



Dynamics of Energy System Transition in Iran

Yadollah Saboohi

Professor: Sharif University of Technology

**INSF Workshop on Urban Resilience through
Applied Systems Analysis**

Tuesday 3 Aban 1401; Tehran, Iran



Table of Content

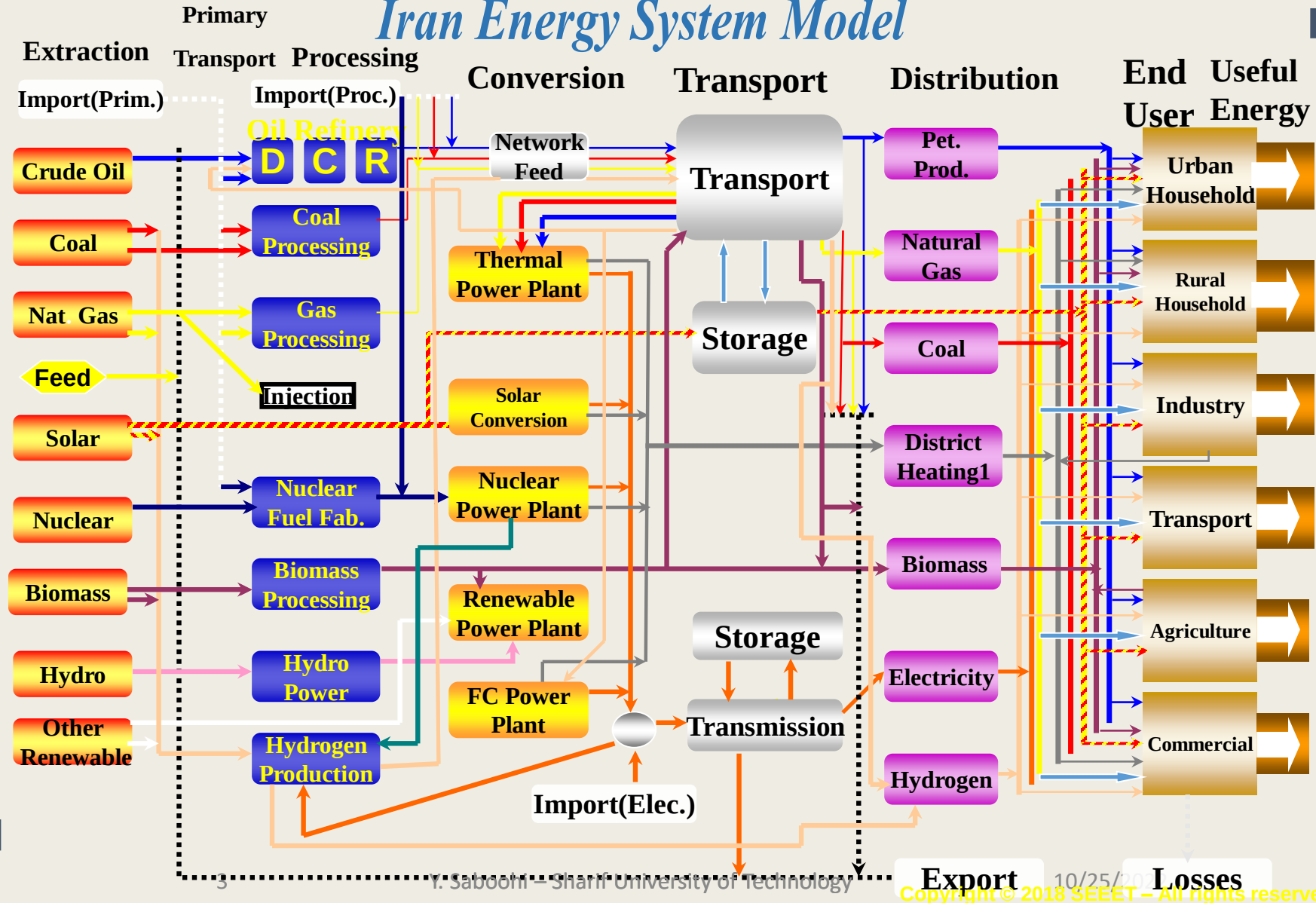
- ❑ Conceptual Model for Systems Analysis
- ❑ Mathematical Model as Analytical Tool for Systems Approach
- ❑ Dynamics of Energy Transition in Iran
- ❑ Policy Implementation of Systems Approach
- ❑ Application of Systems Approach to Urban Energy Resilience



Energy Reference System

Conceptual Model for Systems Analysis

Iran Energy System Model







Mathematical Modeling

Dynamics of Energy System of Iran

- ❑ **Developing Conceptual Model of the System**
 - **Reference Energy Systems**
- ❑ **Application of Laws of Physics to Develop the Model**
 - **First and Second Law of Thermodynamics and Mass Conservation**
- ❑ **Modelling Existing and New Technologies**
 - **Performance and Constraints of Existing and New Technologies and the Constraint on Penetration Path of New Technologies**
- ❑ **Social, Economical and Environment Dimensions**
 - **Related Constraints and their Dynamics**
- ❑ **Institutional and other Constraints**
 - **Related Constraints and their Dynamics**
- ❑ **Criteria of Dynamic Development**
 - **Economic Affordability, Environment, Resiliency, Social Acceptability**



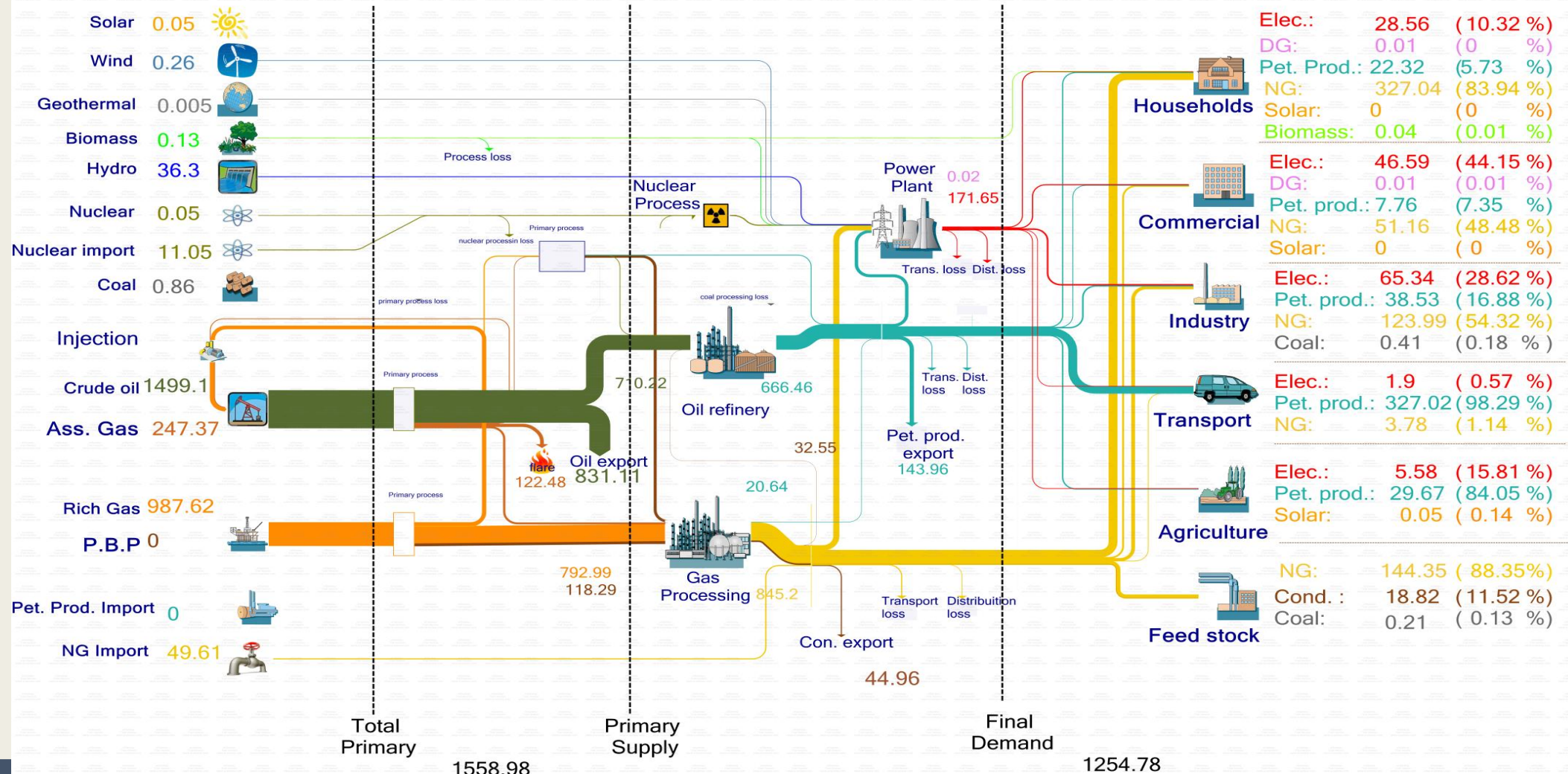
Dynamics of Energy System of Iran

Unit: MBOE/a

IESM's Energy Balance

Scenario: BASE

Year: 1390



1390

1391

1392

1393

1394

1399

1404

1409

1419

1429



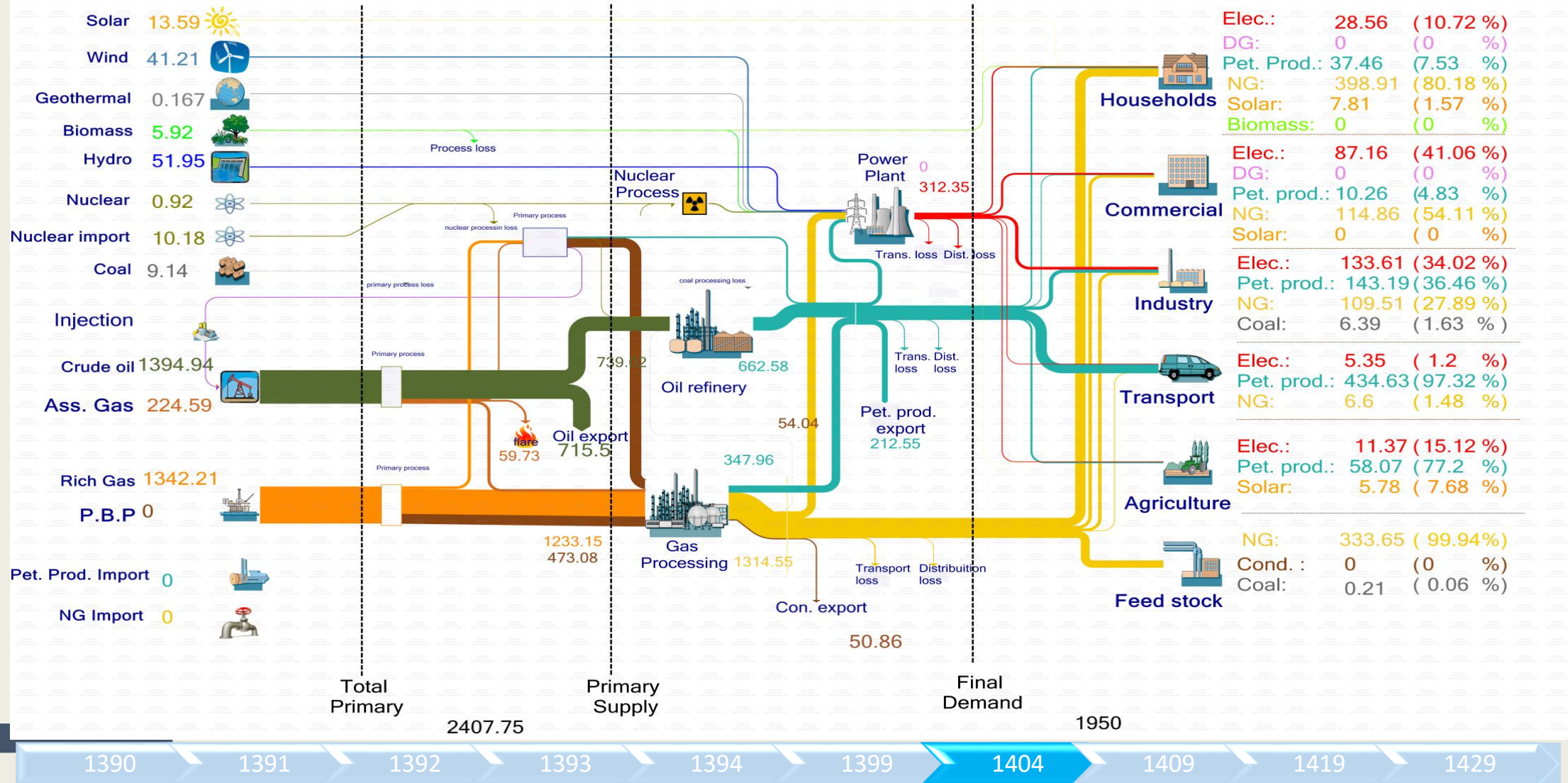
Dynamics of Energy System of Iran

Unit: MBOE/a

IESM's Energy Balance

Scenario: BASE

Year: 1404





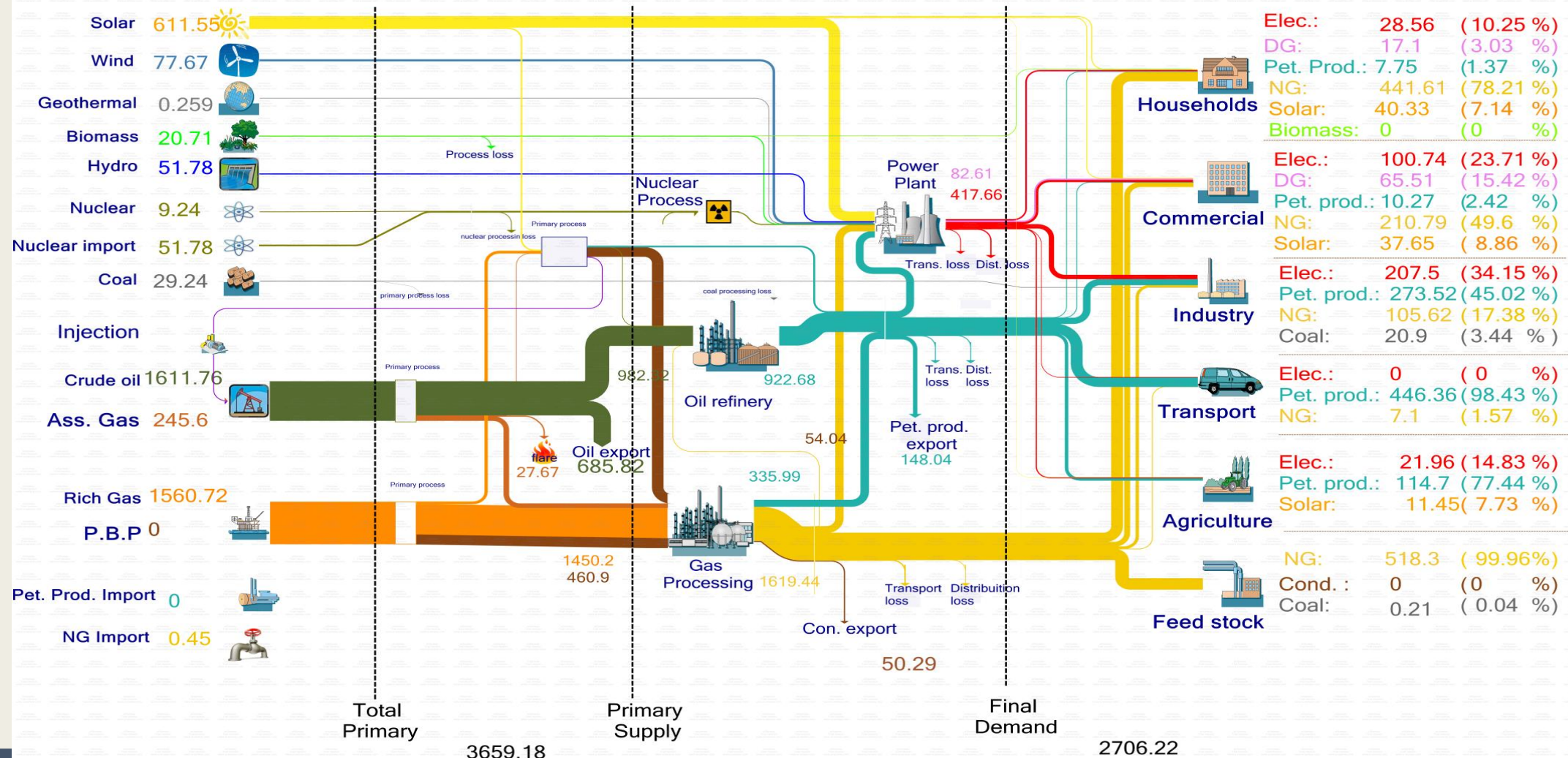
Dynamics of Energy System of Iran

Unit: MBOE/a

IESM's Energy Balance

Scenario: BASE

Year: 1419



1390

1391

1392

1393

1394

1399

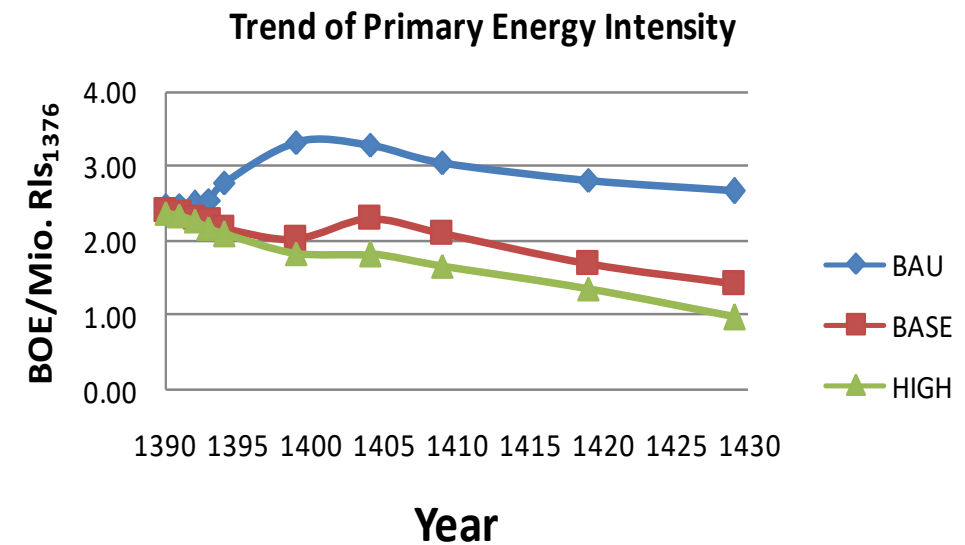
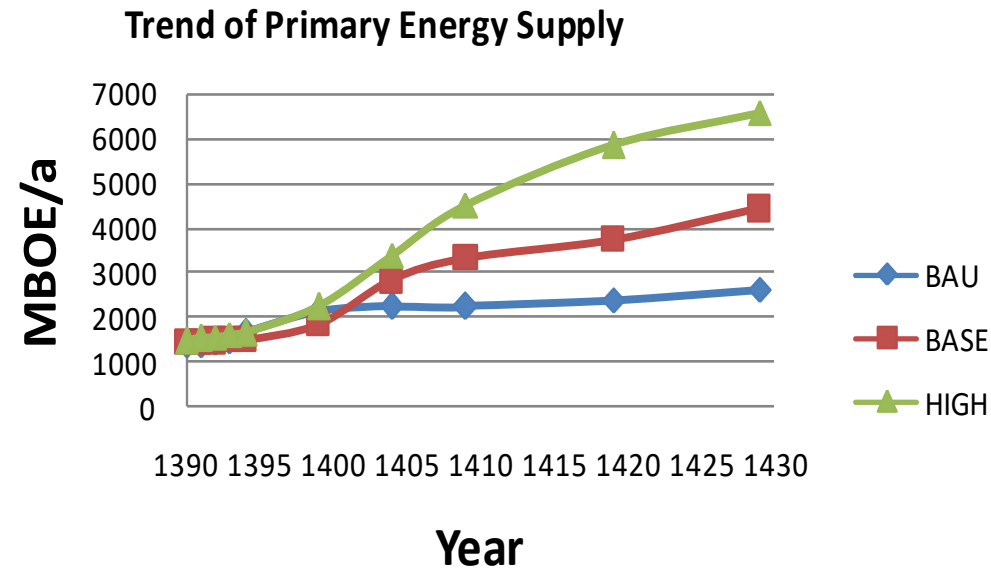
1404

1409

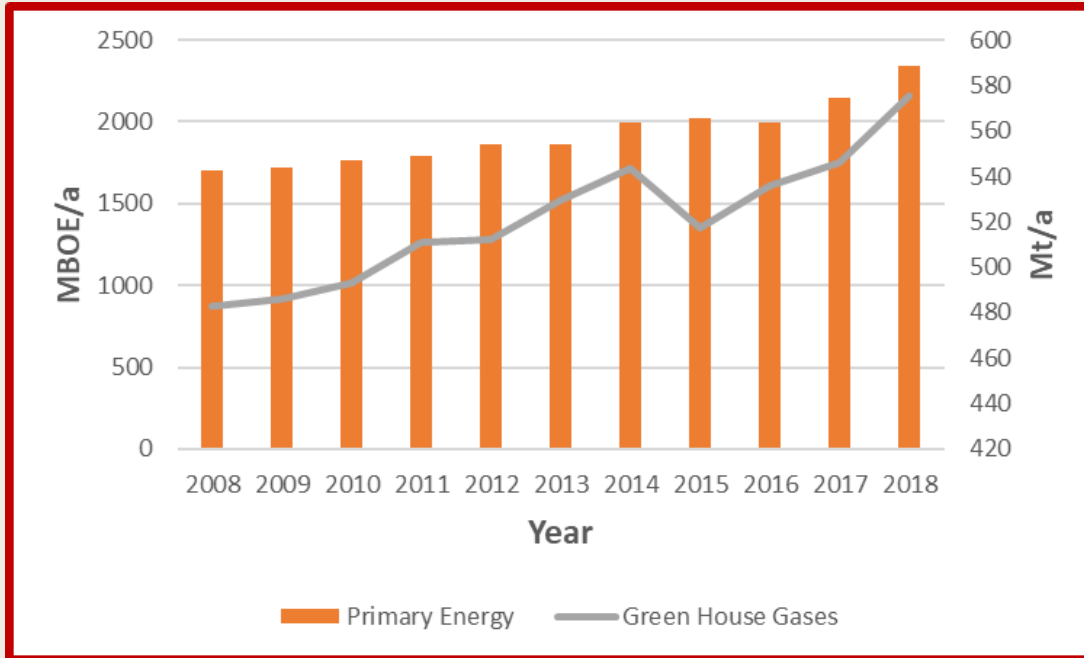
1419

1429

Dynamics of Energy System of Iran

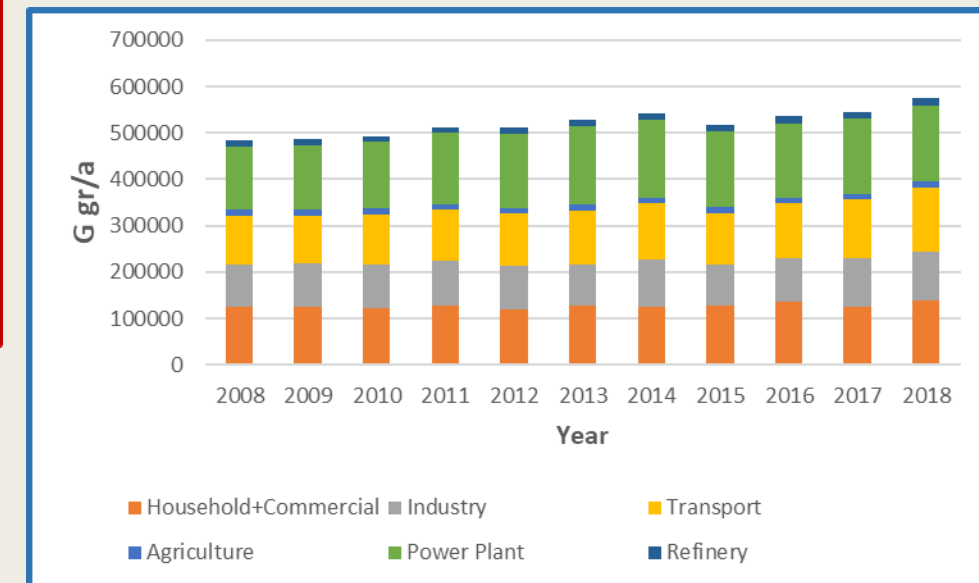


Energy Use and Emission of Green House Gases



Primary Energy Consumption and GHG emission in energy sector

Data Source: Hydrocarbon balances, IIES



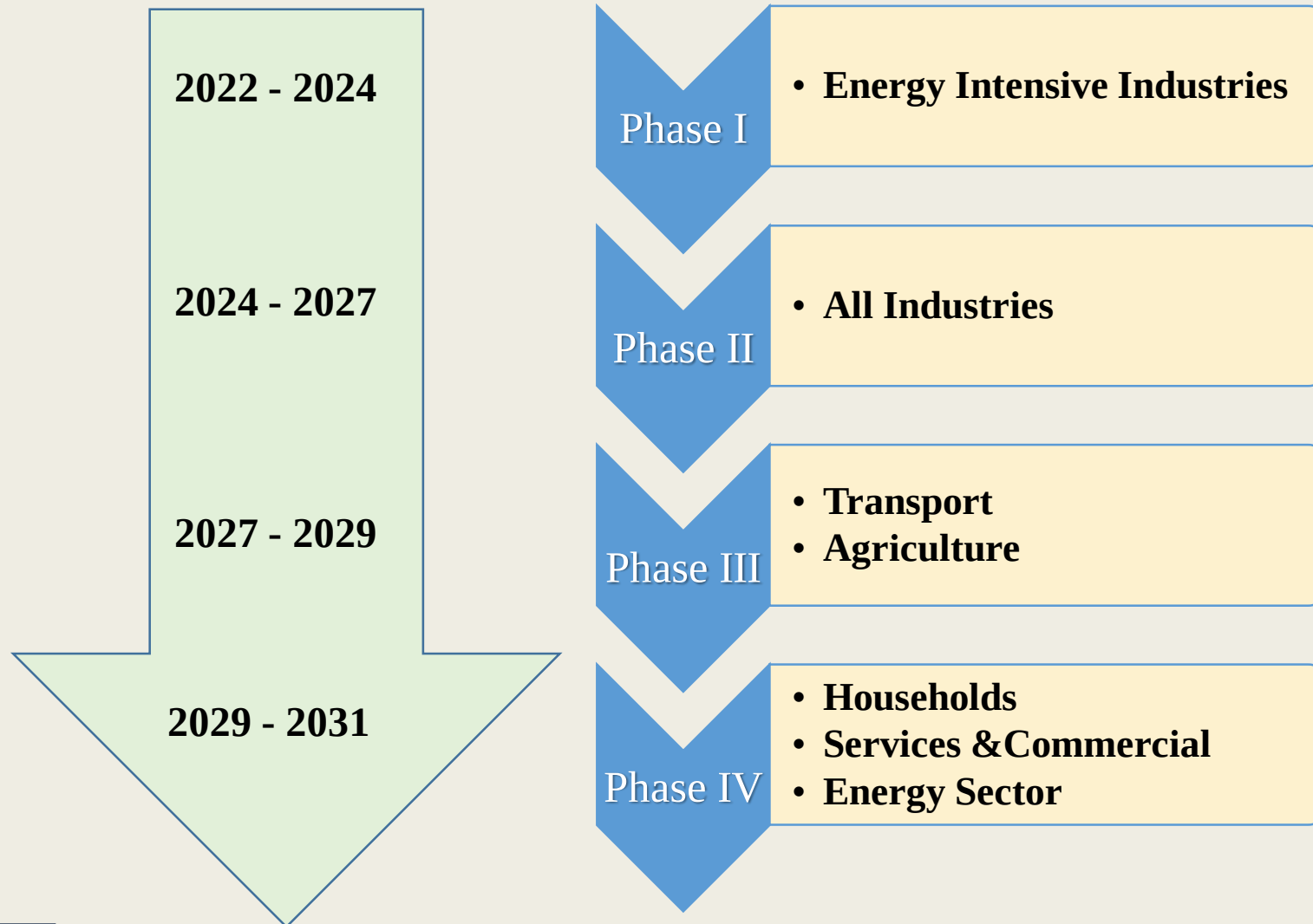
Sectoral breakdown of emission

Data Source: Hydrocarbon balances, IIES

Policy Implication of Systems Approach

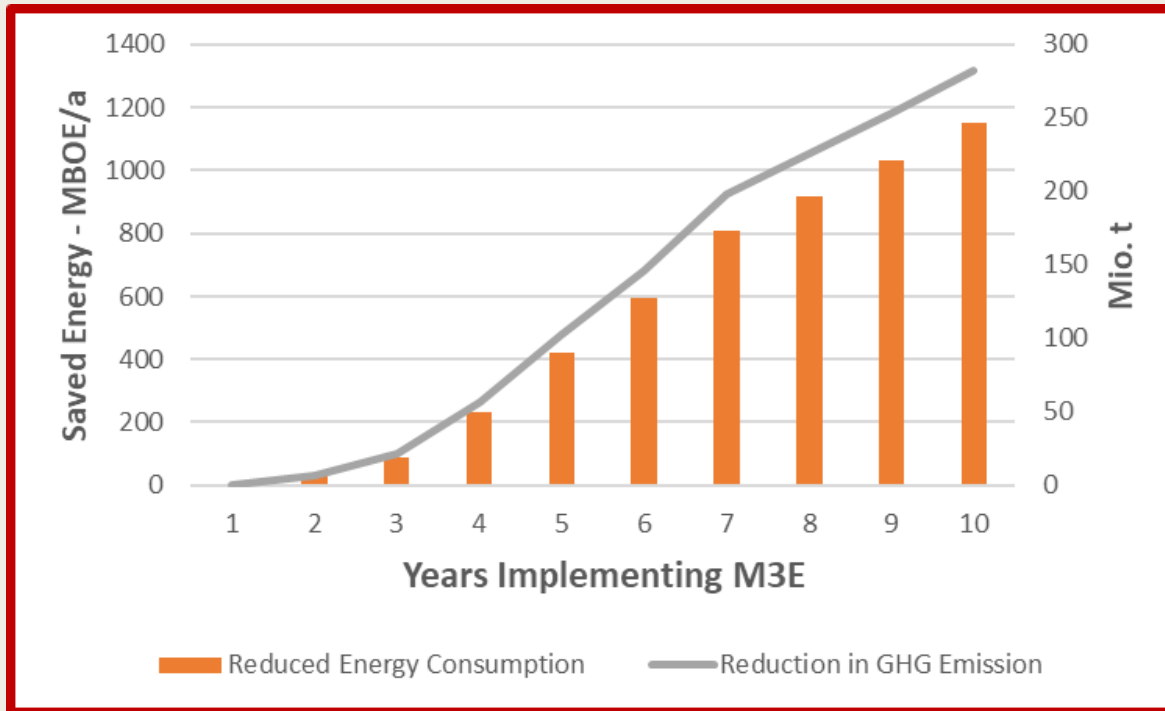


Implementation of Market for Energy Efficiency and Environment (M3E)





Impact of Transition Efficient and Green Energy System of Iran



Generated Economic Resource:

PE opportunity Costs: 390 Mrd. Euro

Investment for Energy Efficiency: 77 Mrd. Euro

Investment for Green Economy: 20 Mrd. Euro

R&D and New Technologies: 15 Mrd. Euro

Social Infrastructure: 85 Mrd. Euro

Energy, Transport and Water Infrastructure: 53 Mrd. Euro

New Jobs: 3 Mio.

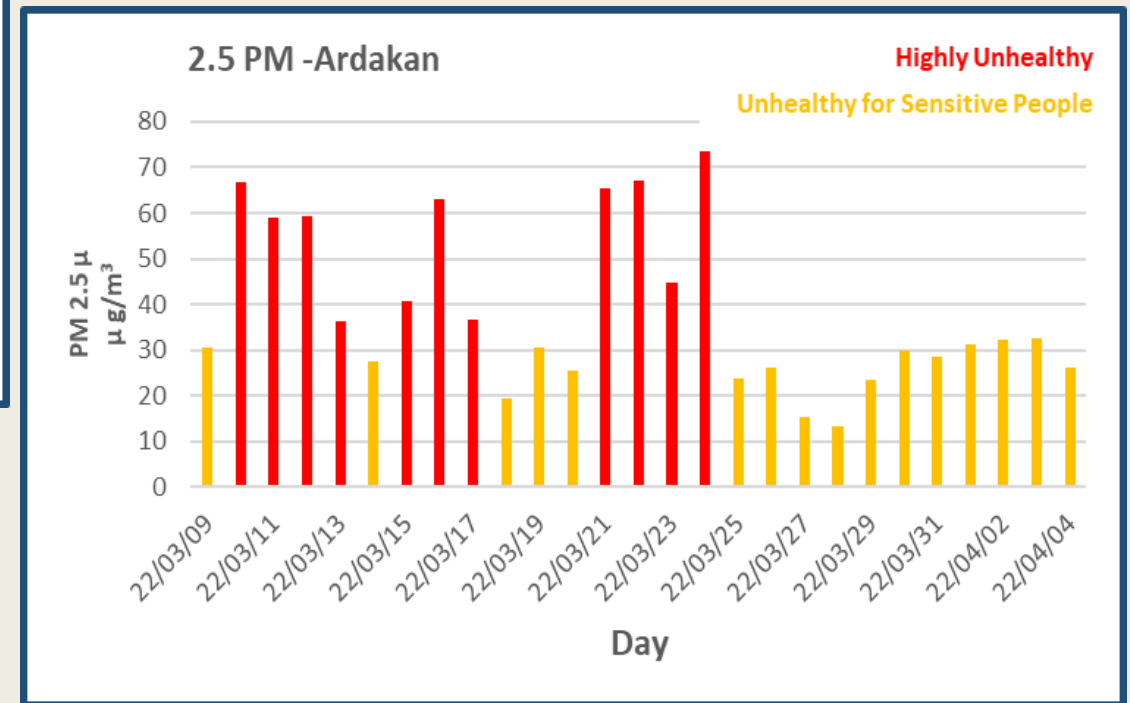
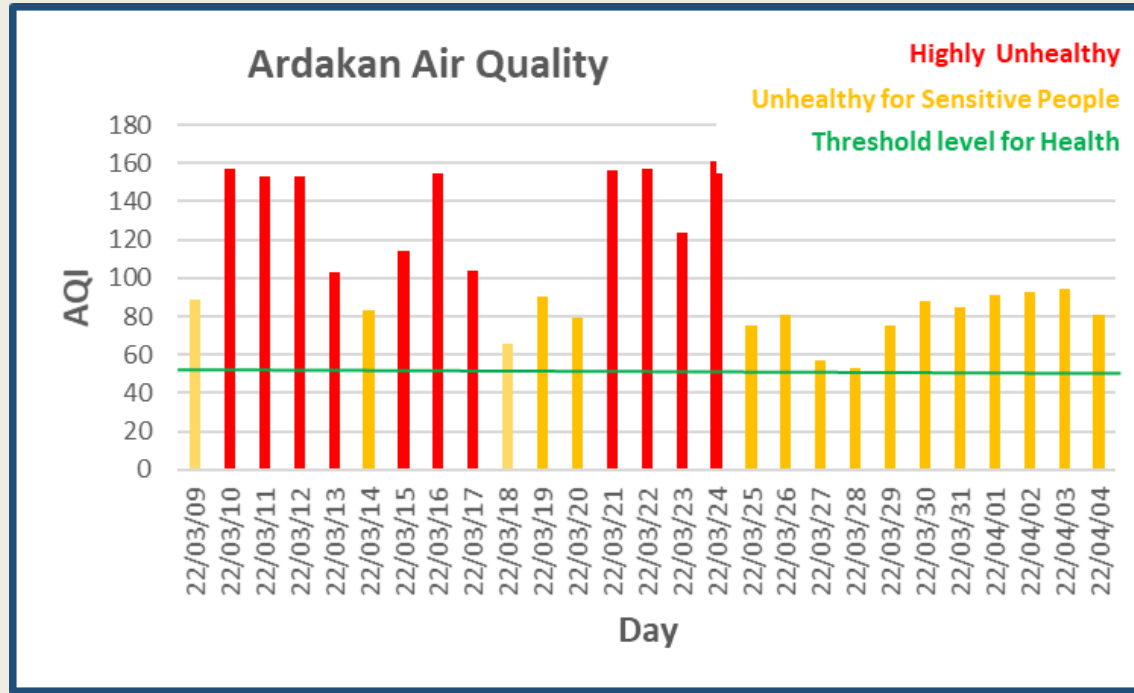
Economic Stability: 60 Mrd. Euro



Application of Systems Approach to Urban Energy Resilience

Dynamics of Transition to Efficient and Green Urban Energy System

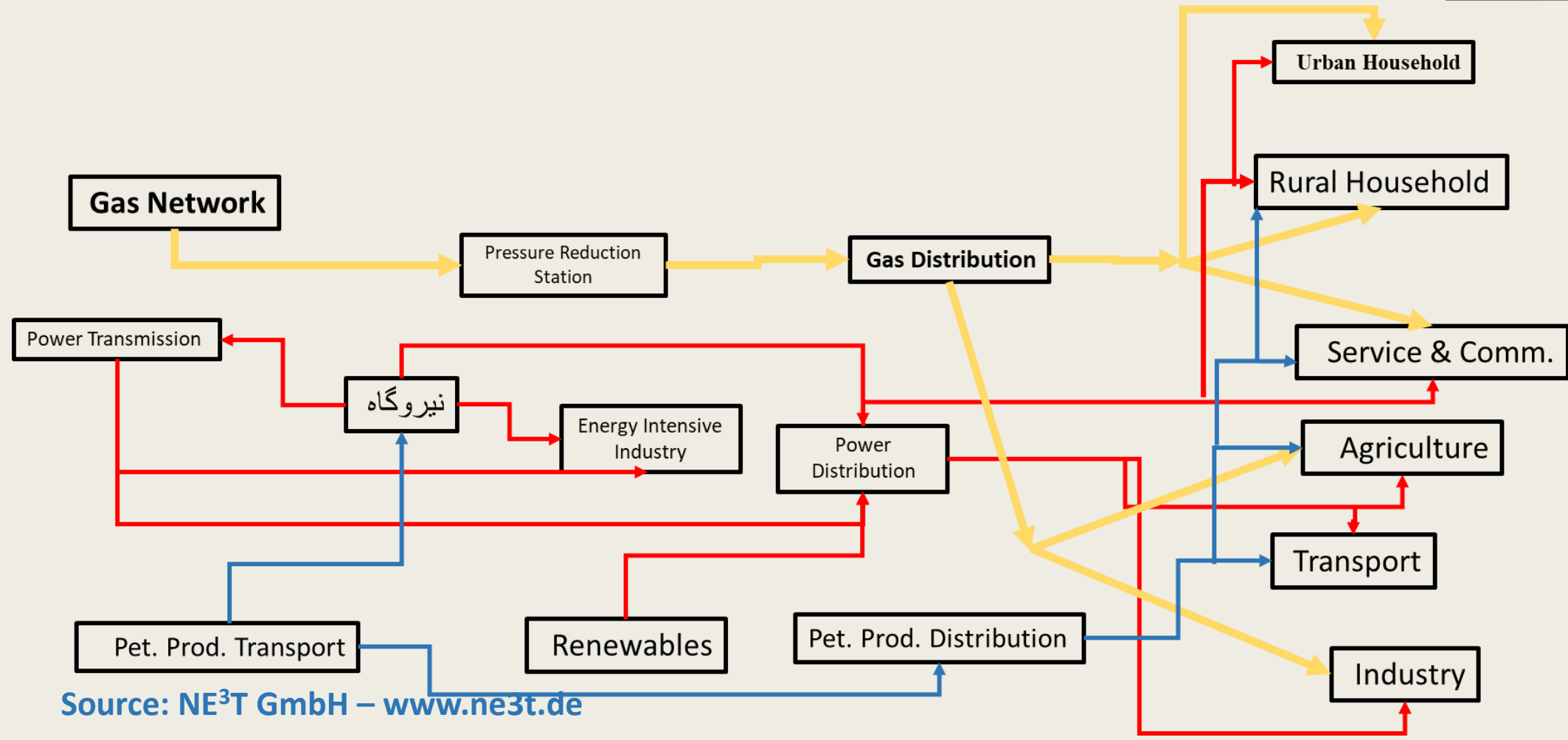
Ardakan – Highly Polluted City



Application of Systems Approach to Urban Energy Resilience



Existing Energy Reference System

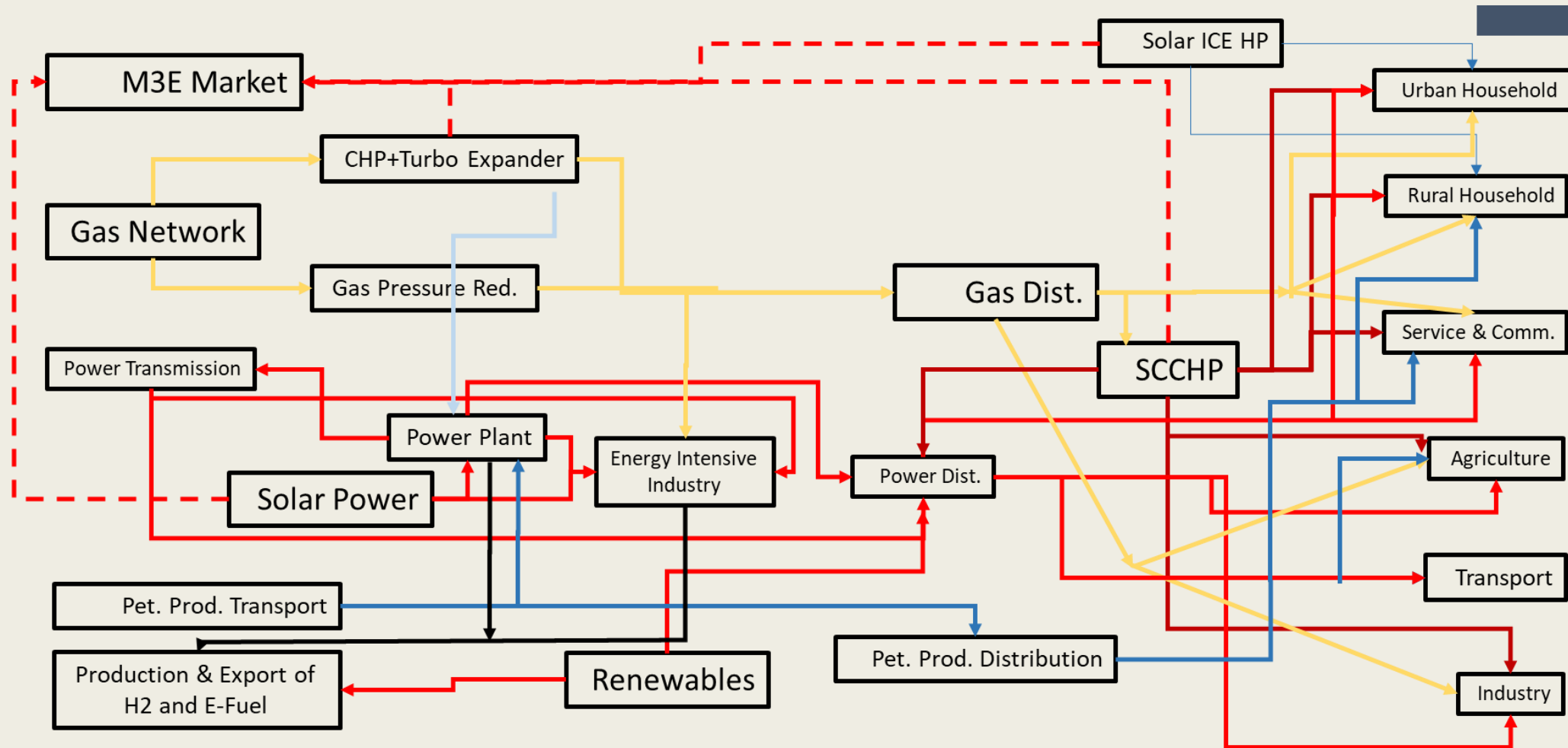


Source: NE³T GmbH – www.ne3t.de

Application of Systems Approach to Urban Energy Resilience



Dynamics of Transition to Efficient and Green Energy System



Source: NE³T GmbH – www.ne3t.de



Thank You

Prof. Yadollah Saboohi
Sharif University of Technology

Email: saboohi@sharif.edu

Home Page: <http://www.sina.sharif.edu/~saboohi>