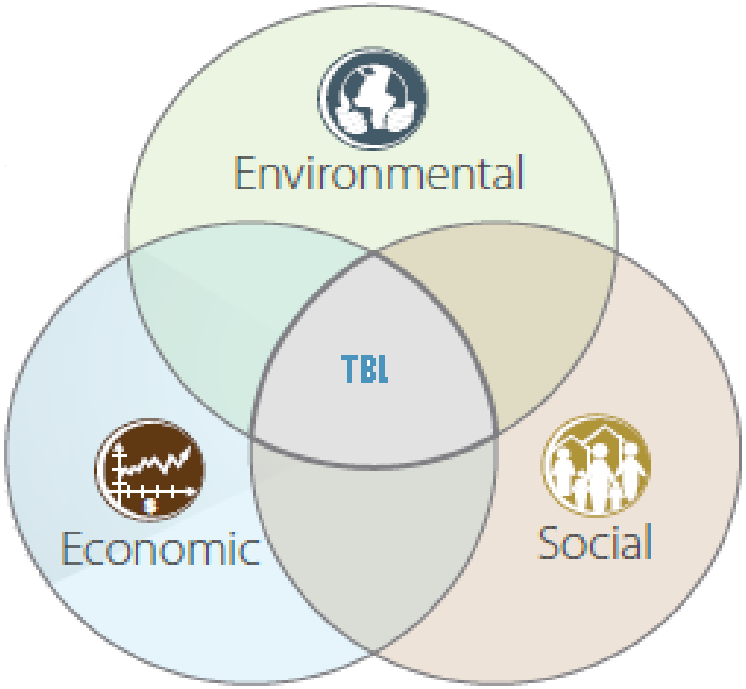
Overview-Development of TBL Calculator

Estimate the TBL --- economic, environmental, and social benefits of capital investments in the following categories:

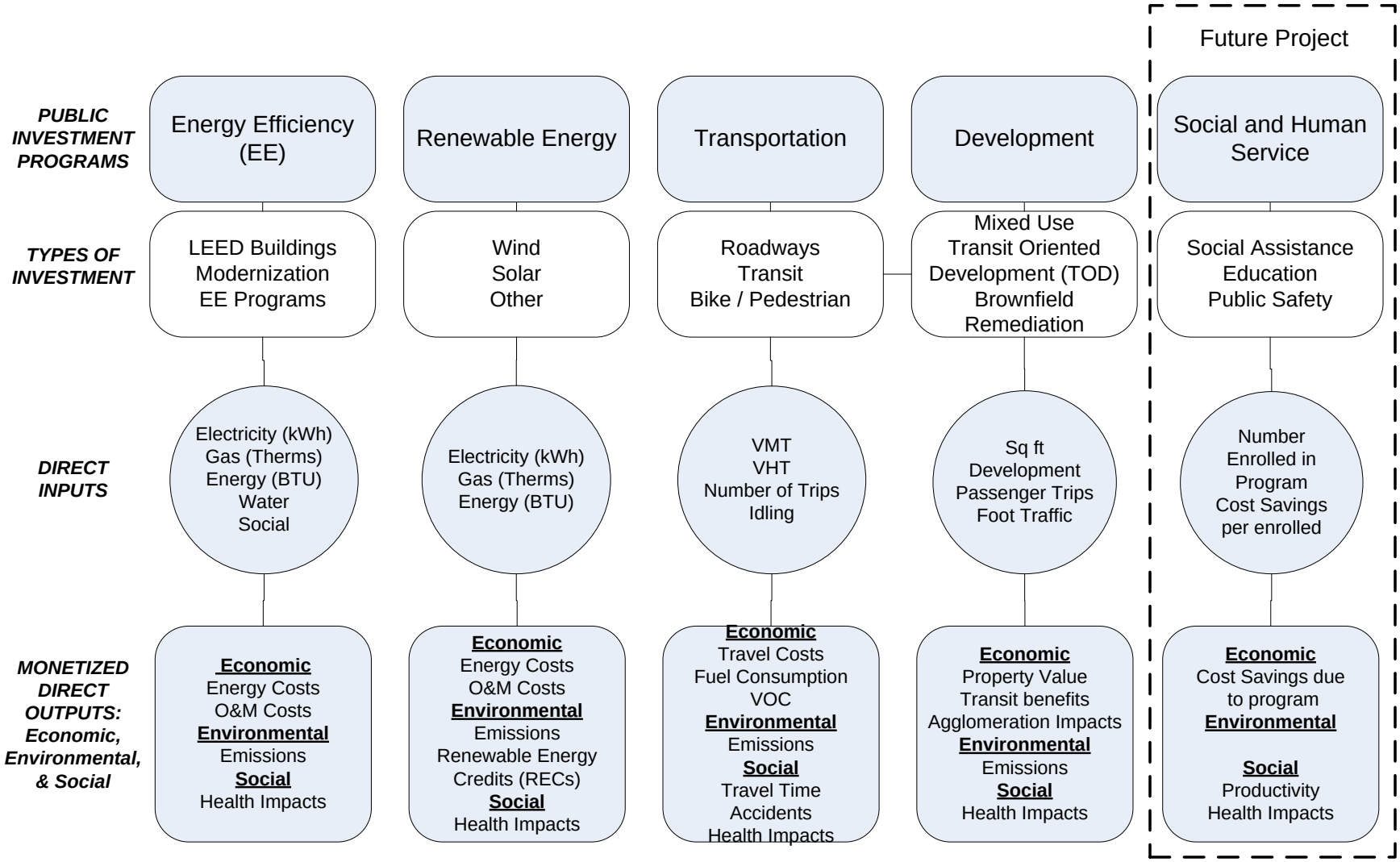
- **Energy Efficiency** - Investments and energy retrofit programs that reduce energy usage for infrastructure, municipal, commercial, and residential buildings.
- **Renewable Energy** - New renewable energy infrastructure including solar, wind, hydroelectric, and others.
- **Transportation** - Investments in roadways, public transit, bike/pedestrian infrastructure, and operations.
- **Development** - Mixed use and transit oriented development (TOD) projects will create more centralized development, reduce auto trips and travel, and increase foot traffic.

Analytical Framework

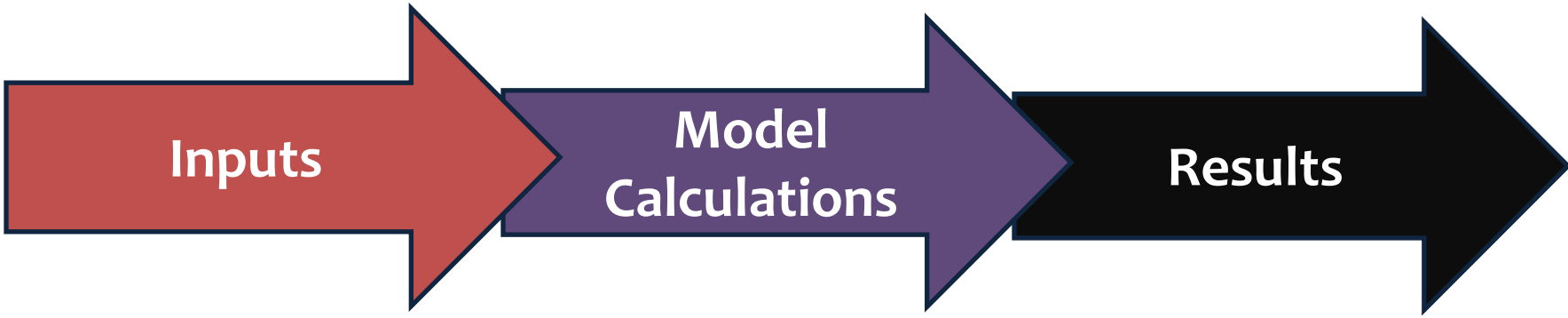
- Capital investments can have a combination of economic, environmental, and social impacts
- In some cases the impacts may be concentrated in only two of the three categories.



USDN Triple Bottom Line Model

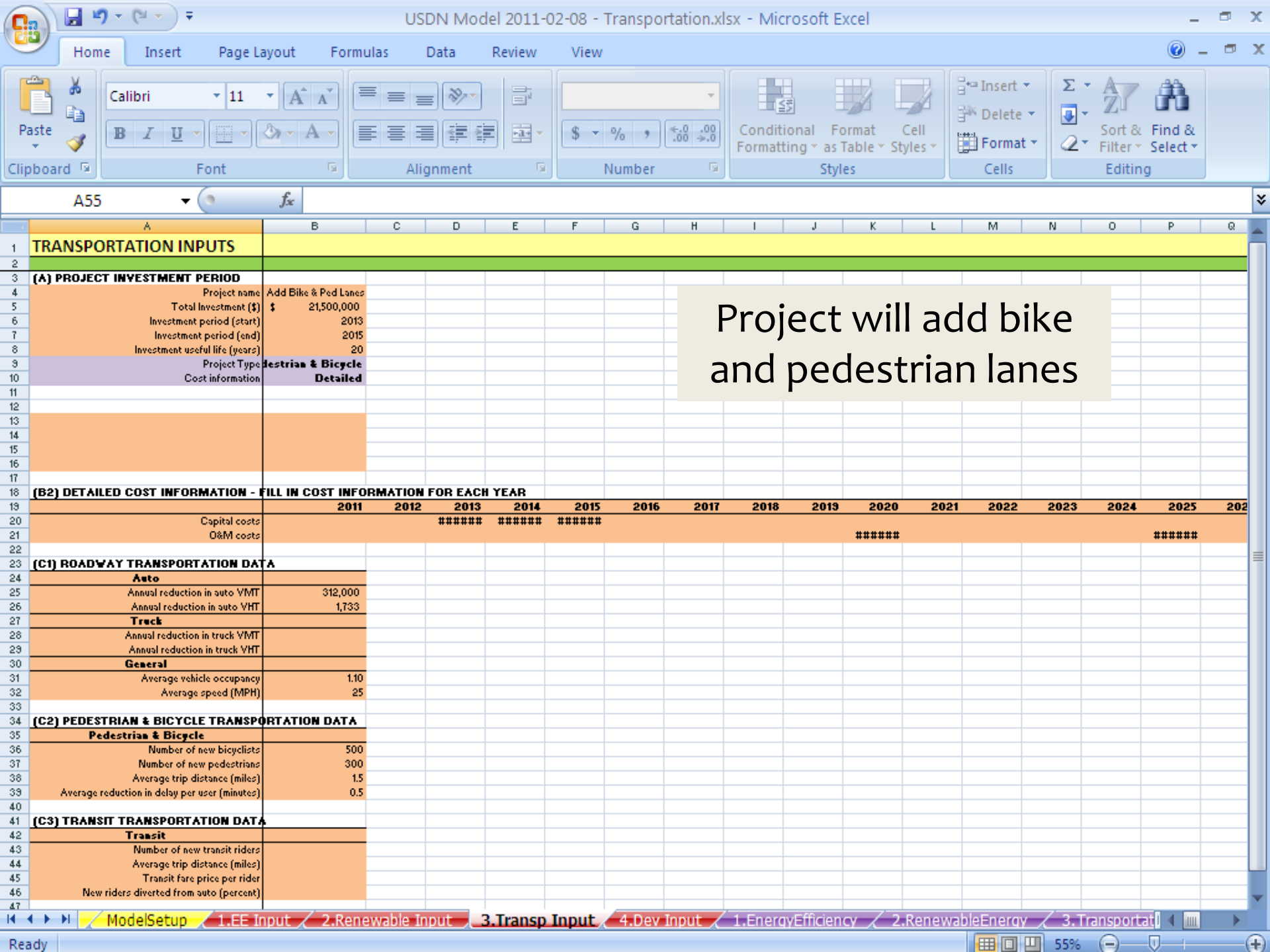


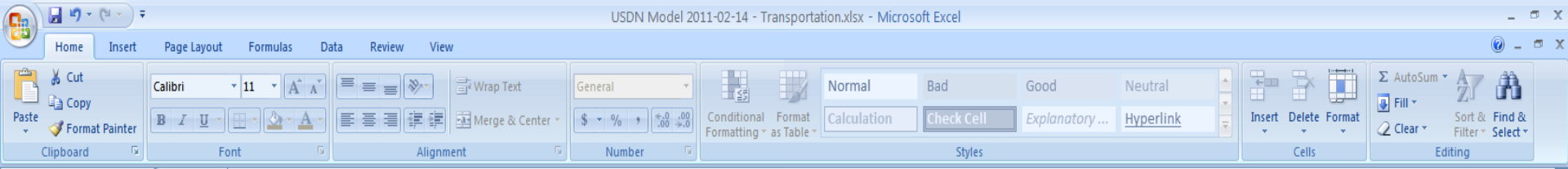
Triple Bottom Line Calculator



Examples:

- Total investments
- Investment period
- Electricity consumer
- Electricity cost differential
- Average vehicle occupancy
- Average office wage
- Annual value of benefits
- Return on investment
- Benefit to cost ratio


USDN Model 2011-02-08 - Transportation.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Paste
Clipboard
Calibri
11
Font
Alignment
Number
Conditional Formatting
Format as Table
Cell Styles
Styles
Insert
Delete
Format
Cells
Sort & Filter
Find & Select
Editing
A55
TRANSPORTATION INPUTS
(A) PROJECT INVESTMENT PERIOD
Project name Add Bike & Ped Lanes
Total Investment ($) $ 21,500,000
Investment period (start) 2013
Investment period (end) 2015
Investment useful life (years) 20
Project Type destrian & Bicycle
Cost information Detailed
(B2) DETAILED COST INFORMATION - FILL IN COST INFORMATION FOR EACH YEAR
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Capital costs ###### ###### ######
O&M costs ###### ######
(C1) ROADWAY TRANSPORTATION DATA
Auto
Annual reduction in auto VMT 312,000
Annual reduction in auto VHT 1,733
Truck
Annual reduction in truck VMT
Annual reduction in truck VHT
General
Average vehicle occupancy 1.10
Average speed (MPH) 25
(C2) PEDESTRIAN & BICYCLE TRANSPORTATION DATA
Pedestrian & Bicycle
Number of new bicyclists 500
Number of new pedestrians 300
Average trip distance (miles) 1.5
Average reduction in delay per user (minutes) 0.5
(C3) TRANSIT TRANSPORTATION DATA
Transit
Number of new transit riders
Average trip distance (miles)
Transit fare price per rider
New riders diverted from auto (percent)
Project will add bike and pedestrian lanes
ModelSetup
1.EE Input
2.Renewable Input
3.Transp Input
4.Dev Input
1.EnergyEfficiency
2.RenewableEnergy
3.Transportat
Ready
55%



A3: Annual Value of Benefits

Transportation Results

TBL Results 2020	Expected	Notes
Annual Value of Benefits	$59,667,019	The total value of the benefits in the 10th year
Time savings	$27,110	
Accidents	$1,256,711	
Vehicle O&M savings	$92,373	
Health benefits	$97,792	
Pavement maintenance	$312	
Congestion reduction	$17,416	
Total Green House Gas Savings	$17	Externality
Total Criteria Air Contaminant Savings	$1,349,688	Externality
Net Present Value	$9,872,918	PV Benefits - PV All Costs
Return on Investment	1%	Arithmetic Average Rate of Return on Capital Investment
Discounted Payback Period	2024	Time in years till positive discounted cash flow
Internal Rate of Return (%)	12%	Discount rate which would make NPV = 0
Benefit to Cost Ratio	1.43	PV Benefits / PV Costs

Transportation Benefits 2020	
NOX (Tons)	-
CO2 (Tons)	0.61
VOC (Tons)	669.91
PM (Tons)	0.22
SO2 (Tons)	0.03
Fuel (gallons)	12,416

Summary of the TBL Calculator

- With knowledge of a few key variables related to capital investments, it is possible to estimate key impacts, such as:
  - Energy savings
  - Water saving
  - Cost-Benefit Ratios
  - Payback periods
- This information can be used to help city decide how to strategically invest capital dollar or to help provide support for investment decisions.

CITY OF BOSTON
Thomas M. Menino
Mayor

Boston
Redevelopment
Authority
Peter Meade, *Director*

HDR