Konferenz „Verkehrsökonomik und –politik“ Berlin, 11.06.2015

Wider economic disbenefits of not implementing the European TEN-T core network corridors (CNC)

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PROJECT OBJECTIVES

- **Quantitative assessment** of impacts if TEN-T would not be implemented as defined by TEN-T guidelines and CEF (EU Regulations 1315/2013 and 1316/2013).

- **Assessment of 2 test cases and 3 scenarios**: **2 corridors (test cases to develop the methodology)**, nine CNCs and full core network, cross-border projects and innovative technologies.

- Focus on **wider economic effects**, in particular GDP and employment.

- Detailed **qualitative and quantitative analysis of jobs** created by the TEN-T (e.g. quality of jobs, innovativeness of jobs).

PROJECT TEAM

Lead: Fraunhofer ISI

Partners: PTV GROUP

INFRAS

Support: M-FIVE

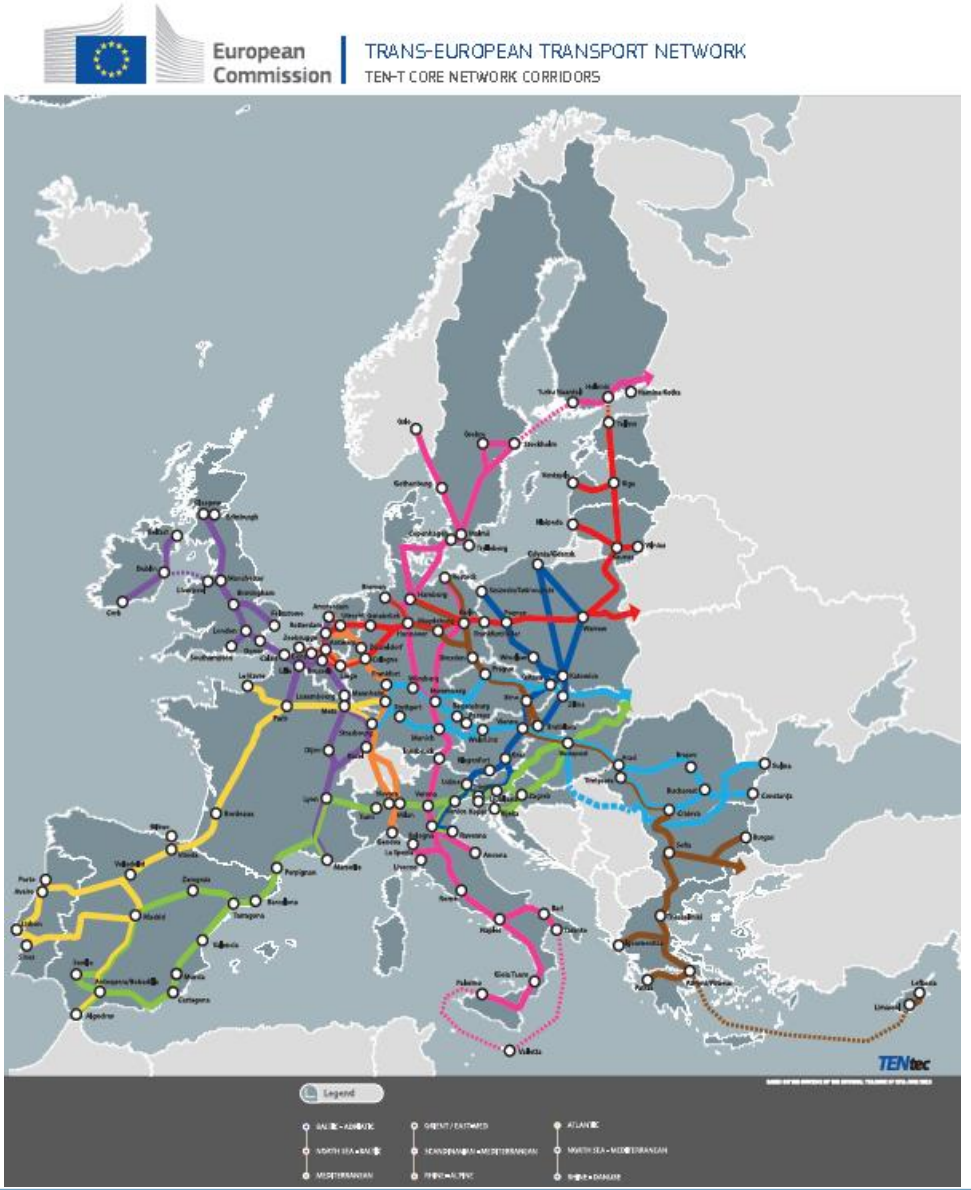
Client: European Commission

TEN-T CORE NETWORK

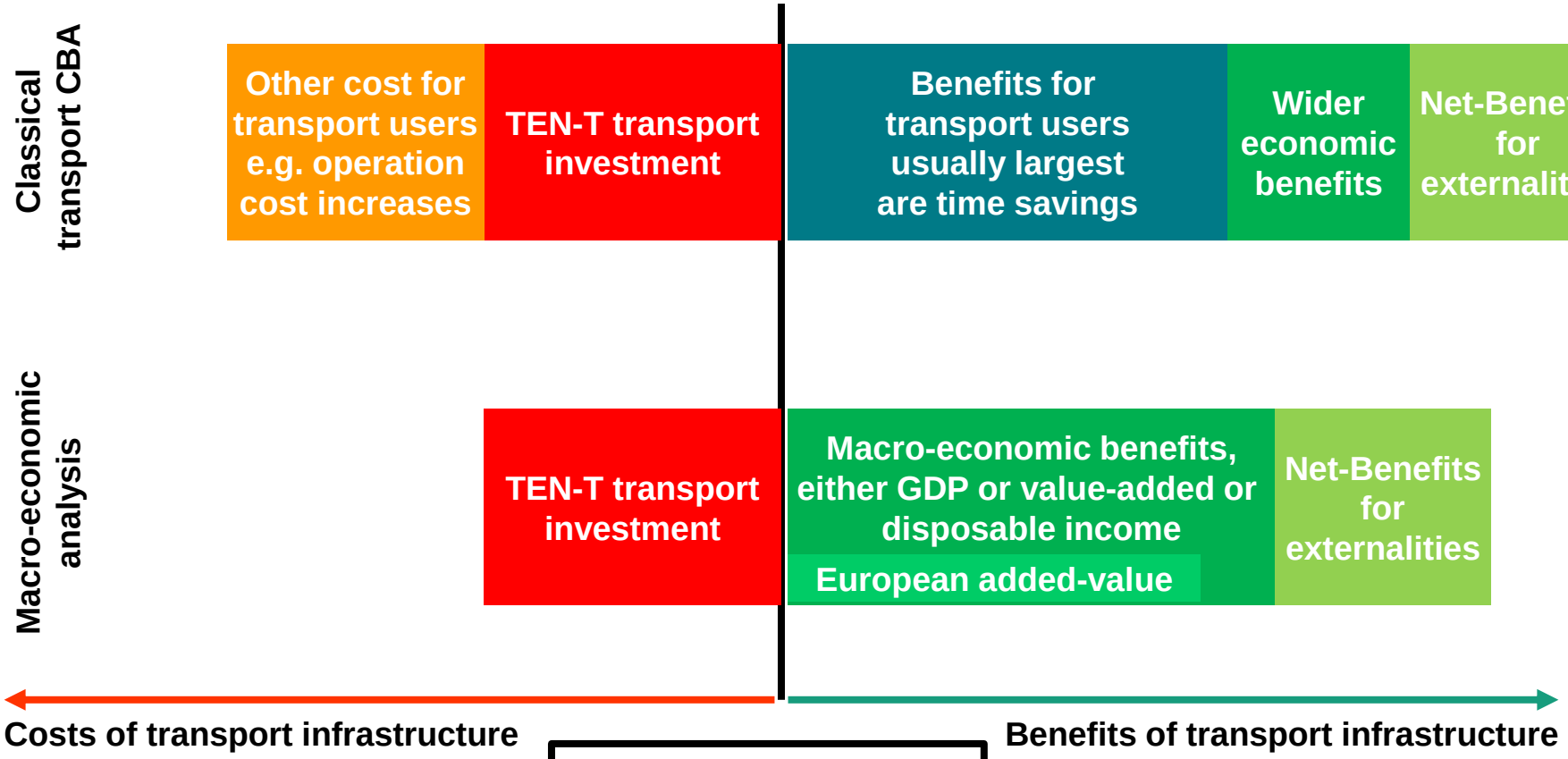
9 CNC (CORE NETWORK CORRIDORS)

TEN-T network comprises:

- TEN-T **core** network, of which
- 9 core network corridors =75%
- TEN-T **comprehensive** network
- Innovative technologies



UNDERSTANDING WIDER ECONOMIC BENEFITS

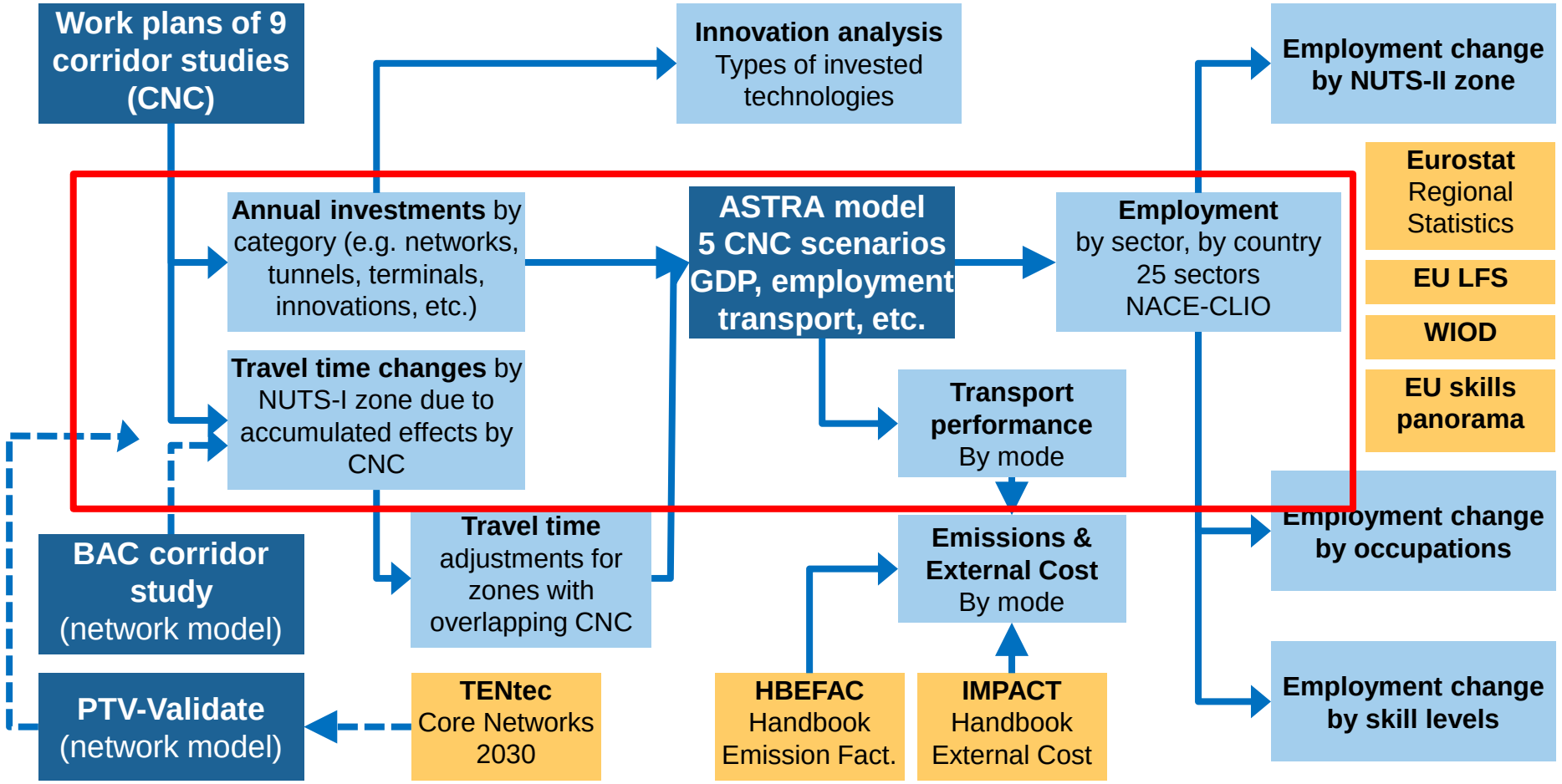


$$\text{BC ratio} = \frac{\text{Benefit side}}{\text{Cost side}}$$

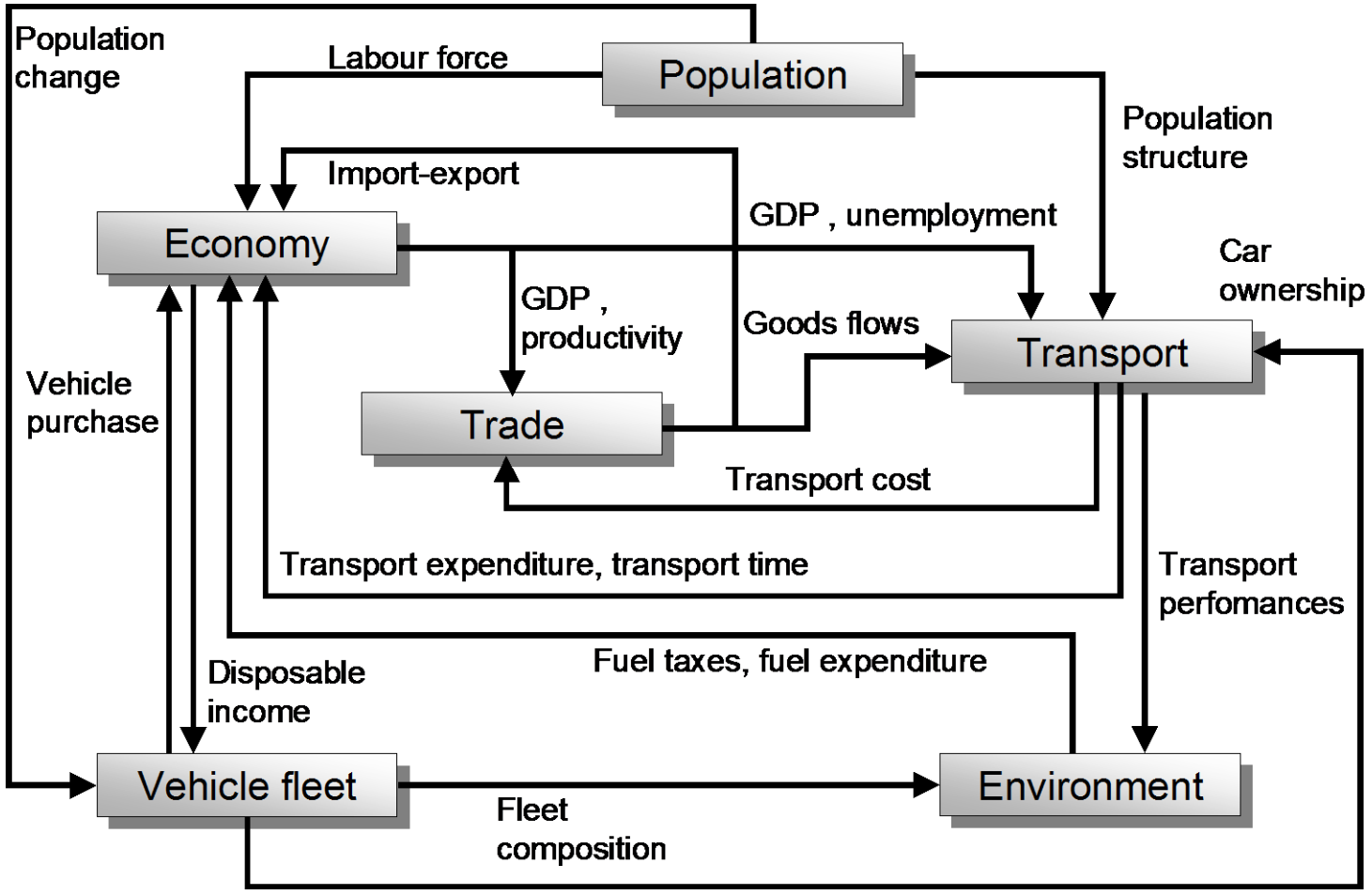
Source: Own presentation

Macro-economic benefit = Cost side X Multiplier

WORKFLOW OF THE PROJECT AND USAGE OF ASTRA MODEL

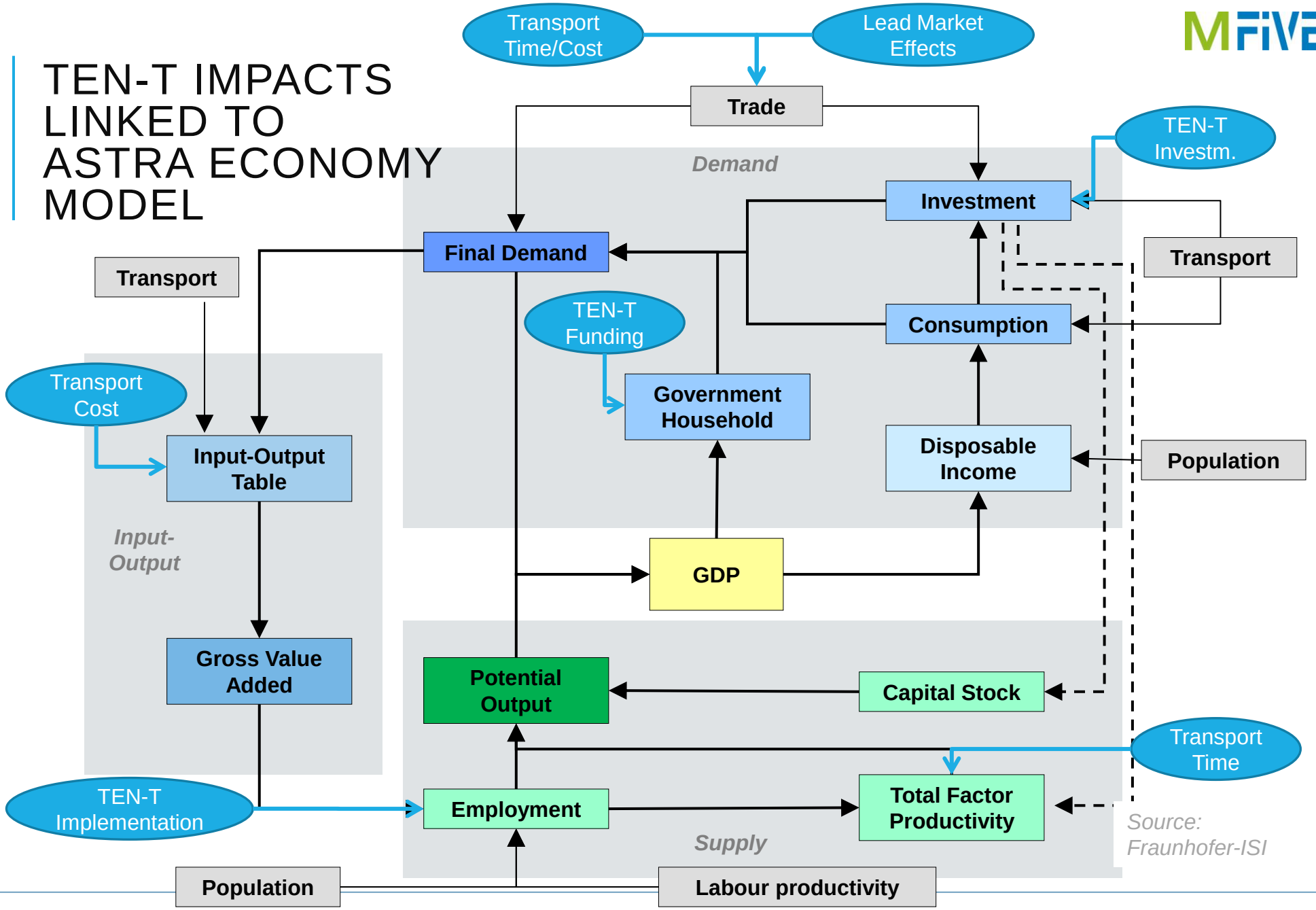


ASTRA MODEL
(=ASSESSMENT OF TRANSPORT STRATEGIES) INTEGRATED MODEL

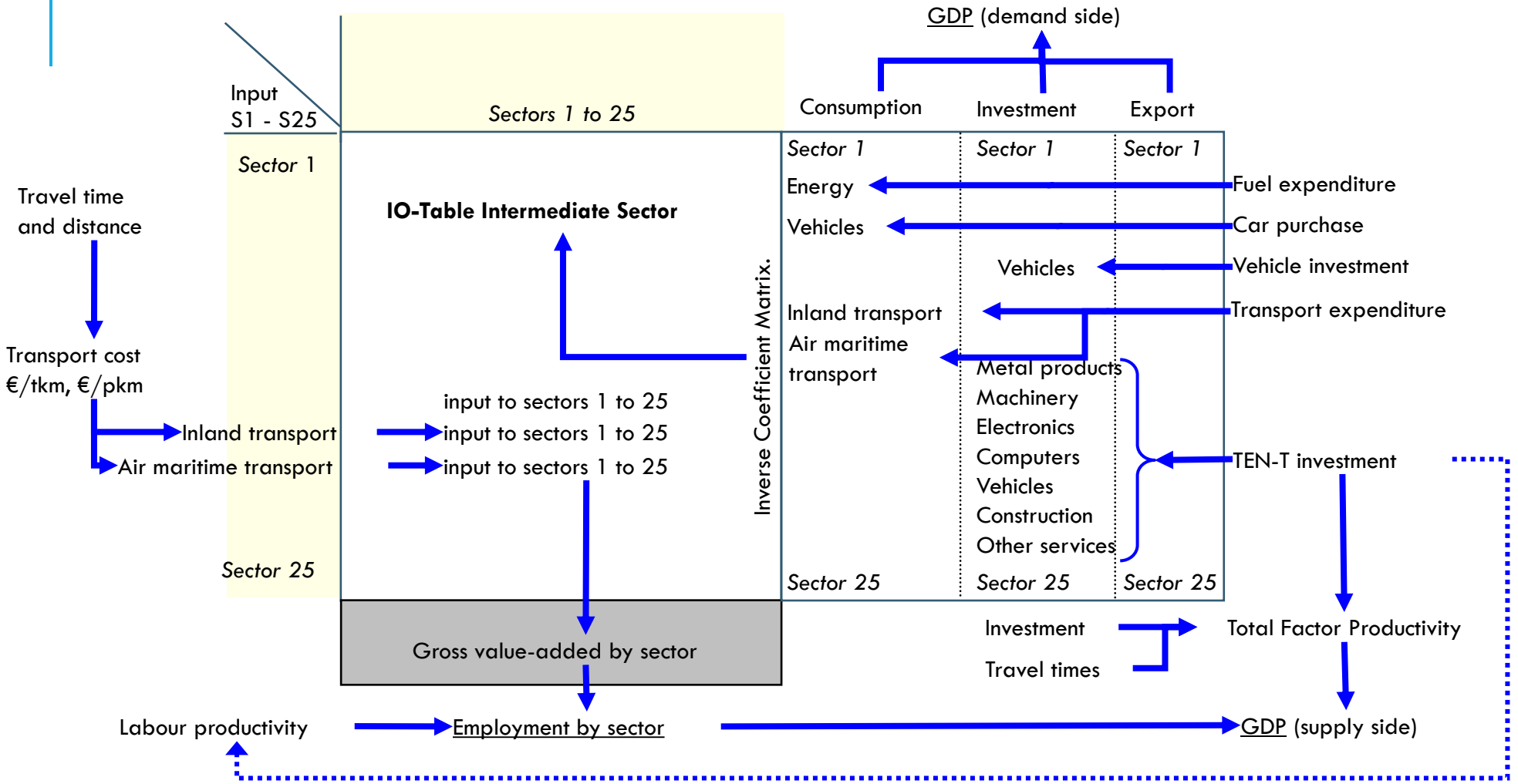


Source: Fraunhofer-ISI/TRT

TEN-T IMPACTS LINKED TO ASTRA ECONOMY MODEL



LINKING TRANSPORT CHANGES TO THE ECONOMIC ACCOUNTING



Source: Fraunhofer ISI / M-Five

SCENARIO SETTING – SELECTION OF CNC PROJECTS

- **No CNC ScanMed**
  - CNC Scandinavian-Mediterranean longest of all 9 CNC (from Sweden to Malta), crossing 7 countries
  - Highest investments of all 9 CNC → large projects like Fehmarn Belt Crossing or Brenner Base Tunnel
  - Planned CNC investments between 2015 and 2030 for EU28 → € 106 billion *

- **No CNC RhAlp**
  - CNC Rhine-Alpine crosses 5 countries (from Netherlands to Italy)
  - Already intensive travel demand on this corridor
  - Large projects: Gotthard BT, Rail Karlsruhe-Basle
  - CNC investments between 2015 and 2030 for EU28 → € 31.6 billion (plus € 11.3 billion for CH)*

- Test against **Reference Scenario** with full core TEN-T network by 2030

**All monetary values are expressed in real terms in constant € 2005*

TIME SAVINGS – ASSESSMENT APROACH

- Basic input: List of about 634 projects/investments from CNC work plans of the two corridors (total TEN-T core network has about 2,700 projects)
- Individual assessment of time savings by project and CNC for each NUTS1 zone (plus NO and CH)
- Rules for estimating travel time savings of:
  - Innovative technologies (ERTMS, SESAR, RIS, etc.) → Literature review
    - SESAR – 10% time savings per EU flight (SESAR Joint Undertaking 2011*)
    - ERTMS – max. 20% time savings for level 2 (Obrenovic et al. 2006**)
    - RIS – max. 10% (mainly for safety, but optimization at locks, etc.)
  - Cross-border: Large projects e.g. Fehmarn–Belt, Brenner, etc. → Literature review
  - Rule of thumbs for multi-modal platforms, logistic hubs, etc.

* *SESAR Joint Undertaking (2011): Assessing the macroeconomic impact of SESAR.*

** *Obrenovic et al. (2006): European Transport Conference: Proceedings of the ETC; Migration of the European Train control system (ETCS) and the impacts on the international transport markets*

INPUTS OF TRANSPORT TIME CHANGES BY NUTS-I ZONE: INTERNATIONAL TRANSPORT
(NATIONAL/REGIONAL TRANSPORT SEPARATE)

International Transport		%-travel time increase in case of non-completion - range of all NUTS-I zones affected by a CNC			
PASSENGER travel time changes in 2030		Rail	Car	Bus	Air
SCM	Scandinavian-Med	10%-68%	3%-68%	3%-68%	5%-10%
RHA	Rhine-Alpine	20%-45%	3%	3%	5%

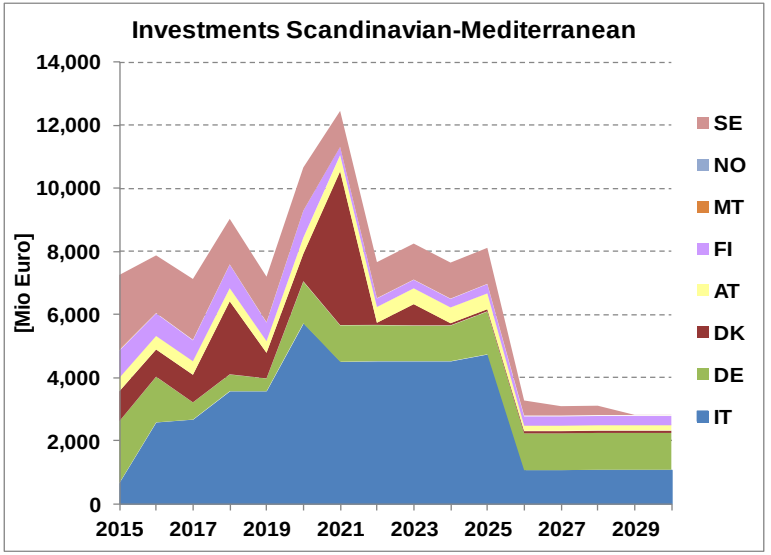
International Transport		%-travel time increase in case of non-completion - range of all NUTS-I zones affected by a CNC			
FREIGHT travel time changes in 2030		Rail	Truck	Maritime	IWW
SCM	Scandinavian-Med	10% - 118%	5%-68%	5%	n.a.
RHA	Rhine-Alpine	20%-45%	5%	5%	10%

Source: Fraunhofer ISI / PTV

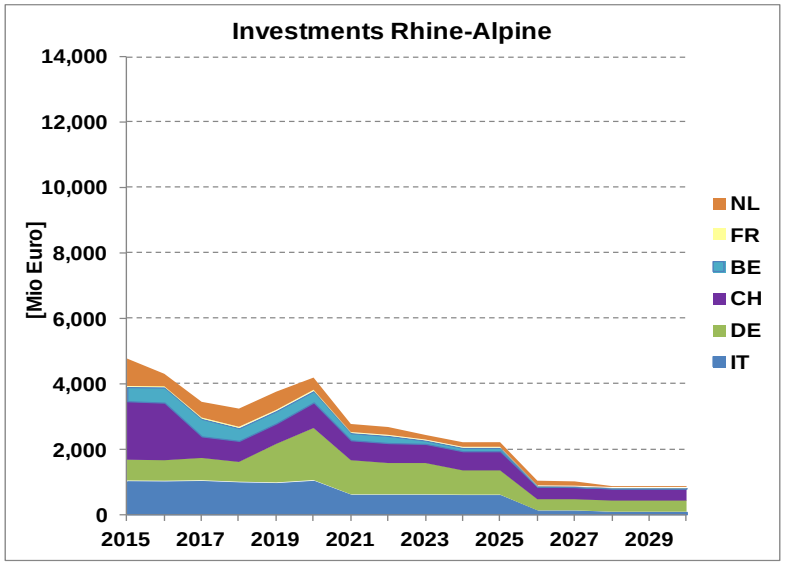
SCENARIO SETTING – AVOIDED INVESTMENTS

No CNC ScanMed

- 423 projects from CNC work plan
- Planned investments: € 130 billion* (2015 and 2030: € 106 billion*)
- 16% of all projects / 23% of investments



Source: Fraunhofer-ISI



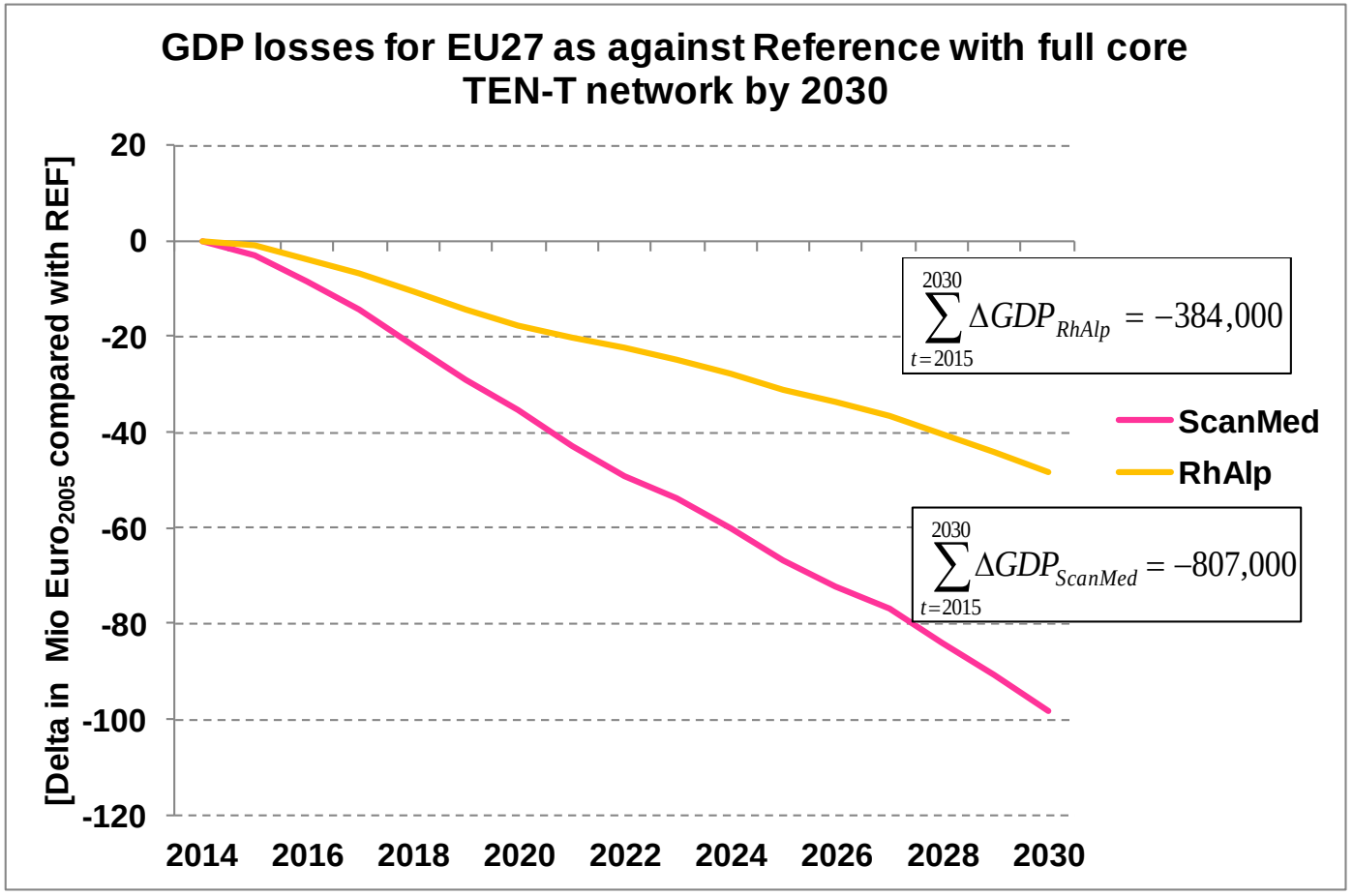
Source: Fraunhofer-ISI

No CNC RhAlp

- 211 projects from CNC work plan
- Planned investments: € 61 billion* (2015 and 2030: € 43 billion*)
- 8% of all projects / 9% of investments

* *All monetary values are expressed in real terms in constant € 2005*

CORRIDOR SCENARIOS – LOSS OF GDP



Source: Fraunhofer-ISI

No ScanMed

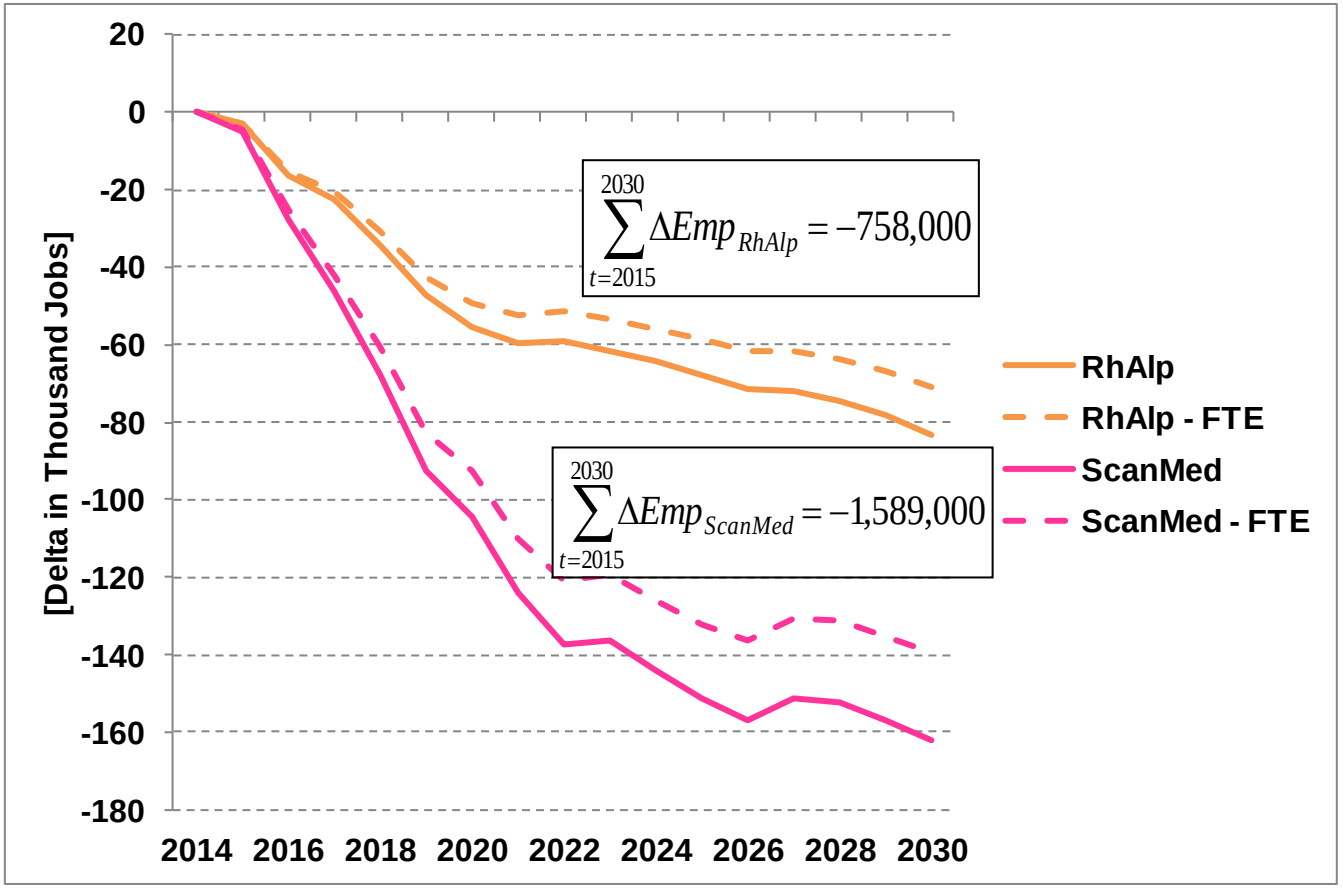
- 2030: - € 98 bn
- 2015-2030: € 807 bn

No RhAlp

- 2030: - € 49 bn
- 2015-2030: € 384 bn

* *All monetary values are expressed in real terms in constant € 2005*

CORRIDOR SCENARIOS – JOBS NOT CREATED



Source: Fraunhofer-ISI

No ScanMed

FTE jobs

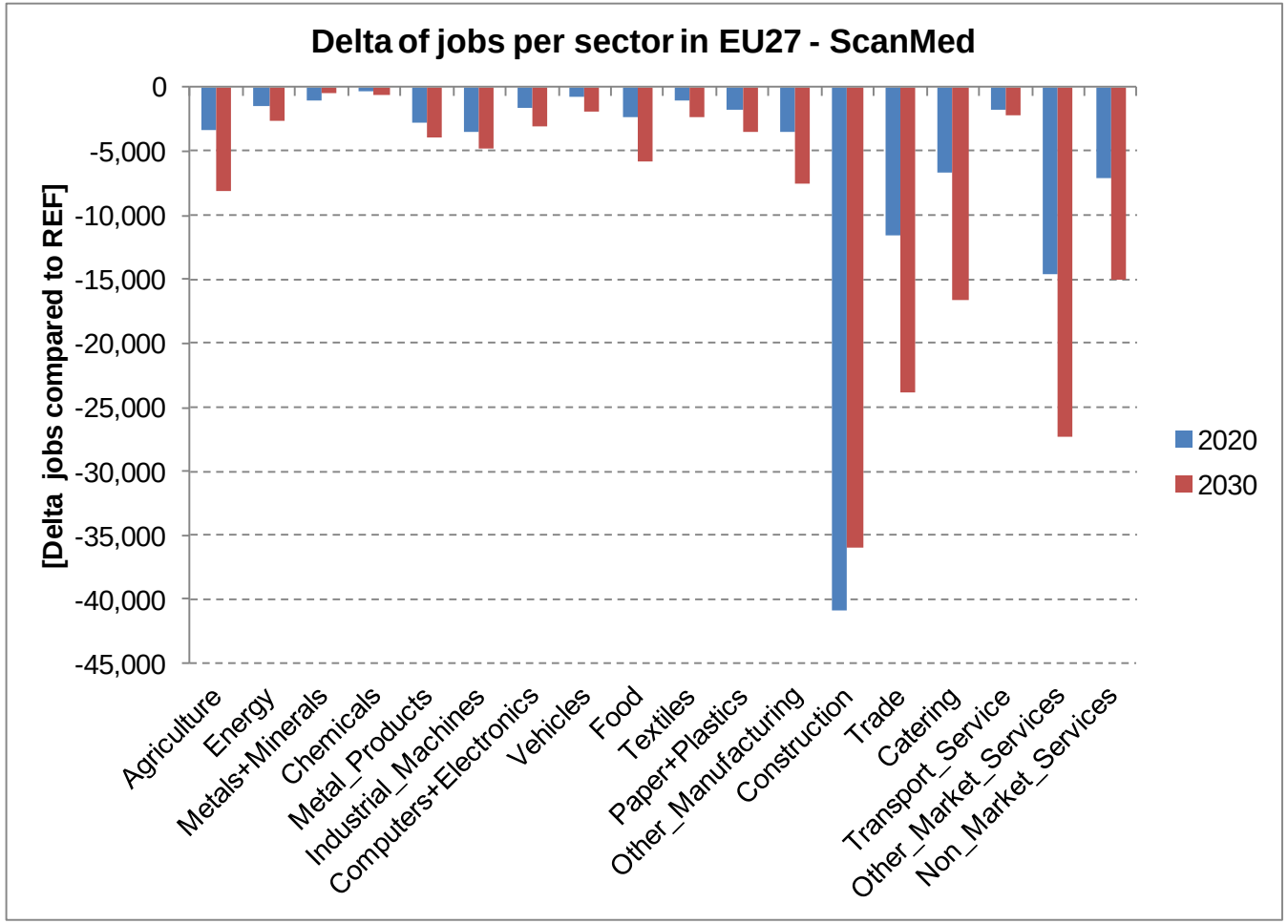
- 2030: - 139,000
- 2015-2030: - 1,6 million

No RhAlp

FTE jobs

- 2030: - 71,000
- 2015-2030: - 758,000

CORRIDOR SCENARIOS – SECTORAL EMPLOYMENT



Source: Fraunhofer-ISI

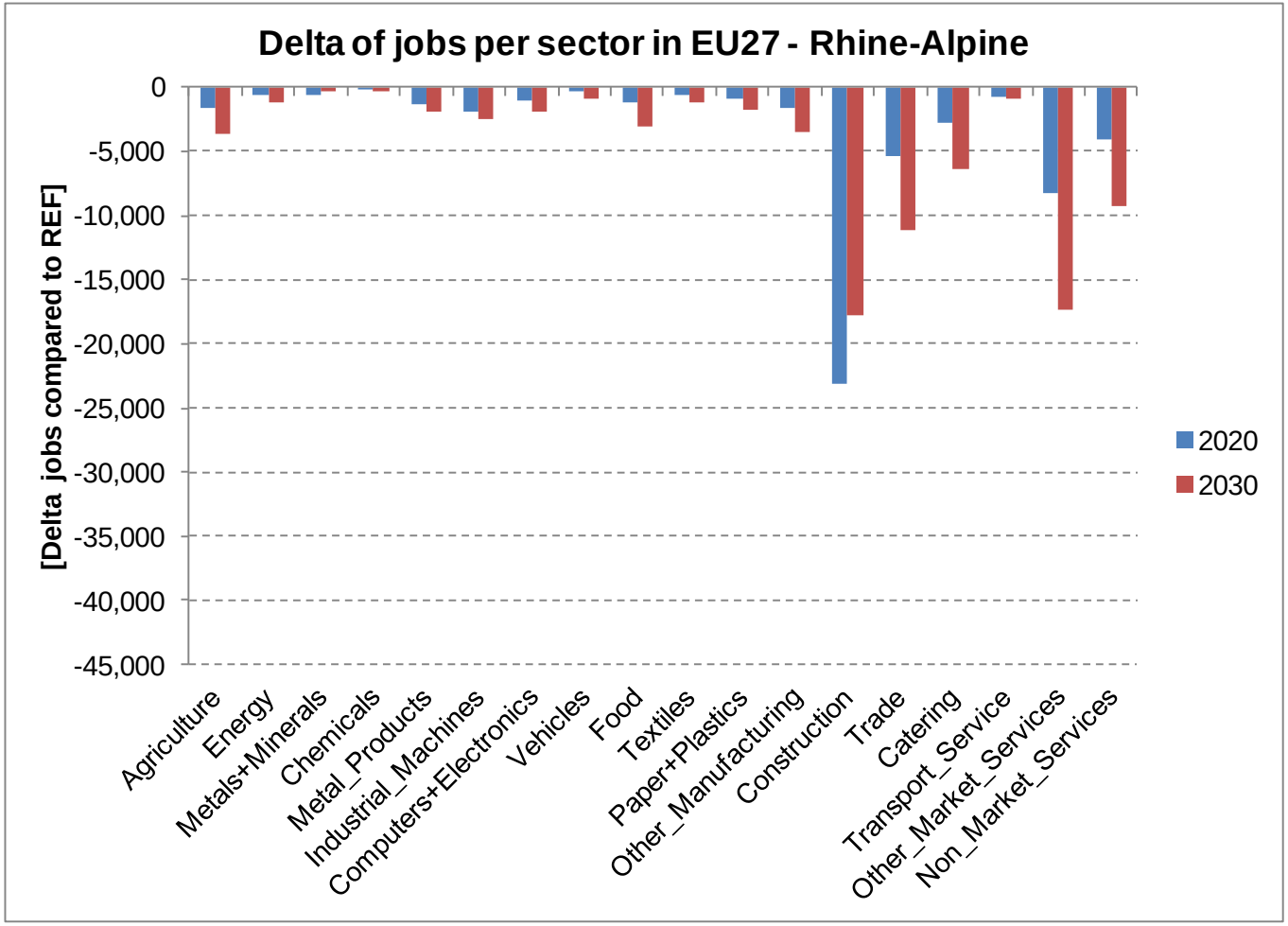
CNC No ScanMed

- Strongest impact on construction and service sectors
- 2nd round impacts on agriculture
- Modal shift from rail to road compensates loss of rail (and air) jobs

CORRIDOR SCENARIOS – SECTORAL EMPLOYMENT

CNC No RhAlp

- Similar impacts
- Strongest impact on construction and service sectors
- 2nd round impacts on agriculture
- Modal shift from rail to road compensates loss of rail (and air) jobs



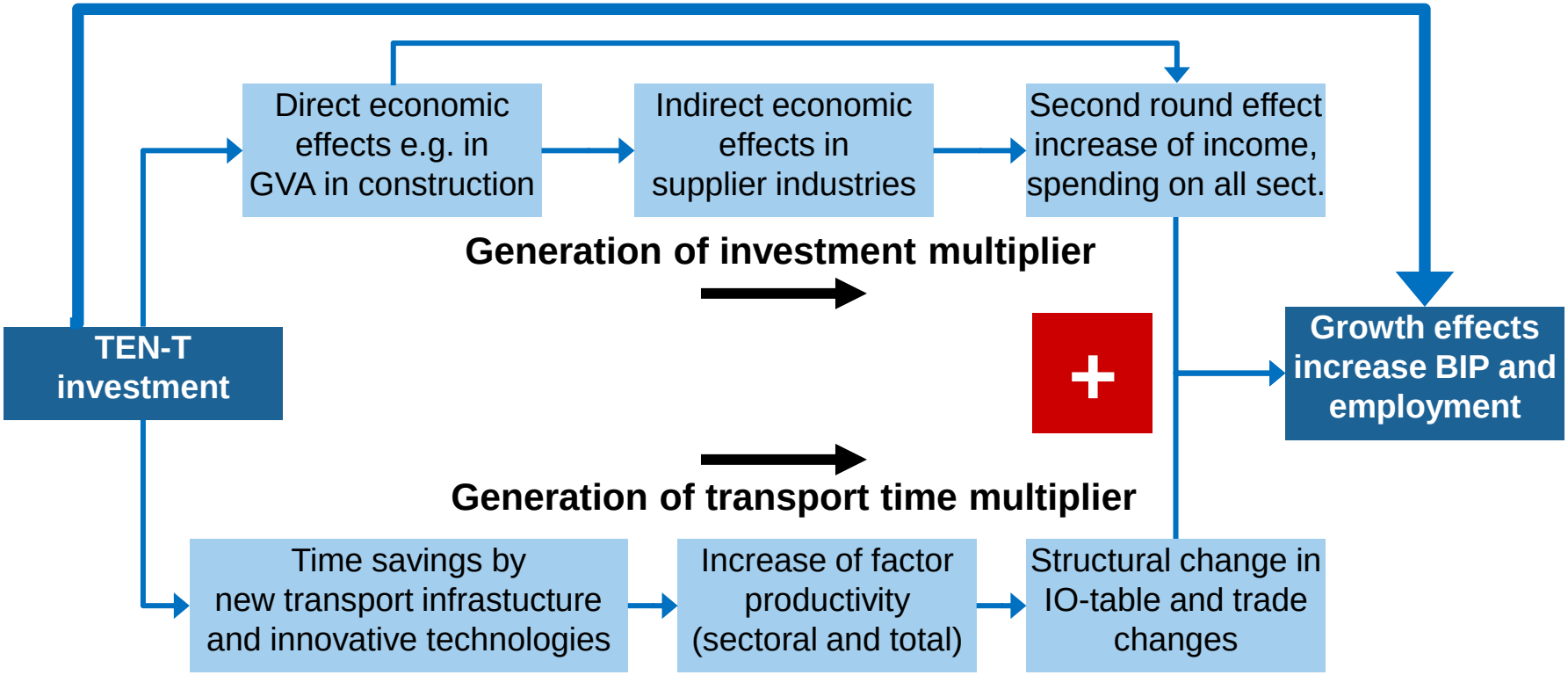
Source: Fraunhofer-ISI

KEY FINDINGS WIDER ECONOMIC IMPACTS – NO CNC SCANMED AND NO CNC RHALP SCENARIO

Indicator	No CNC ScanMed	No CNC RhAlp
Avoided investments for EU27 (2015-2030)	€ 106 billion	€ 43 billion
Loss of GDP for EU27 in 2030 compared with REF	- € 98 billion	- € 49 billion
Cumulated loss of GDP for EU27 (2015-2030)	- € 807 billion	- € 384 billion
Jobs not created (Total/FTE) in EU27 in 2030 compared with REF	162,000 / 139,000	83,000 / 71,000
Job-years (Total/FTE) not created in EU27 (2015-2030)	1.8 million /1.6 million	0.87 million / 0.76 million

ECONOMIC MULTIPLIER OF TEN-T INVESTMENTS

Multiplier from investment to economic impact



Source: Schade/Krail 2015

COMPARISON OF WIDER ECONOMIC IMPACTS OF THE TWO CORRIDORS

Economic Multipliers	Scenario	Value	Unit
FTE-Job-Years per billion investment	No_CNC_ScanMed	14,683	Person-Years/B€
	No_CNC_RhAlp	25,935	Person-Years/B€
	Literature values	12,700 to 37,300	Person-Years/B€
Accumulated GDP gain per investments (both in bn€) Period 2015 to 2030 Effects continue after 2030	No_CNC_ScanMed	7.5	GDP/INV Multiplier
	No_CNC_RhAlp	13.2	GDP/INV Multiplier

Source: own elaboration

KONTAKT

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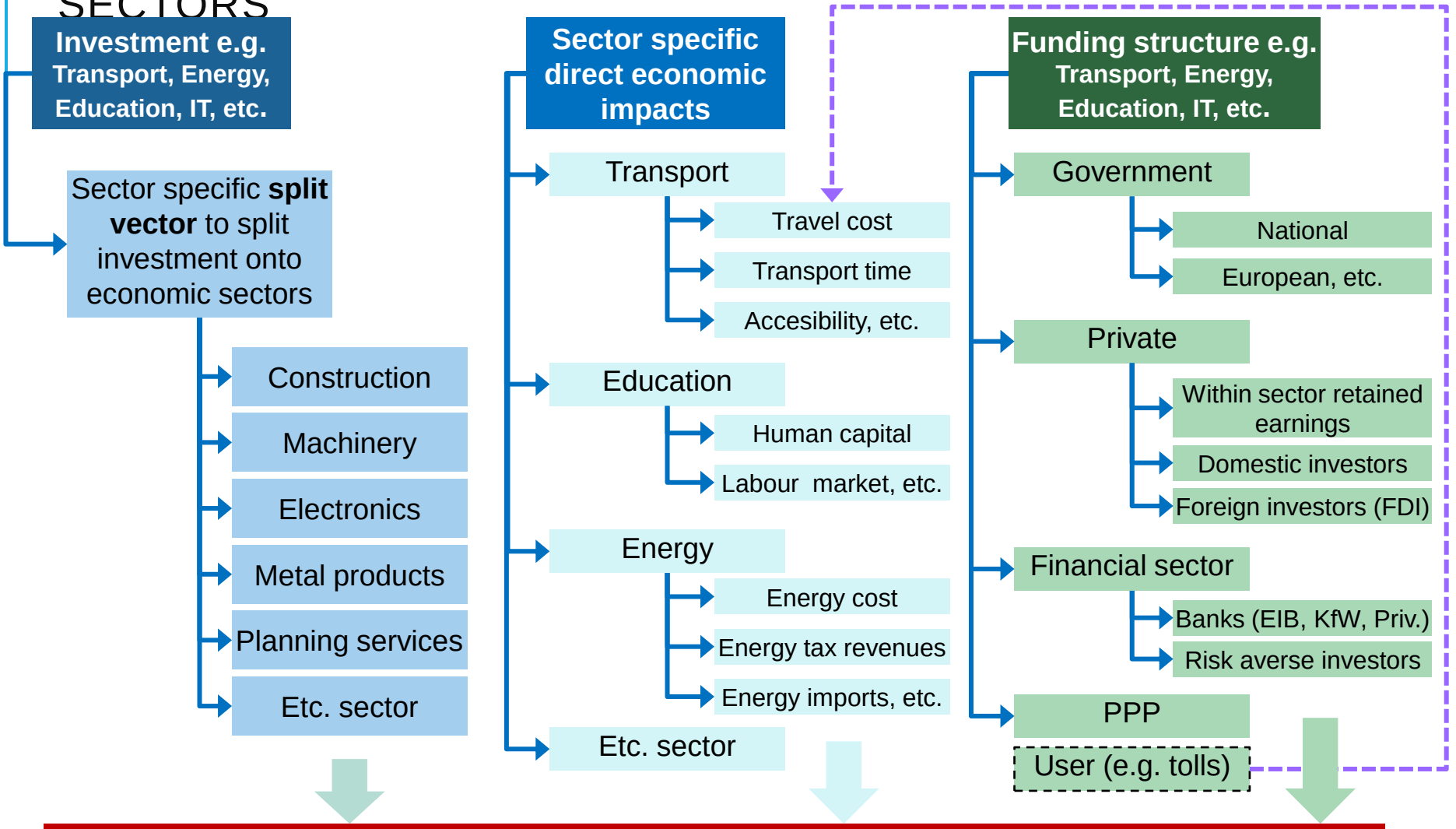
OPTIONAL SLIDES

IMPACTS OF INFRASTRUCTURE INVESTMENTS IN DIFFERENT SECTORS



Source: Schade/Krail 2015

AVERAGE EMPLOYMENT GENERATION OF INFRASTRUCTURE INVESTMENT
(JOB-YEARS / BN$ INVESTED)

Project type	Studies reviewed	Total employment generated (Direct + Indirect + Induced)	
		Average values	Total Range
Energy	16	26,136	8,829 – 51,185
Transportation	25	24,223	12,709 – 37,259
Highways	5	34,288	22,535 – 37,259
Roads and bridges	8	33,770	18,926 – 35,307
Rail	4	18,871	12,709 – 22,286
Mass Transit	5	29,295	23,329 – 32,430
Buildings	10	26,204	17,736 – 32,119
Water	6	25,297	18,352 – 30,435
Telecommunication	3	28,608	19,729 – 31,646
Health	1	20,356	20,356

Source: National Roads Authority (2013). The Employment Benefits of Investment Projects. International Studies.

