



CHANGE PATHWAYS
climate | energy | evaluation

SOUTH AFRICAN ELECTRIC VEHICLE MACRO-ECONOMIC STUDY

EVIA Conference - 4 Dec 2017



sanedi

South African National Energy
Development Institute



Unstoppable momentum?

"Expert" Disruption Forecasts?

AT&T hired McKinsey & Co to forecast cell phone adoption by the year 2000 (in 1985)

Their prediction: **900 000** subscribers

Actual year 2000
number:

**109
million**

Off by a factor
of
120x



Source: Toby Seba https://www.youtube.com/watch?time_continue=22&v=2b3ttqYDwFO

Steepening Technology S-Curves

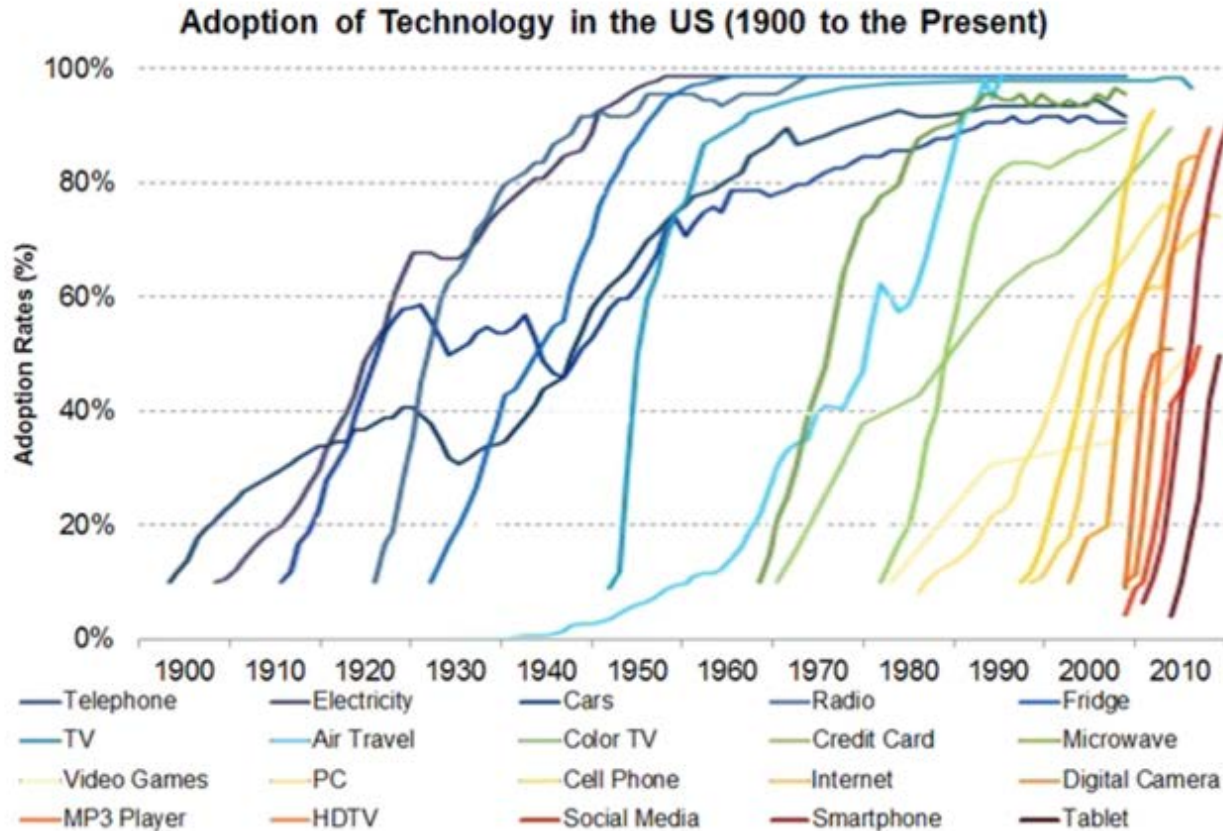


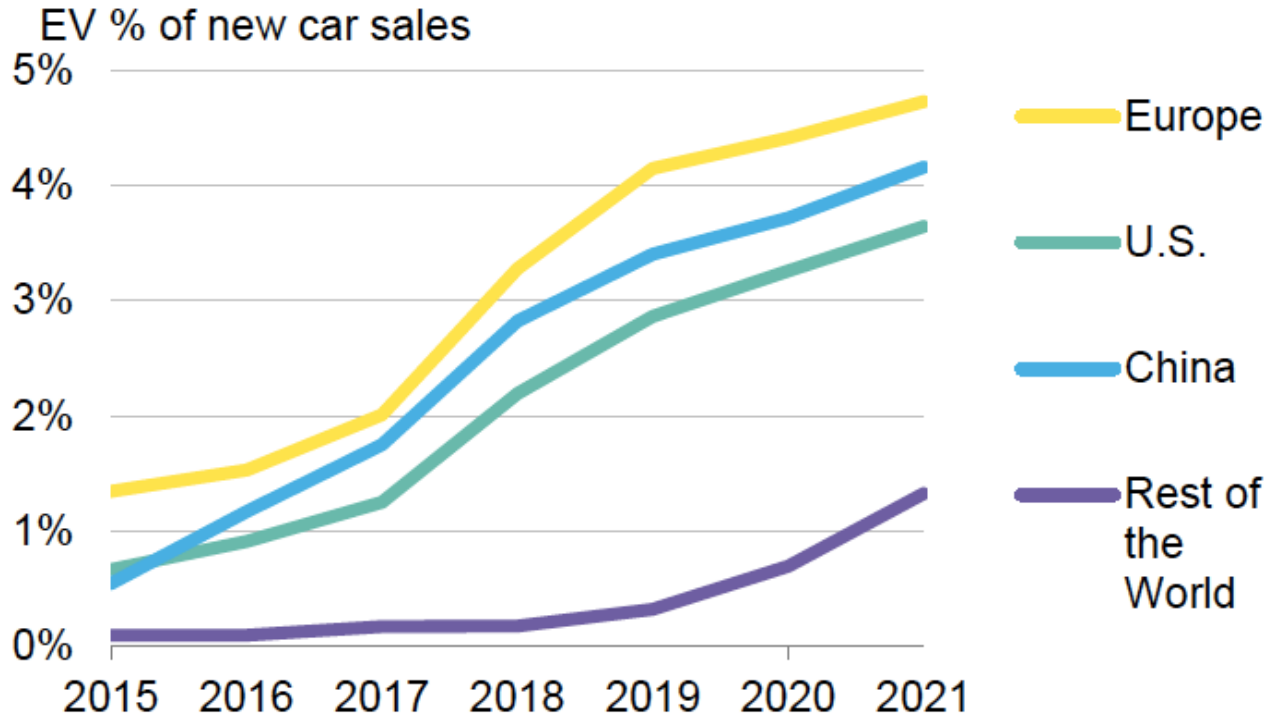
Fig. 1. The pace of technology adoption in the U.S., after Blackrock (see [here](#)).

Source: <https://seekingalpha.com/article/4111150-money-electric-vehicle-supply-chain-part?page=2>



EV penetration rate forecast

Short-term, 2015-2021



Source: Bloomberg New Energy Finance

Source: Bloomberg New Energy Finance

Source: Bloomberg New Energy Finance, 2017



A shift.....

The year of 2017 may end up in history as the inflection point for automobile electrification.

“The biggest theme over the next 10 or 15 years of investing is going to be getting right the transition away from the combustion vehicle towards EVs.”

Evvy Hambro - manager of BlackRock World Mining Fund



A shift.....

- What should **South Africa do given its development objectives?**
 - Lack of policy framework
 - EVs not included in APDP and new Master Plan (Volume Assembly Allowance for >50k vehicles not supportive)
 - Electricity is not recognised as a transport fuel
 - EVs face maximum import duty (25%)
 - But significant movement in policy direction to EVs through the NDC: 2,854,499 EVs by 2050
 - Low EV penetration thus far: 300 EV passenger vehicles – “chicken & egg” situation?
 - Lack of infrastructure (perceived & real)
 - Automotive industry focused on ICE vehicles, components and value chain- not positioned for high value knowledge-based production (limited innovation, R&D)
 - Etc.....



Programme objectives

Overall Objective:

- demonstrate the economic, social and environmental **impacts of potential South African EV market scenarios** to inform and generate buy-in for **appropriate** institutional and regulatory reform, investment in the development of the EV market, and to inform additional research requirements.

| | Short term | Medium Term | Long term |
|------------|---|--|--|
| Objectives | <ul style="list-style-type: none"> ➤ Generate a conceptual model: Economy-wide EV stories: ➤ Inform robust research ➤ Contribute to other related efforts | <ul style="list-style-type: none"> ➤ Robust economy-wide assessment ➤ Conduct “deep dives” into components of the EV stories. | <ul style="list-style-type: none"> ➤ Additional research identified as a priority during the medium term phase ➤ EV Community of Practice - research |
| | 2017 | 2018 | 2018 / 2019 - |



Project background

Funder:



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Implementing entity:



sonedi
South African National Energy
Development Institute

.....with support from Change Pathways

Reason for this work:

- DTI request following DoT Green Transport Strategy + study to evaluate SA green transport industry development options
- Lack of coordinated EV policy direction & lack of evidence to inform this

Reason for this approach:

- Balance S-T output vs M-T robust evidence (process)
- Complexity + uncertainty makes it difficult to have structured dialogue (tendency to tunnel or discuss "red herrings")
- Concrete starting point needed as a basis for discussion
 - Produce visual EV stories
 - Learn & inform approach



Conceptual model

“First Pass”



Scenarios

SLOW GLOBAL SHIFT

- Slow EV penetration
- Unchanged transport model

QUICK GLOBAL SHIFT

- Quick EV penetration
- New transport model

“SLOW
RESPONSE”

- Unchanged Electricity Supply
- No EV-related manufacturing
- No EV policy incentives

“PROACTIVE
RESPONSE”

- Smart, Low Carbon Electricity System
- Significant EV-related manufacturing
- Numerous EV policy incentives

Impact indicators

- GDP
- Sectoral output
- Trade balance
- Income & Welfare
- Electricity Price
- GHG emissions
- Air quality
-etc

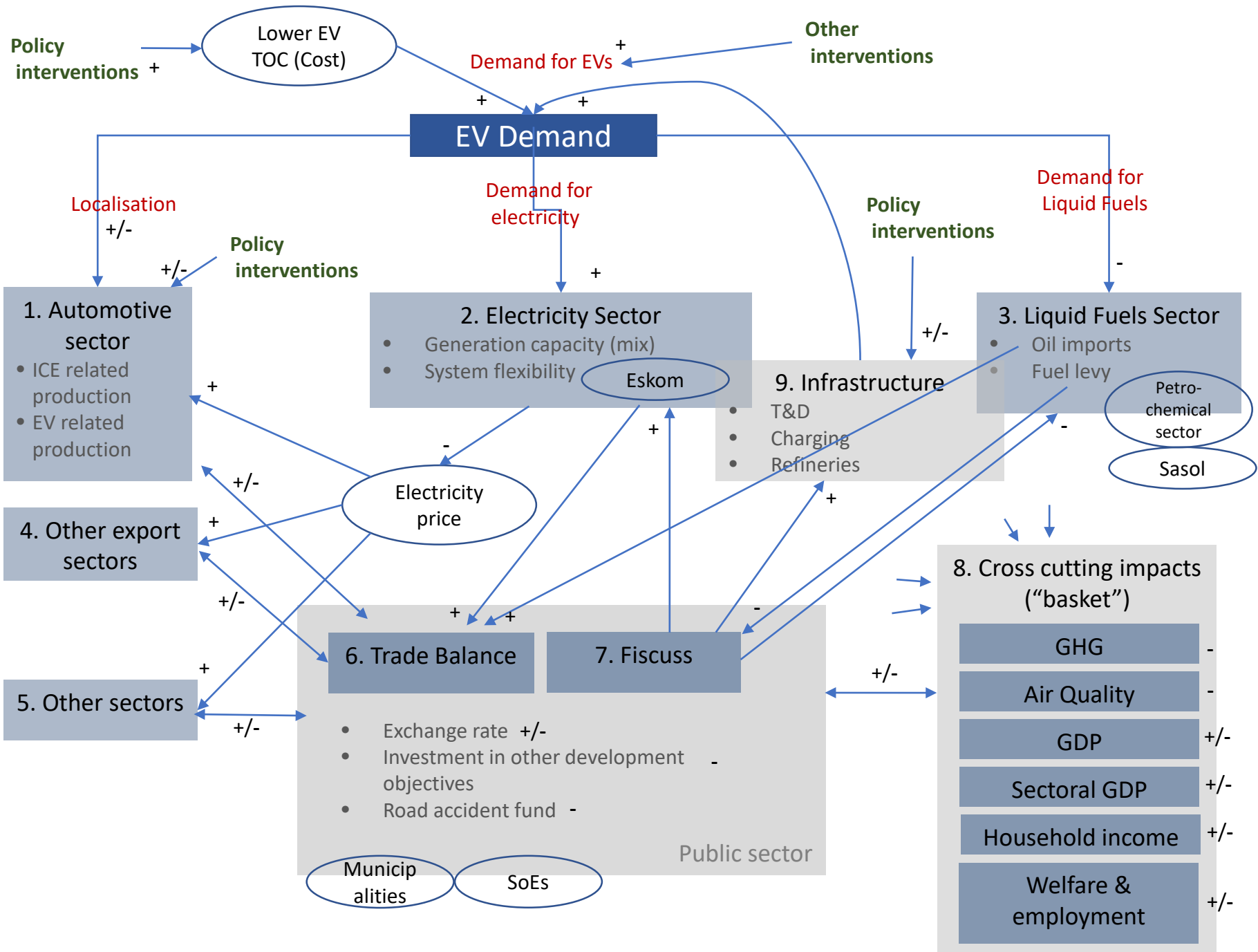
2030

2050

2030

2050





Policy interventions +

Lower EV TOC (Cost)

Demand for EVs +

Other interventions

EV Demand

Localisation +/-

Demand for electricity +

Policy interventions +/-

Demand for Liquid Fuels -

1. Automotive sector
 • ICE related production
 • EV related production

2. Electricity Sector
 • Generation capacity (mix)
 • System flexibility

3. Liquid Fuels Sector
 • Oil imports
 • Fuel levy

4. Other export sectors

Eskom

9. Infrastructure
 • T&D
 • Charging
 • Refineries

Petro-chemical sector
 Sasol

Electricity price

5. Other sectors

6. Trade Balance
 • Exchange rate +/-
 • Investment in other development objectives -
 • Road accident fund -

7. Fiscuss

8. Cross cutting impacts ("basket")

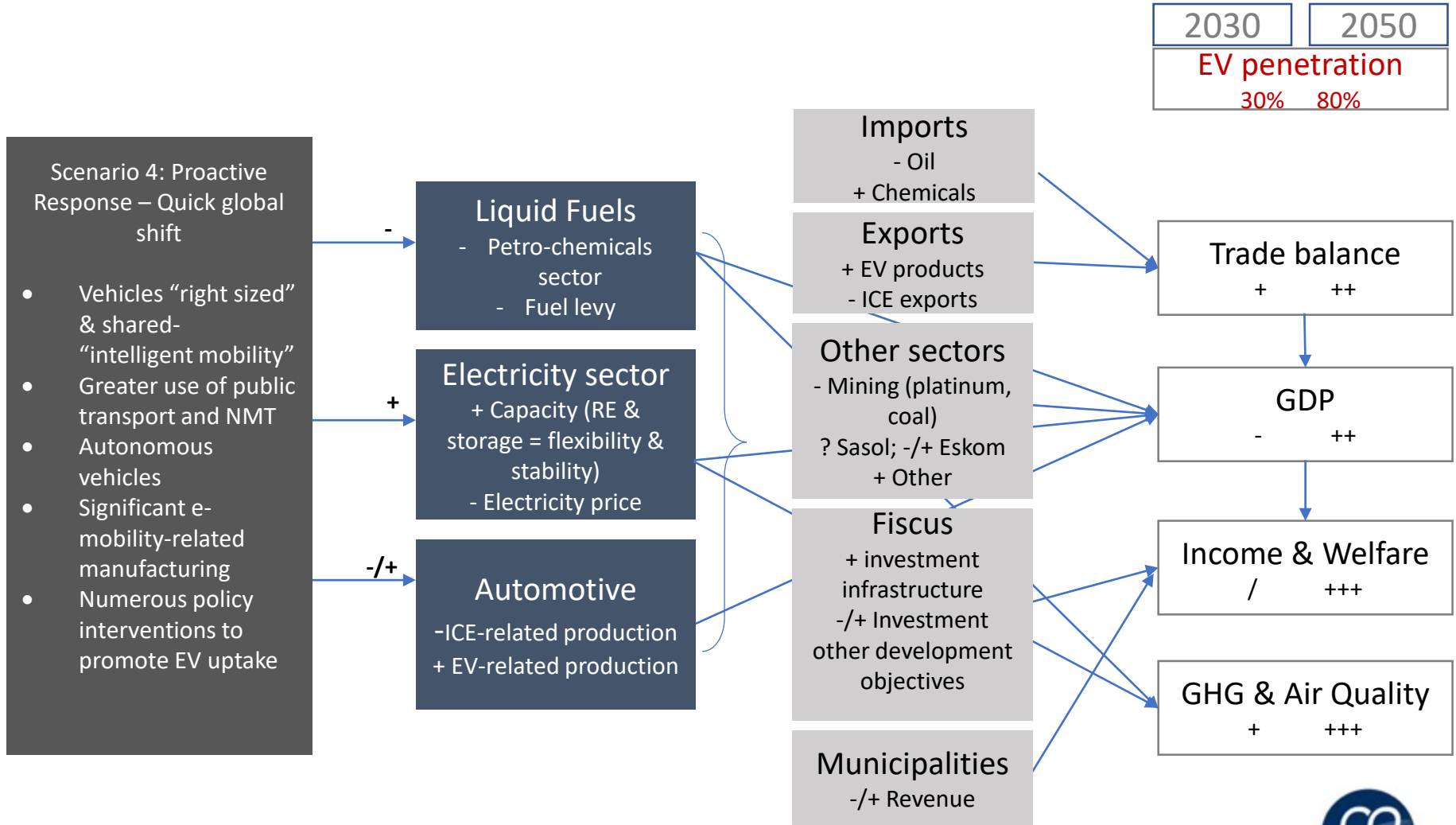
- GHG -
- Air Quality -
- GDP +/-
- Sectoral GDP +/-
- Household income +/-
- Welfare & employment +/-

Municipalities

SoEs

Public sector

Impact/ Change Pathways



Research Design

Key research questions:

1. What **industrialisation opportunities** exist associated with different EV stories and what are the skill requirements and policy interventions needed to realise those opportunities?
2. **Which sectors benefit and which lose** (in terms of growth and the associated basket of development indicators)?
3. What are the **poverty & inequality impacts** associated with different EV stories
4. What are the **environmental** (particularly climate change and air quality) **impacts** associated with different EV stories?
5. **What interventions are required** to achieve desired levels of EV penetration and industrial development (government and the private sector)?



Research Design

Approach

Four components are proposed:

1. Integrated economy wide modelling of a range of scenarios
2. “Deep dives” into specific elements of the EV stories
 - a. Micro assessment of the liquid fuel sector
 - b. Micro assessment of the automotive sector options-
 - c. Exploring behavioural / human factor
 - d. Diagnostic evaluation: “Recipes for success”
 - e. Relationship between EVs and other technologies over time.
 - f. Exploring how to monetize the benefits to grid balancing
 - g. Training & skills stories
 - h. Sub-national policy interventions
3. Packaging of the outputs
4. Engagement & dissemination



Research Design

Timing

- It is proposed that this work be conducted over a **7-month process starting in January / February 2018** (some of the preparatory work and “deep dives” could be started in December 2017)



Thank You

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