



EN 653/PS 611

Energy Policy Analysis

Framework for Policy Analysis
L3 (8th January 2019)



Framework

- Decisions
- Stakeholders
- Policies
- Goals
- Criteria
- Analysis



Energy Goals

- Increase Energy Access
 - Develop capacities for energy transitions
 - Enhance Energy Security
 - Manage Energy Related Market Power
 - Manage Energy Resource Endowments
- Reduce Environmental and Human Health Impacts
- Accelerate Energy related Technological change
- Co-ordinate and implement international energy related policies



Deciding Energy Policies

Scope

- IIT Campus
- Powai
- Village
- Block
- Mumbai
- Maharashtra
- India
- Global

Elements

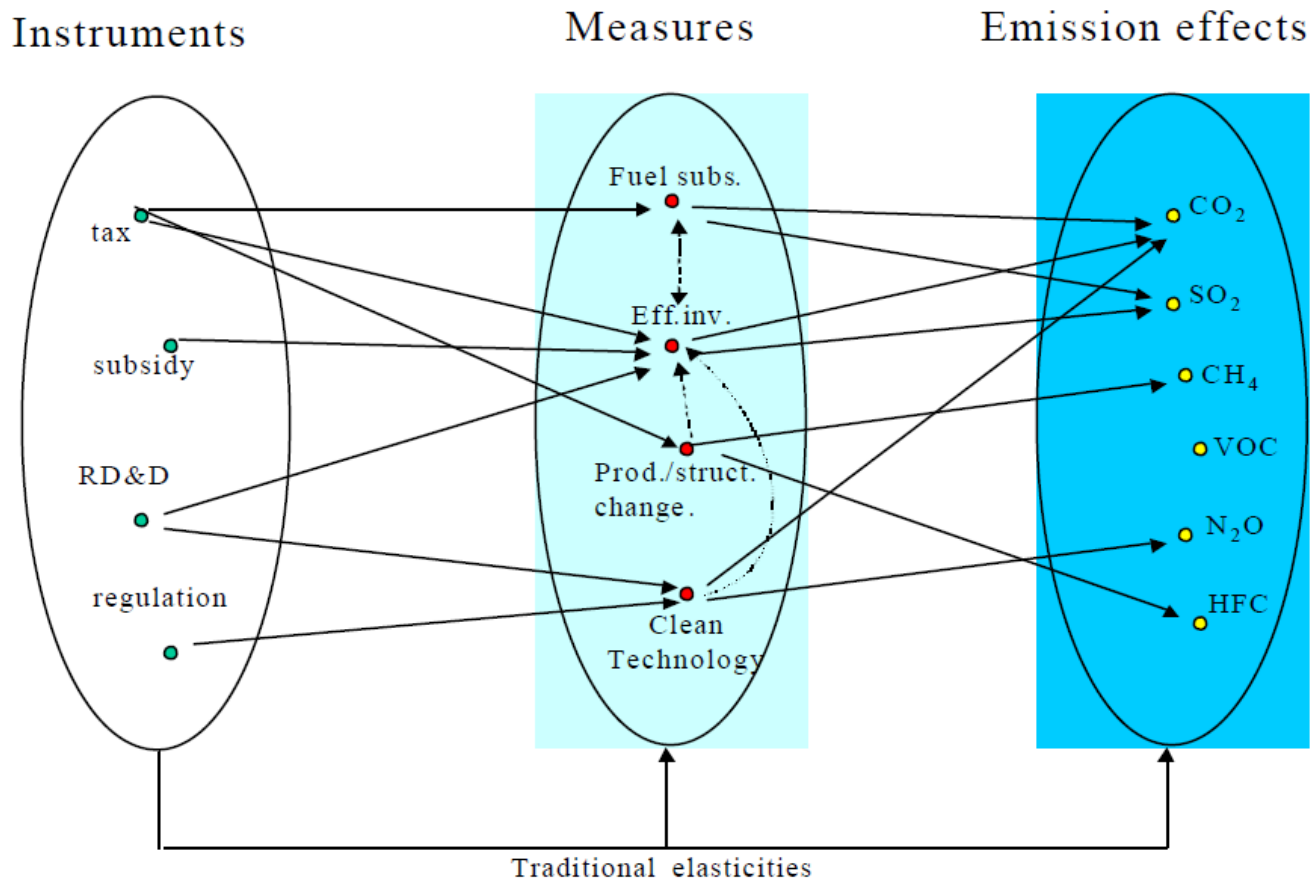
- Decide Goals
- List out Policy instruments
- List out challenges
- Existing Institutions and roles
- Time Horizon
- Analytical framework



Classification of policy Instruments

- Regulating instruments
 - Rationing – emission quotas, mandatory technology
 - Performance standards, benchmarks
- Implied Deregulation-
 - Emission Permit Trading, Green Certificates
 - Voluntary Agreements
- Fiscal and Financial Instruments- Taxes, subsidies or grants
- Supportive Actions
 - Improvement knowledge, market transparency
 - Dissemination
 - Reduce Transaction costs

Impact of Policy Instruments



Perrels, IPCC, 2001



India -Policy Documents

- Five Year Plans
- Integrated Energy Policy, 2008
- National Action Plan on Climate Change – JNNSM and NMEEE
- Electricity Regulation Commission Act 1998
- Electricity Act 2003
- UMPP 2005
- Rural Electrification Policy 2006
- INDC 2015



Policy options

- Market or Government (Mandate/ Legislate)
- Regulation
 - Energy Access
 - Renewable Energy
 - Energy Efficiency
 - Nuclear Energy
 - Pricing/ Taxes/Subsidies



Criteria to Analyse Policy

- Effectiveness
- Economic efficiency
- Administrative feasibility
- Equity
- Political acceptability
- Policy robustness
- Policy consistency

(Source GEA Chapter 22)



Typical Energy Decisions

- World- International agreements – GHG, CFC
- Nation- Energy policy, pricing, technology development
- State – Taxes/Incentives, fund allocation to districts
- District – Fund Allocation to blocks, Mouza electrification, Industrial devpt., Coal – elect., fuel / ration shops Sanctions.
- Block– Fund Allocation to GPs, Kerosene allocation, industry promotion, marketing support.
- Gram Panchayat – Agriculture / irrigation schemes, Co-op industry, request for fuel/ration shop, electricity.
- Household – Fuel choice, Device choice.



Tutorial 1- Framework for policy

In each of the following examples from your IIT life – describe a framework for policy formulation, analysis. Specify the stakeholders, policy goals, criteria, institutions, type of analysis. Comment on the existing policies vis-à-vis different stakeholders (Be as specific as possible)

IITB Themes/ topics

- Mood Indigo/ Techfest
- Student Technical Teams for International Competitions at IIT Bombay
- Student Exchanges at IIT Bombay
- Mess operation in the hostel
- Seminar/ Project Allotment
- Campus Placement for Jobs/ Internships
- New student admission, accommodation, orientation
- Course Policies

Additionally please feel free to add new topics related to your life at IIT Bombay



MI/TF Review

Meeting No.	Date	Ve
1*	07 Jan 15	DI
2	15-Jan 15	De
3	30-Jan-15	Co
4	16-Feb-15	Ho
5	16-Mar-15	Co
6*	14-Apr-15	Go
7*	29-Apr-15	DI
8	15-Jun-15	DI

Online survey through
LDAP login
706 students
146 faculty
70 staff

MI/TF REview

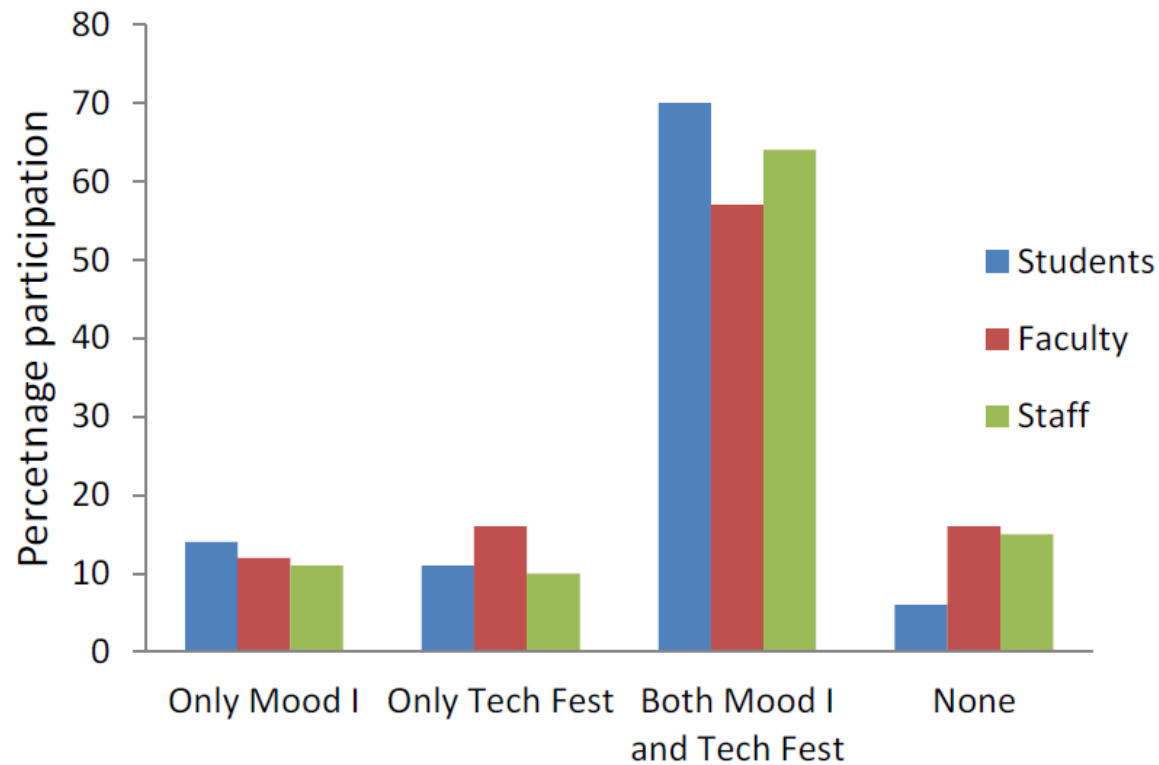
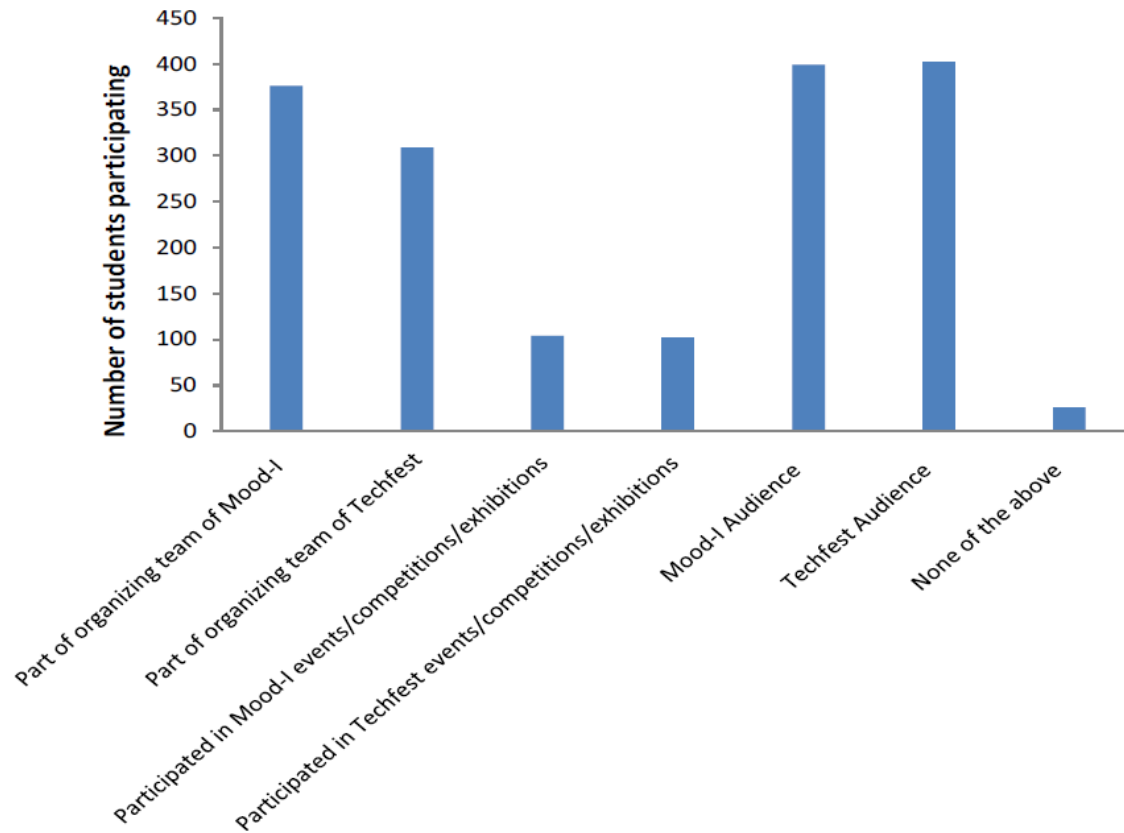


Fig. 4 Comparative participation trends



MI/TF Review



MI/TF Review

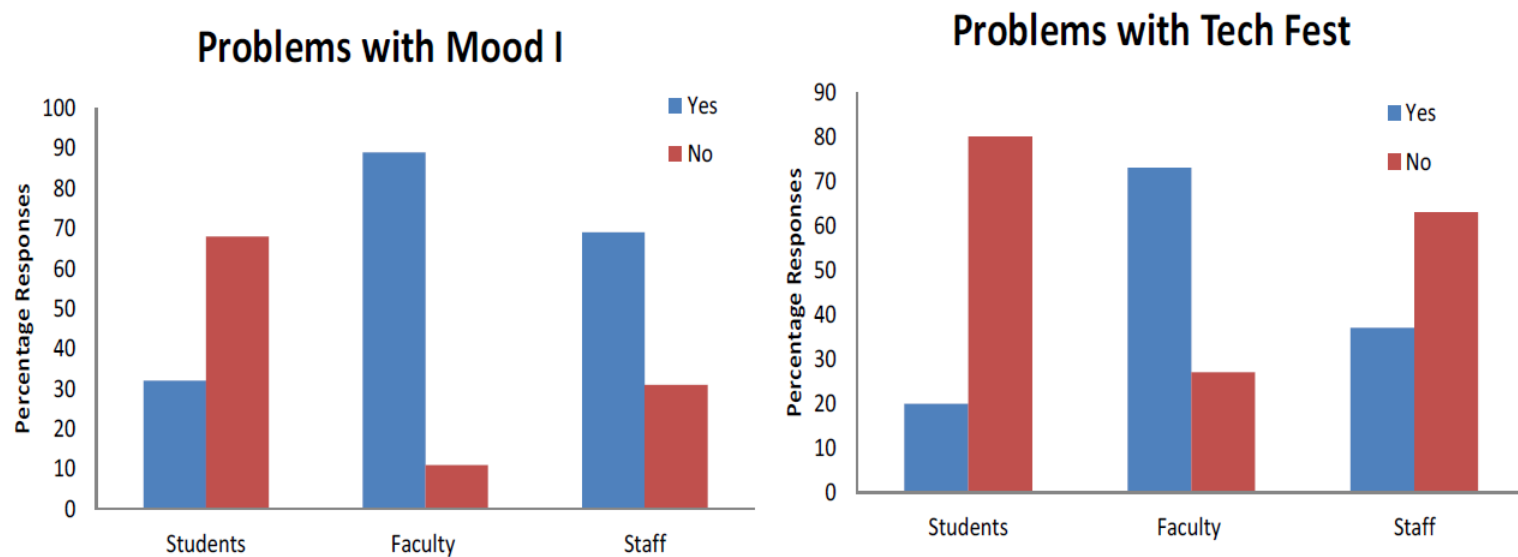


Fig. 6 Problems faced due to Mood I and Techfest

MI/TF Review

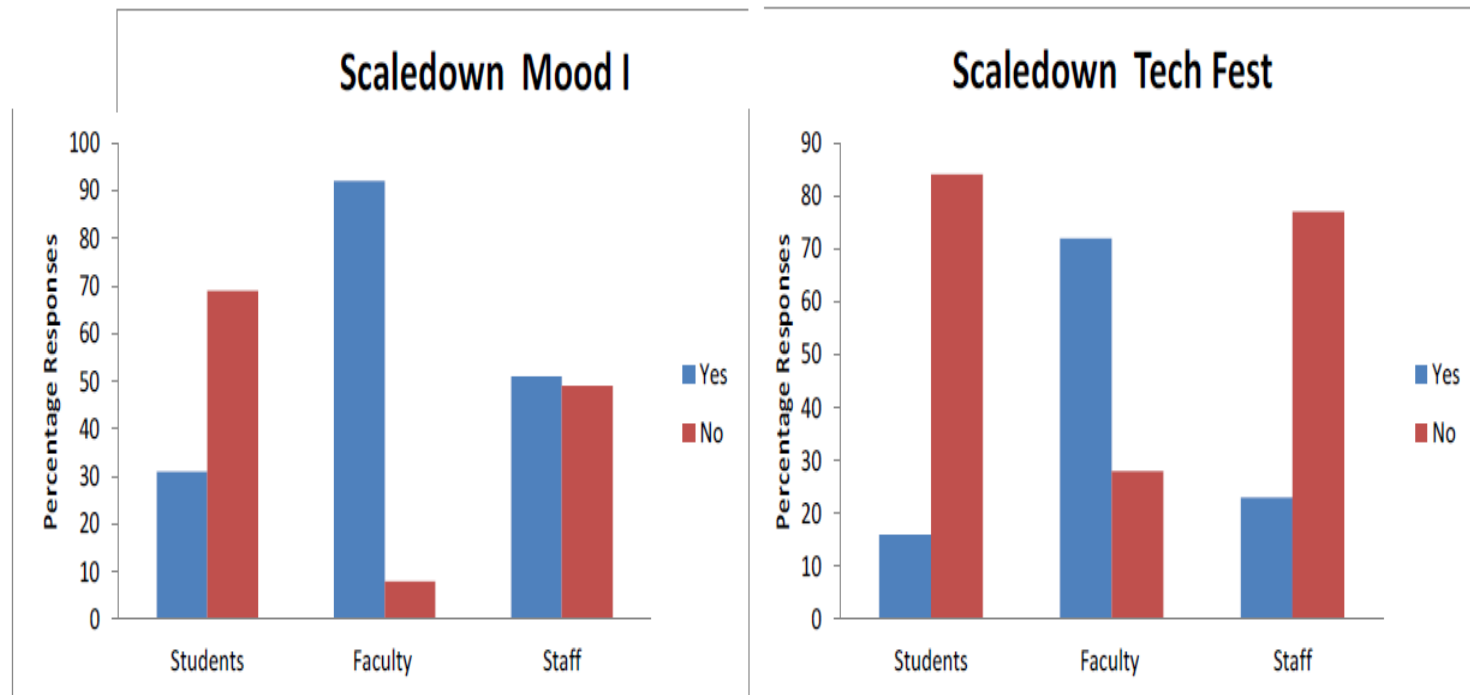


Fig. 7 Scaling down Mood I and Techfest

Odd Even Scheme

Installed in Delhi during Jan 1-15, 2016

Odd vehicles on odd dates and even on others

EPIC, UChicago and Harvard

TERI studies

- Goal: To improve air quality in Delhi during winter
- Stakeholders – Urban residents
Commuters
Vehicle Manufacturers
Taxis
Public Transport
Offices, Commercial
Police
- Mandate- Command and Control



Policy Framework

- Institution- Delhi Government
Police
CPCB
- Analysis – Changes in number of vehicles, PM2.5 levels at different locations, Inconvenience



Odd - Even

Table : Snapshot of Delhi's Odd – even traffic experiment

Issues	Phase I	Phase II
Effective period	January 1-15 , 2016	April 15 – 30, 2016
Duration	15 days	16 days
Period	8 am to 8 pm	8 am to 8 pm
Days applicable	Monday to Saturday	Monday to Saturday
Sundays	No restrictions	



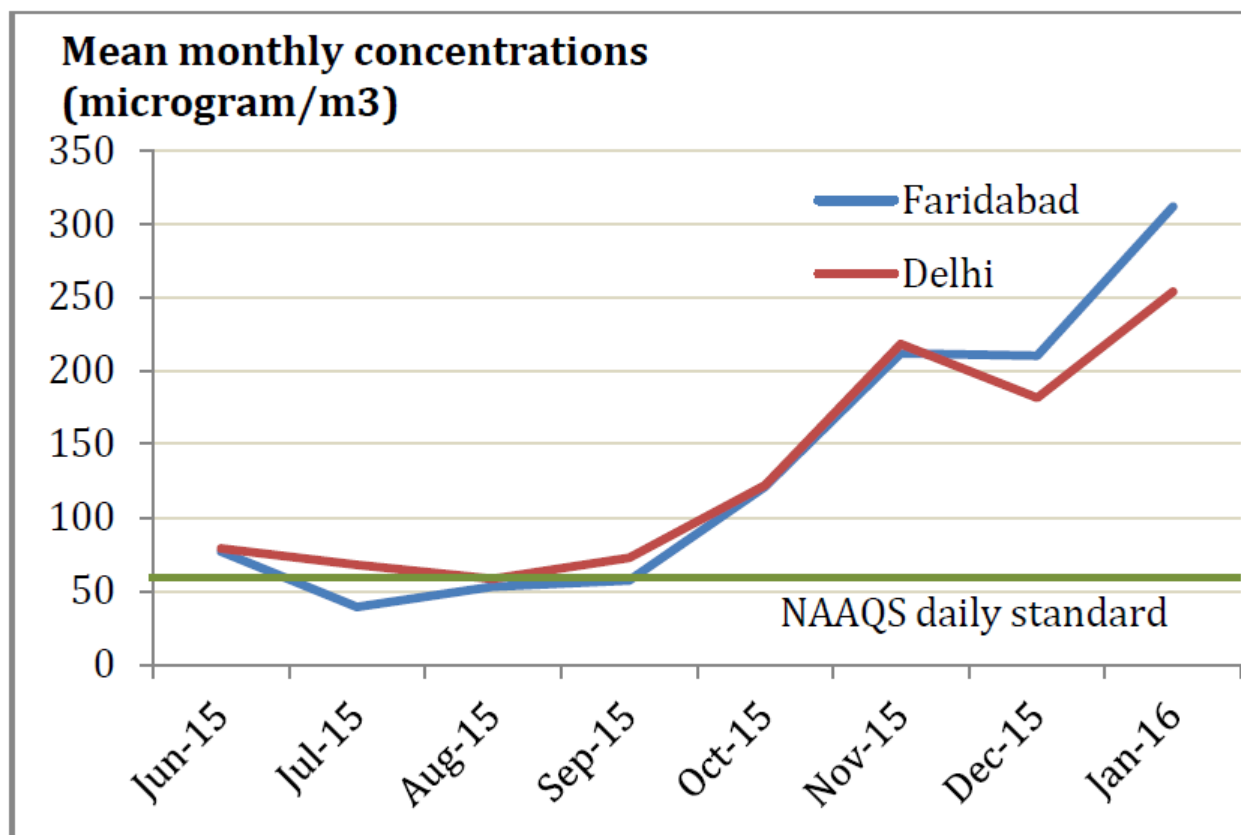
Differential analysis

	Before Program	After Program	Change during the time where program is implemented
Area with program	B1	A1	$(A1-B1)$
Area without program	B2	A2	$(A2-B2)$

Change due to program in the area where program is implemented	$(A1-B1) - (A2-B2)$
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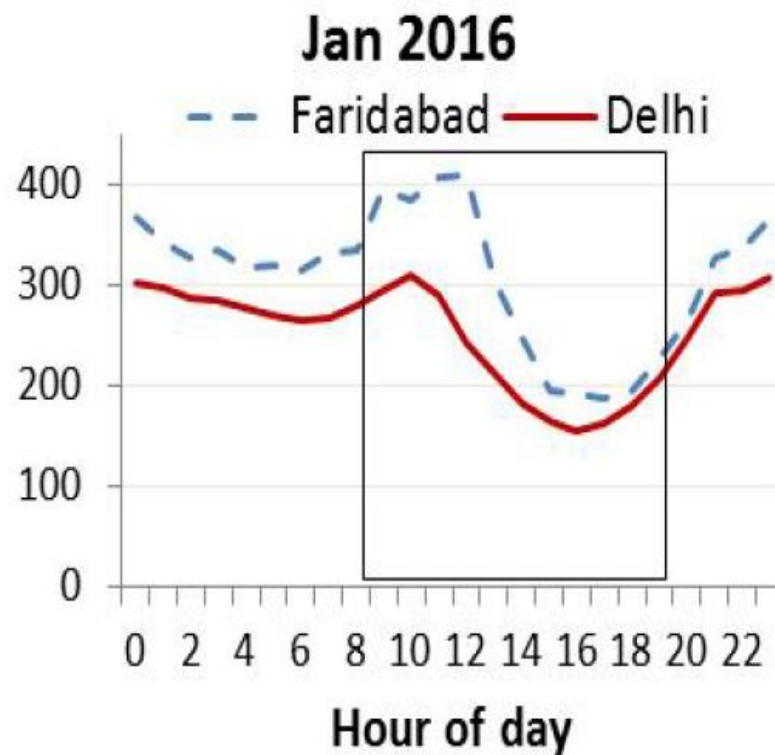
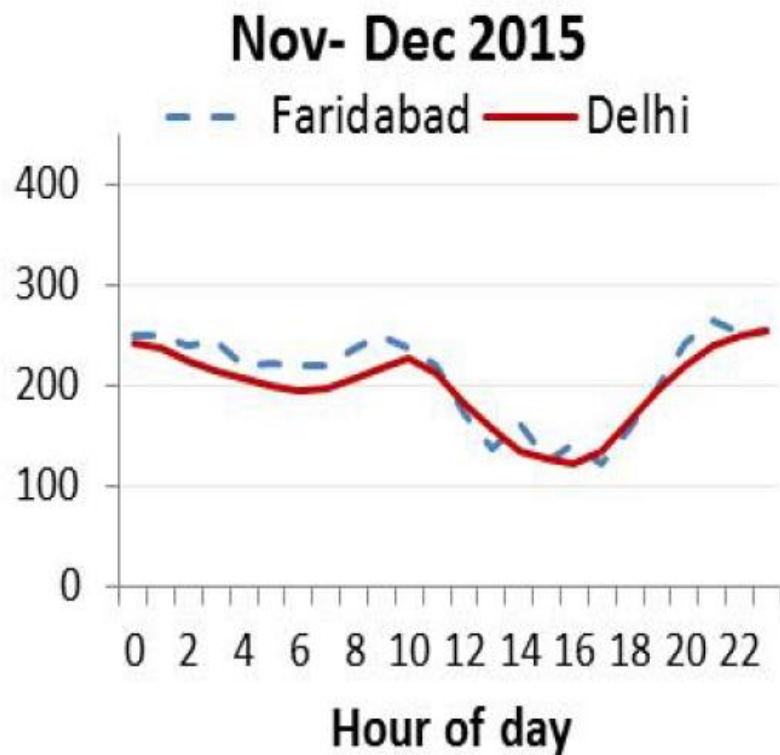
EPIC study

Comparative data



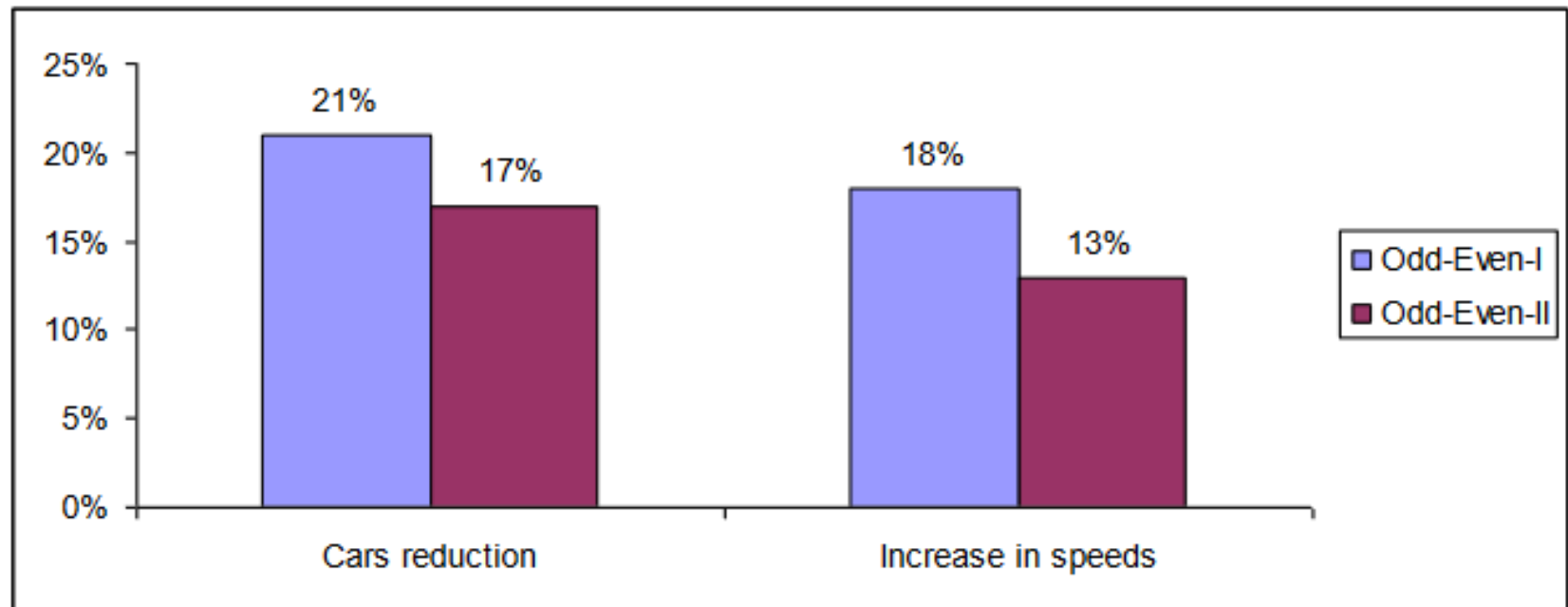
EPIC study

Comparative data PM2.5



EPIC study

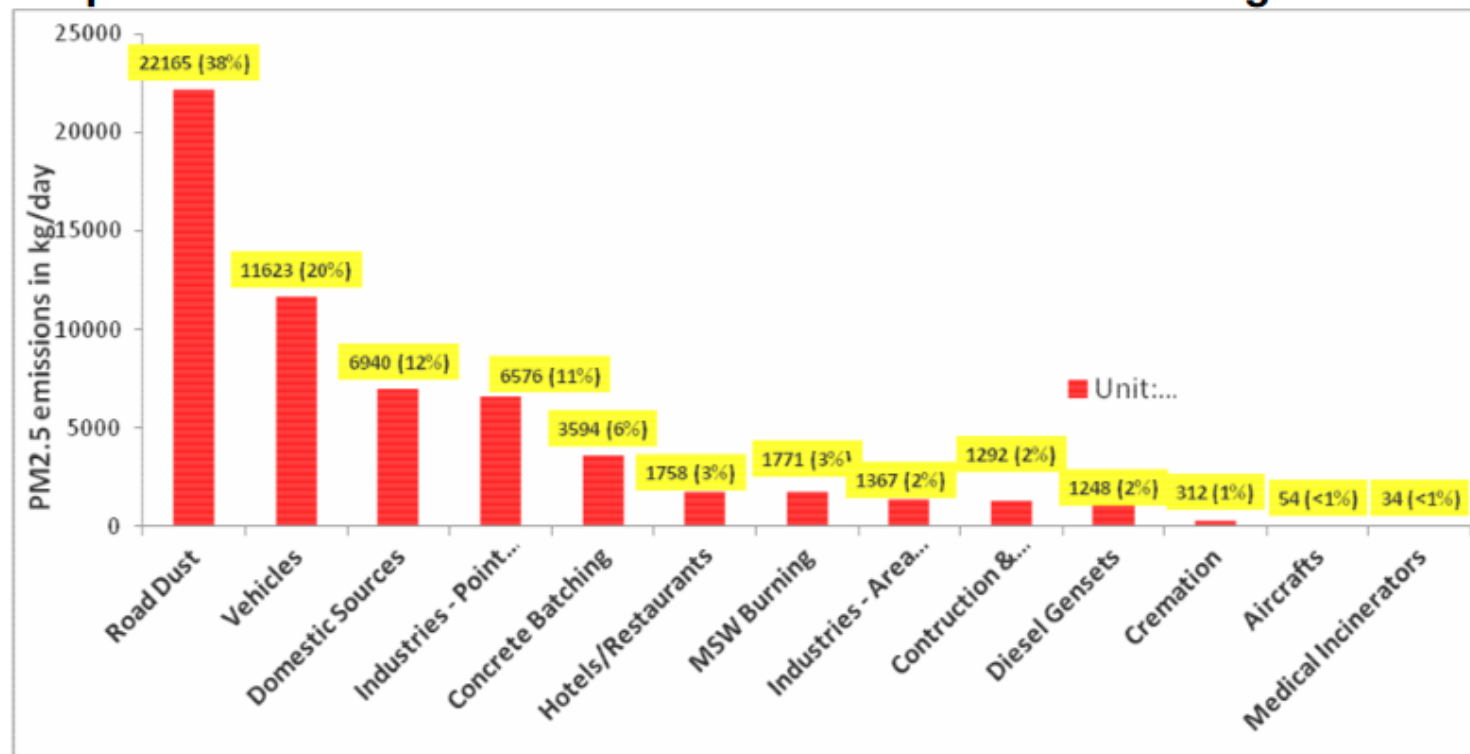
Delhi- Phase 1, 2 comparison



TERI study

Source Apportionment

Graph 5: Sources of PM2.5 in Delhi: Vehicles are second highest



Source: IIT Kanpur's Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi (Draft Report: Air Pollution)

Travel Delays

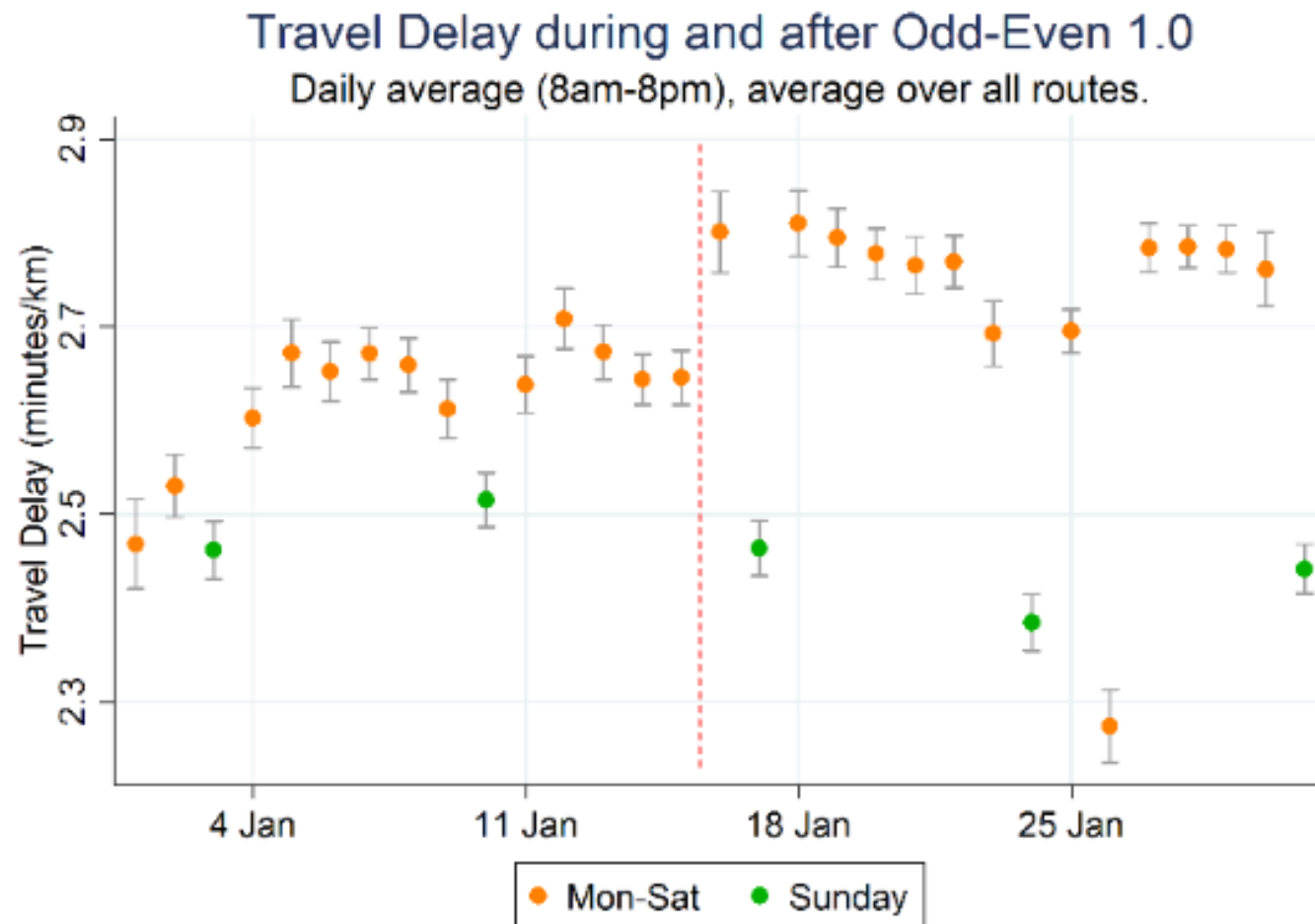


Table 2. Driver Survey Descriptive Statistics

	(1)	(2)	(3)
	Mean	Observations that satisfy condition	Total Observations
<i>Panel A. Number of Respondents</i>			
<i>Respondents reached during phone surveys</i>		956	
<i>Phone surveys</i>		4178	
<i>Panel B. Demographics</i>			
<i>Age</i>			
18-29 years old	41.5%	397	956
30-49 years old	53.6%	512	956
over 50 years old	4.9%	47	956
College degree	69.4%	663	956
<i>Occupation</i>			
Private employment	39.0%	373	956
Self-employed	41.8%	400	956
Government employee	6.0%	57	956
Student	8.3%	79	956
Other	3.9%	37	956
<i>Panel C. Vehicle ownership</i>			
Primary car has odd license plate	48.8%	467	956
Primary car age (years)	5.2	-	312
Household has another car	33.6%	321	956
Household has motorcycle	52.0%	496	953
Believes Odd-Even policy is good or very good for Delhi	69%	381	554

Table Notes. This table reports sample descriptive statistics from the baseline (recruiting) survey and the follow-up (phone) survey. More detailed information on response rates is available in Appendix Table 3.

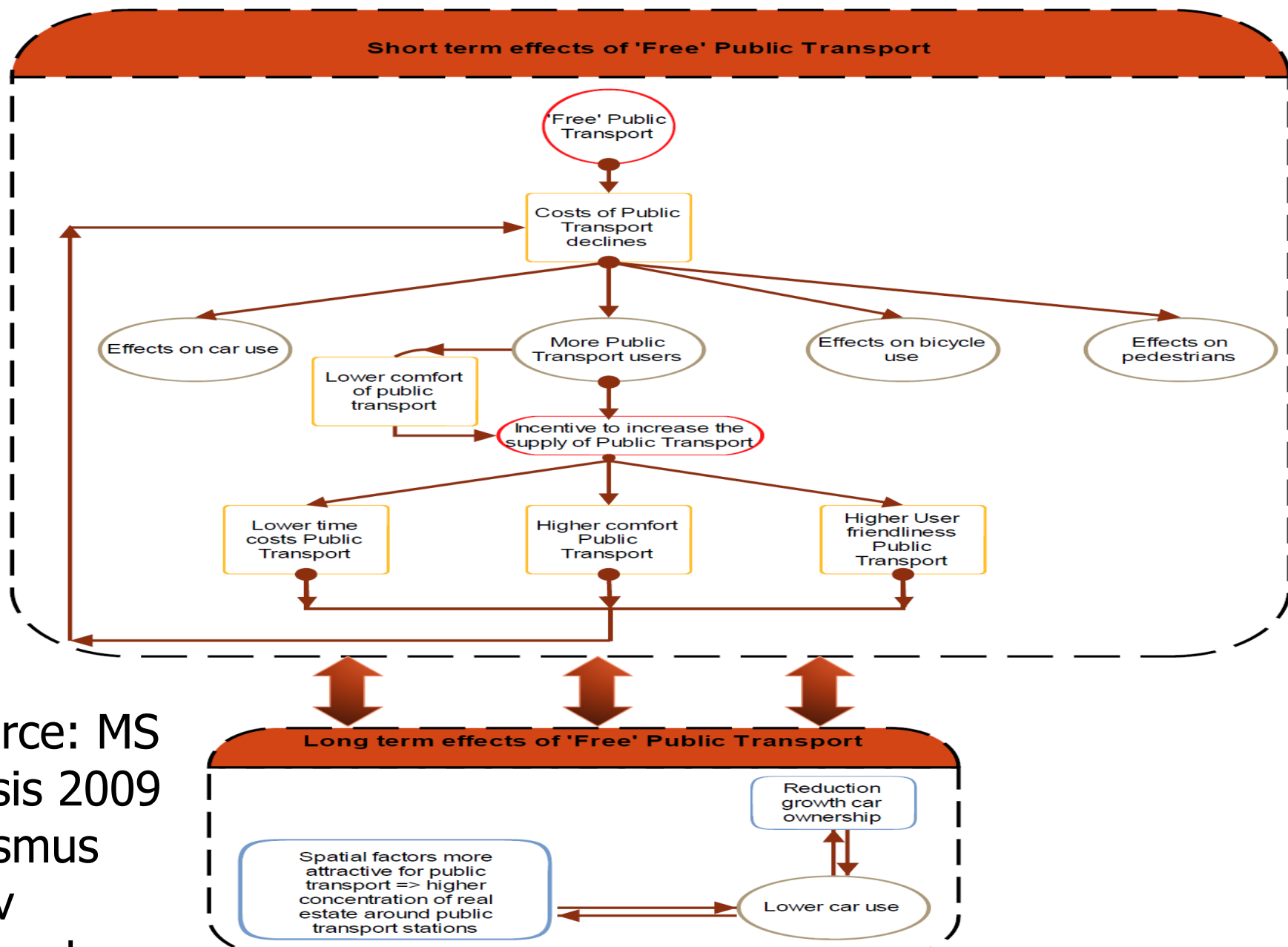


Figure 3.1: Short and long term effects of 'free' public transport (source: own elaboration).



INDC

- Goal: To limit global temperature rise to less than 2 C, to compel global consensus and limit CO2 emissions. To provide a voluntary response from India
- Instruments- Variety
- Institutions- MOEF, MNRE, IPCC
- Stakeholders- Government, People, Fossil Energy industry, Renewable Energy Industry, Financing Institutions



INDC - Introduction

INDIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION: WORKING TOWARDS CLIMATE JUSTICE

ॐ द्यौः शान्तिरन्तरिक्षं शान्तिः
पृथिवी शान्तिरापः शान्तिरोषधयः शान्तिः ।

“Om dyauh śāntir antariksam śāntih prithvi śāntih āpah śāntih osadhayah śāntih”

-- Yajur Veda 36.17

{{Unto Heaven be Peace, Unto the Sky and the Earth be Peace, Peace be unto the
Water, Unto the Herbs and Trees be Peace}}

<https://nmhs.org.in/pdf/INDIA%20INDC%20TO%20UNFCCC.pdf>



INDC –Future scenario

Indicator	India in 2014	India in 2030
Population (billion) ^a	1.2	1.5
Urban population (million) ^b	377 (2011)	609
GDP at 2011-12 prices (in trillion) ^c	INR 106.44 (USD 1.69)	INR 397.35 (USD 6.31)
Per capita GDP in USD (nominal) ^c	1408	4205
Electricity demand (TWh) ^c	776(2012)	2499

Source: a: Population Foundation of India; b: UN World Urbanization Prospects, 2014; c:

<https://nmhs.org.in/pdf/INDIA%20INDC%20TO%20UNFCCC.pdf>



INDC

- Reduce Carbon Intensity of GDP by 33-35% of 2005 level in 2030
- Create 40% cumulative non fossil power by installed capacity by 2030 (using finance from Green Climate Fund)
- create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional tree cover and forest



What does the carbon intensity of the economy depend upon?



Metrics

- Carbon intensity -2030 vs 2005
- Energy Intensity- 2030 vs 2005
- Equity impact
- Impact on jobs
- Impact on investments
- Share of non-fossil by installed capacity, by generation
- Costs of transition
- Carbon sink



Policies-INDC

- National Environment Policy 2006
- NAPCC, SAPCC(32 states)
- Energy Conservation Act
- National Electricity Policy
- National Policy for farmers
- Integrated Energy Policy
- PAT
- REC,RPO



Policies - INDC

- 25 Solar Parks, Ultra Mega Solar Power
- National Smart Grid Mission, Green Energy Corridor
- NMEEE
- Standards and Labelling
- Partial Risk Guarantee Fund for Energy Efficiency
- Venture Capital Fund for Energy Efficiency
- ECBC/Griha
- Smart Cities Mission, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and National Heritage City Development and Augmentation Yojana (HRIDAY) + many more



Contents lists available at SciVerse ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol



Energy transitions research: Insights and cautionary tales

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Global Energy Transitions

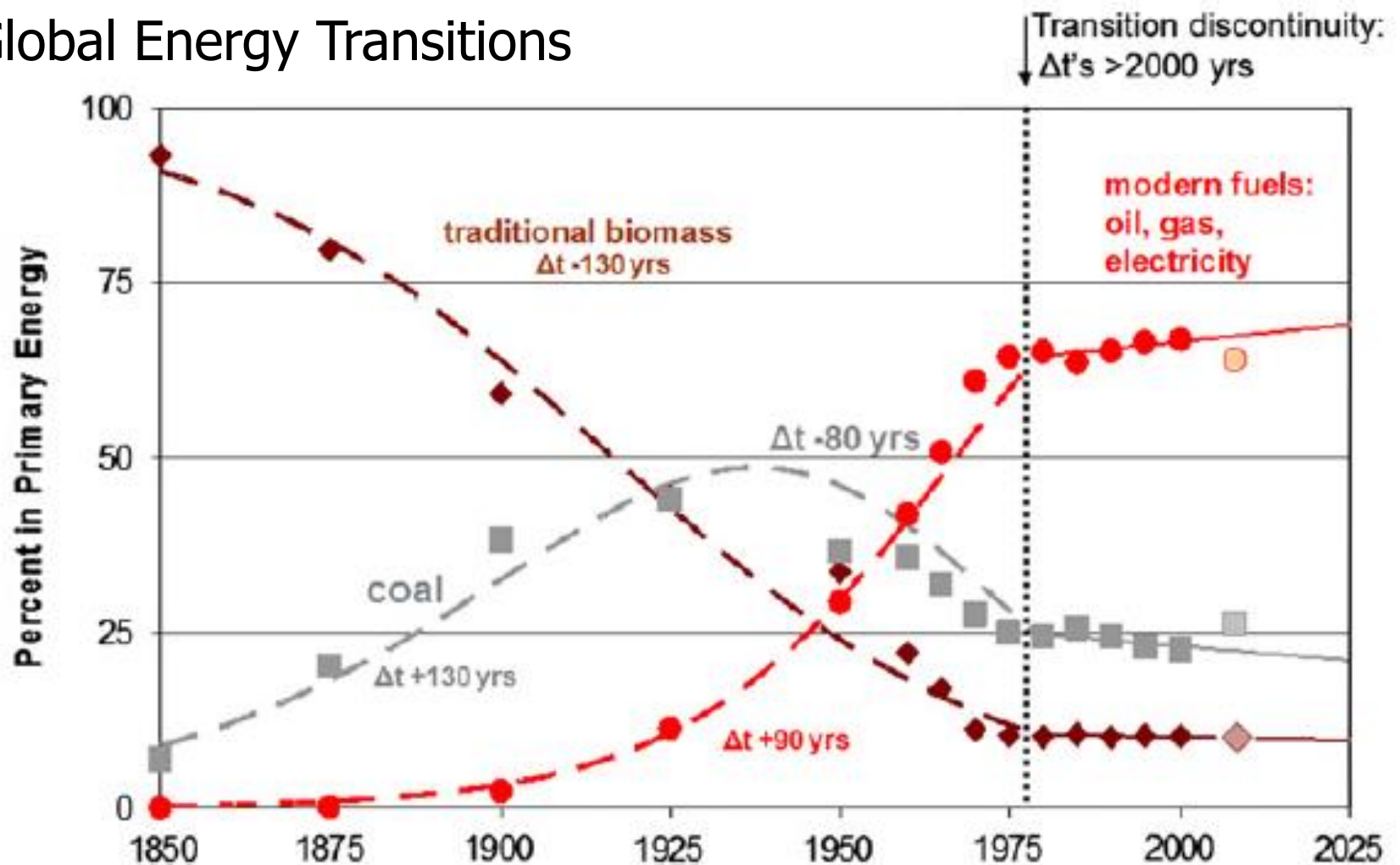
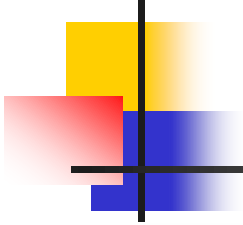


Fig. 1. Two “grand” transitions in world primary energy use 1850–2008 (in percent of primary energy). Symbols denote historical data and lines are model estimates using a multiple logistic substitution model to approximate the historical data. Source: adapted from Wilson and Grubler, 2011.



Lessons from energy history for climate policy

Roger Fouquet

September 2015

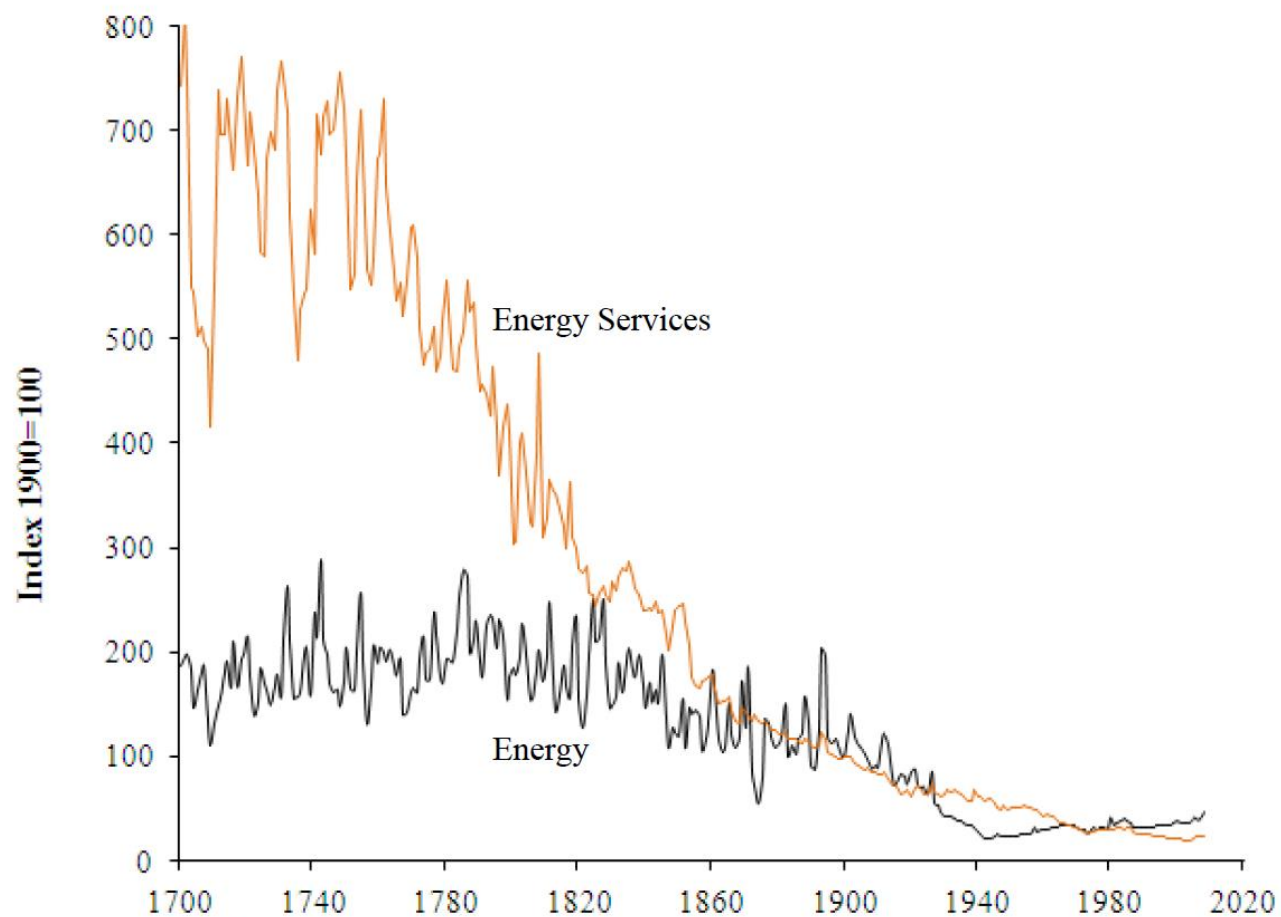
Centre for Climate Change Economics and Policy

Working Paper No. 235

**Grantham Research Institute on Climate Change and
the Environment**

Working Paper No. 209

<http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/09/Working-Paper-209-Fouquet.pdf>



Source: Fouquet (2011)

Figure 1. Average Price of Energy and of Energy Services⁴ in the United Kingdom (1700-2008)

Source: Fouquet (2015)

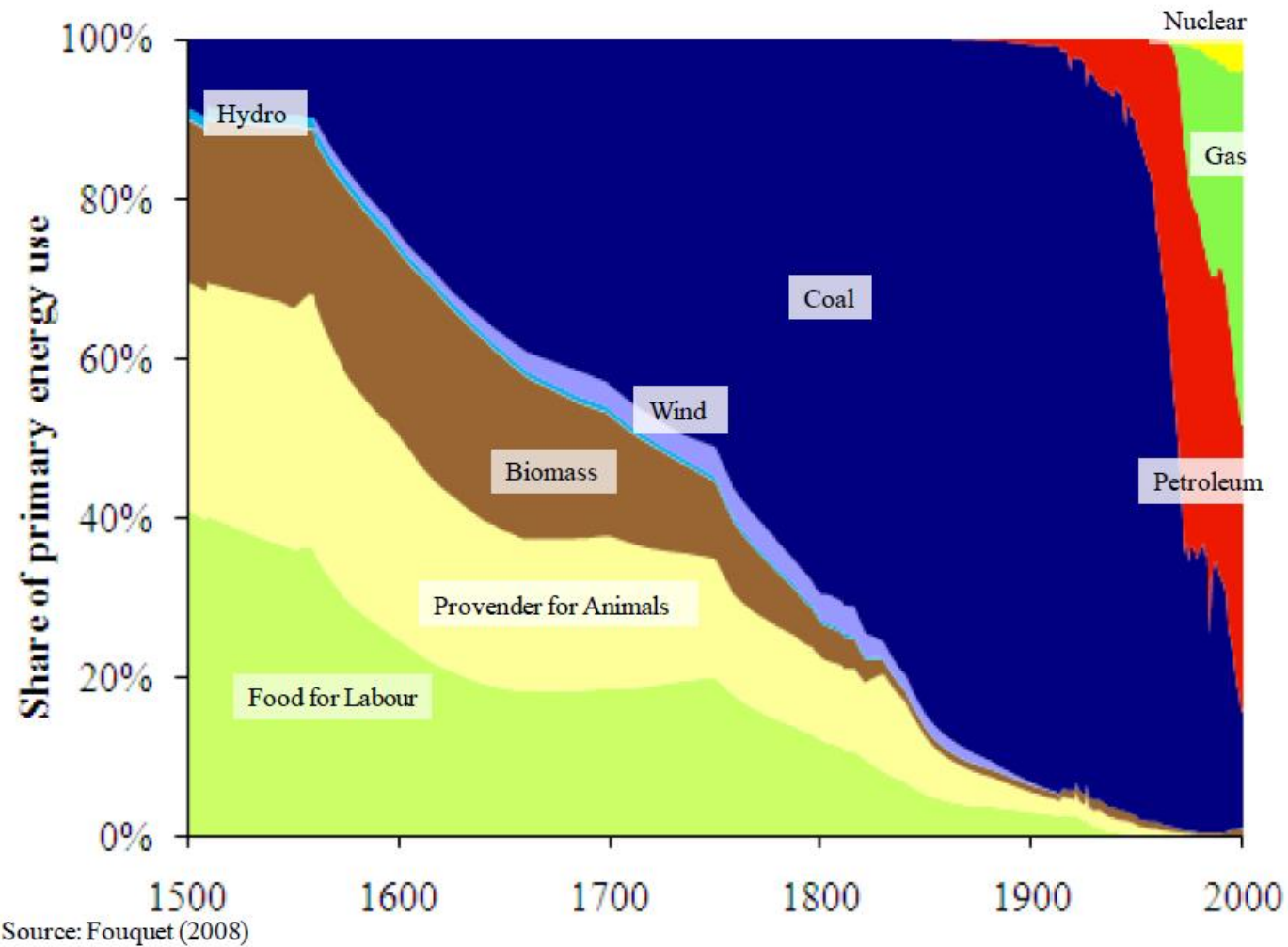


Figure 9. Share of Primary Energy Consumption in the United Kingdom (1500-2000)

Source: Fouquet (2015)



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