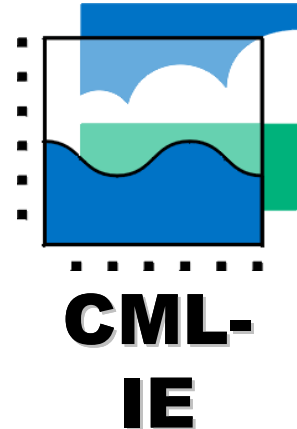


# Top Down Instrument Development: from Scenario Families to consistent sets of Building Blocks

Gjalt Huppes, with Arjan de Koning,  
Sebastiaan Deetman and Ruben Huele

Presented at

***CECILIA2050 Scenario Workshop***  
***London, 30 October 2013***



# Top down towards Building Blocks: three parts

## 1. From Governance Storylines to Governance Scenarios

IPCC-adapted: Adding Governance Block

## 2. Instrument options specified and ordered

Strategy: From general to specific

## 3. Building Blocks per scenario

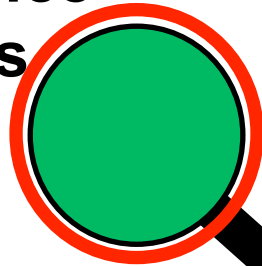
First general instruments then gaps filled consistently

4. *[Instrument mixes detailed: Not here and now]*

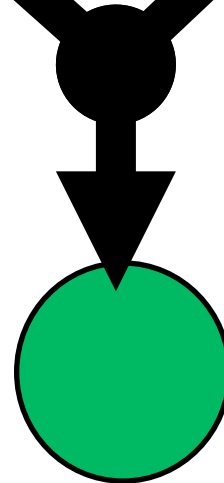
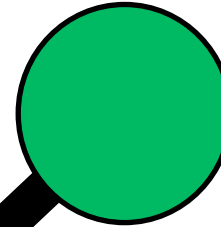


# Main structure visualized

**Governance  
Scenarios**



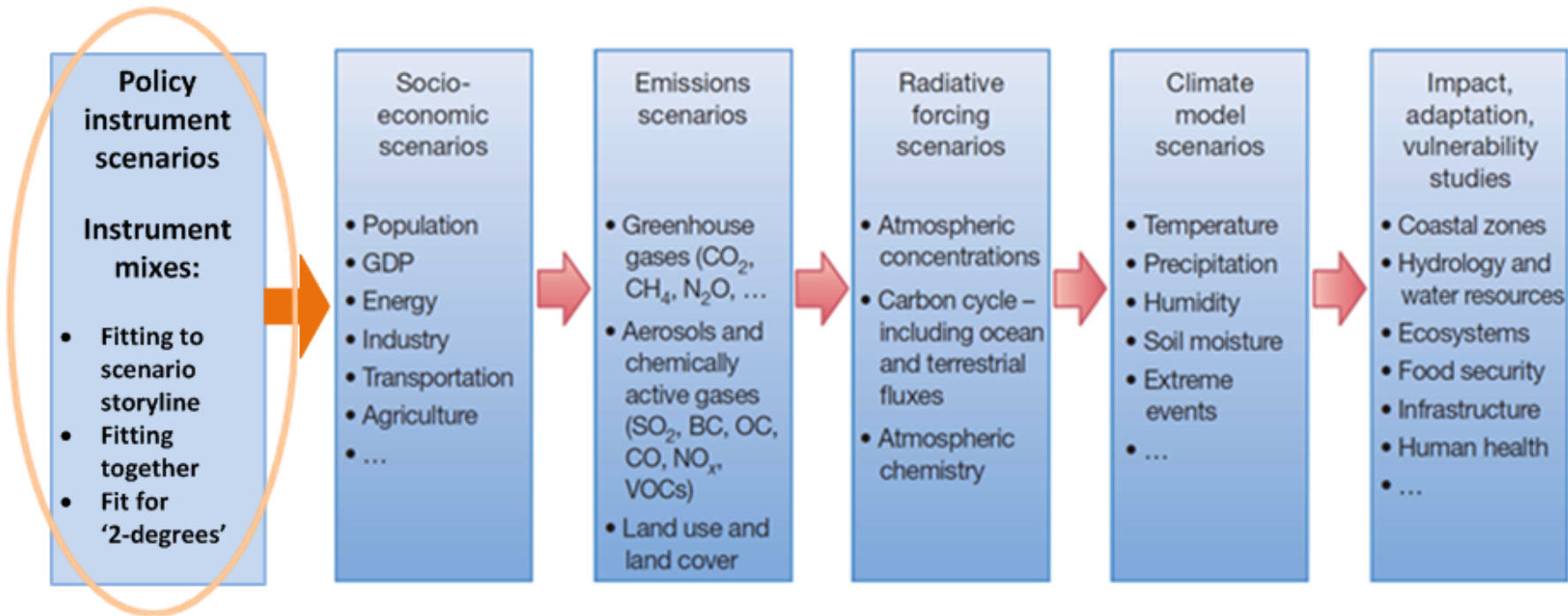
**Instrument  
options**



**G-Scenarios with  
Building Blocks**



# Storylines and Scenario Families for Climate Policy Instrumentation: IPCC



# Three Governance Dimensions for Climate Policy Instrumentation

## 1. Supranationality

low ← → high

Authority vested in supranational bodies

EU Commission power versus Member State dominance, etc.

## 2. Administrative capacity

low ← → high

Implementation according to impartial rules

(EU CDM China: stopped because of “unclear results”)

## 3. Market centrality

low ← → high

Markets ordered generically: limited public interference,  
limited power of private parties (mono/oligopolistic)



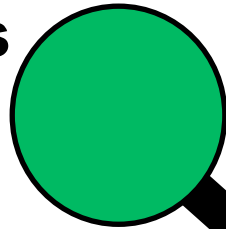
# Eight Governance Scenario Families

low ←	→ high	
●		sup
●		adm
●		mar
●		sup
●		adm
	●	Mar
●		sup
	●	Adm
●		mar
●		sup
	●	Adm
	●	Mar

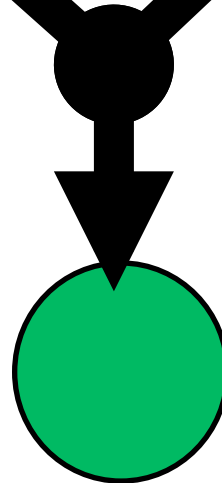
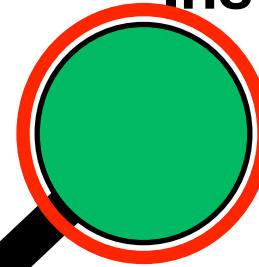
low ←	→ high	
	●	Sup
●		adm
●		mar
	●	Sup
	●	Adm
●		mar
	●	Sup
●		adm
	●	Mar
	●	Sup
	●	Adm
	●	Mar

# Where are we?

**Governance  
Scenarios**



**Instrument  
options**



**G-Scenarios with  
Building Blocks**



# Hierarchy of Basic Instrument Types

## 1. Institutional Framework

- Electricity markets; capital markets; reduced constraints (working hours, taxes, etc.); macro-economic + environmental policy; spatial planning; BTA rules; ...

## 2. Internalization of climate emissions

- Encompassing emission pricing CO<sub>2</sub> equiv

## 3. Basic research

- Future technologies; future behavior; ...

## 4. Infrastructure for public and private use

- Main elec-grid; CO<sub>2</sub> transport; Ammonia transport; HS-train lines; ....

## 5. Technology specifications overruling market behavior

- Operating permits; product specifications; high feed-in tariffs; tax exemptions; etc, etc.

## 6. Innovation implementation

- Valley of death prevention; learning curves creation; low-carbon refurbishing initiation; ...



# Hierarchy in filling gaps: Example Elec market

## 1. Institutional Framework

Linking producer and end-user in electricity markets, spot pricing; solving the zero ST marginal cost problems of renewables

## 2. Internalization of climate emissions

## 3. Basic research

## 4. Infrastructure for public and private use

- Main electricity grid open to all, capacity expressed in market prices.

## 5. Technology specifications overruling market behavior

- No smart grid regulations needed: electric car owners linked to small and large producers; IT is there already.

## 6. Innovation implementation

➔ **Solutions depend on governance situation**

# Hierarchy in filling gaps: Example carbon pricing

## 1. Institutional Framework

- BTA brought in line with WTO

## 2. Internalization of climate emissions

- Upstream carbon tax with CCS refund, an

## 3. Basic research

- Guided by market perspectives, if not: difficult planning task

## 4. Infrastructure for public and private use

- .CO2 transport design, and implementation?

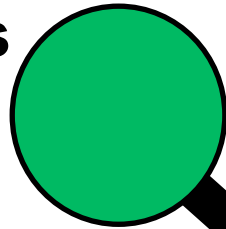
## 5. Technology specifications overruling market behavior

- For most non-CO2 emissions command and control

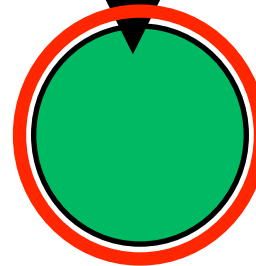
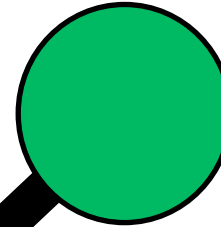
## 6. Innovation implementation

# Where are we?

**Governance  
Scenarios**



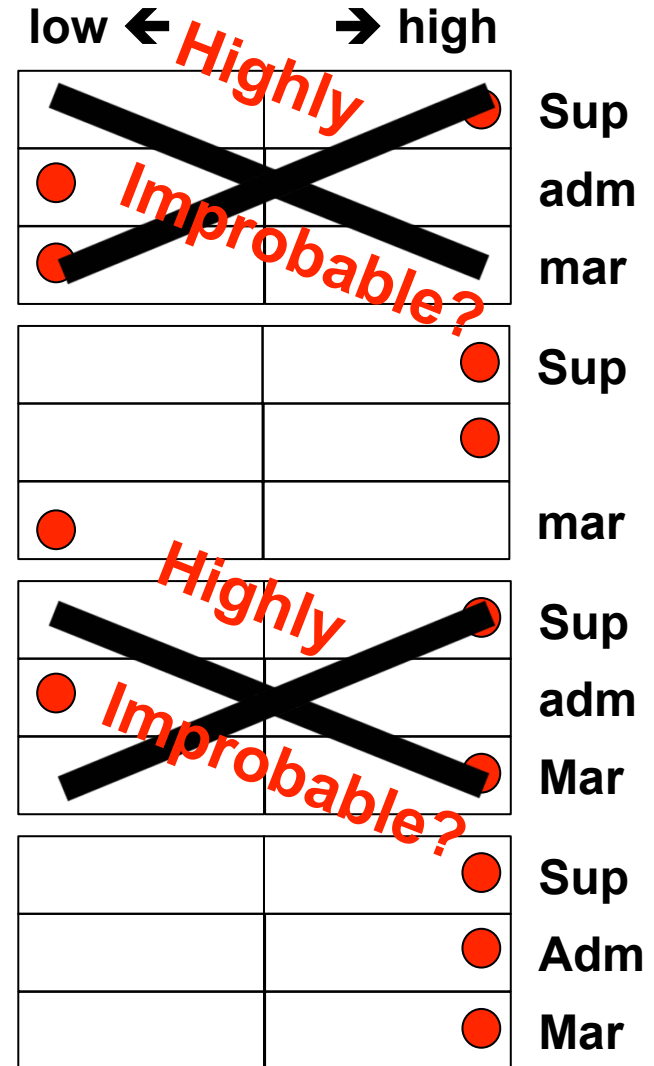
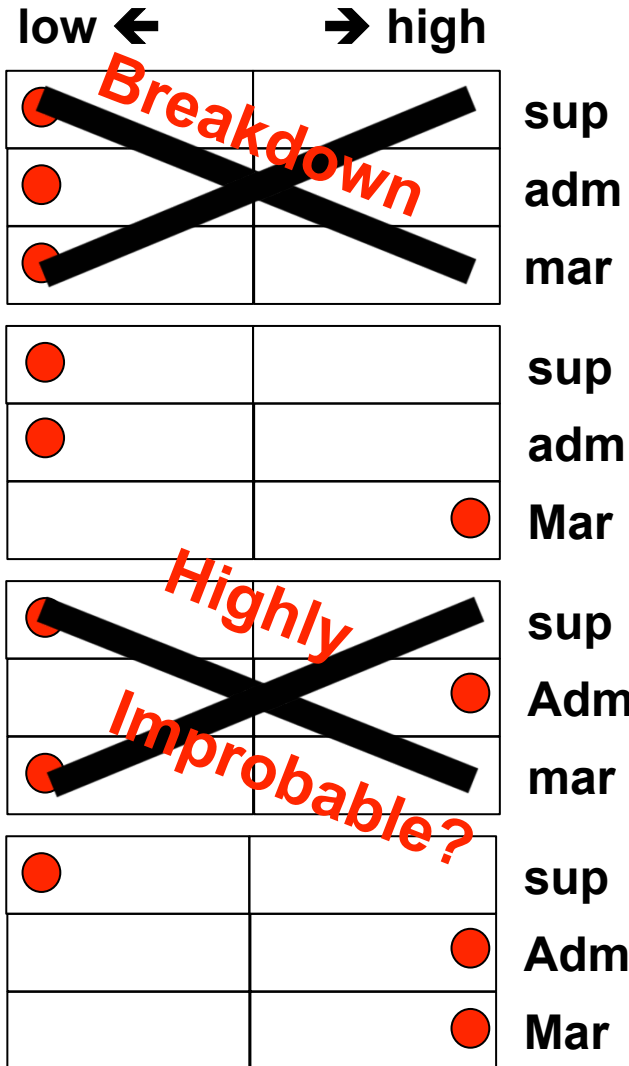
**Instrument  
options**



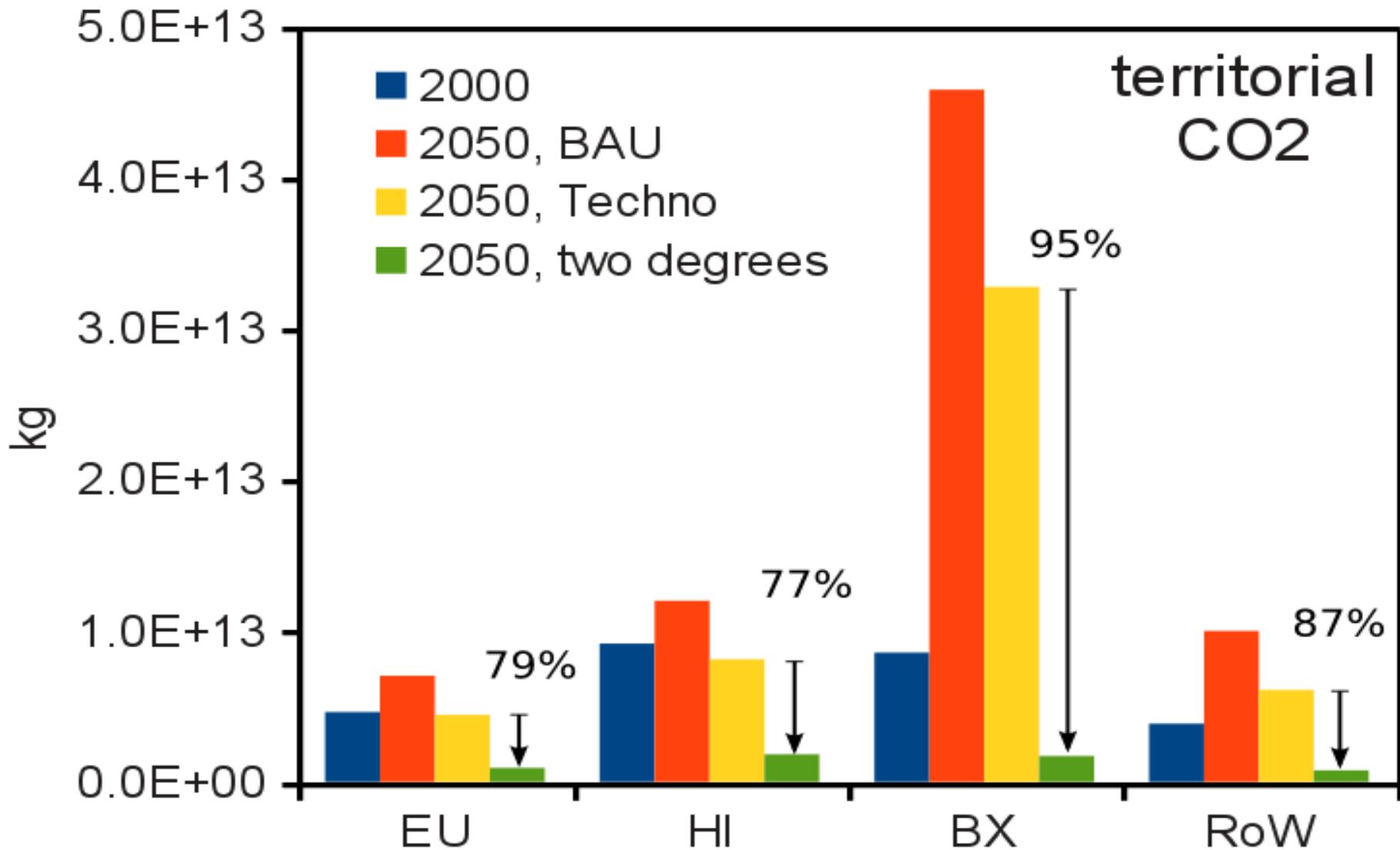
**G-Scenarios with  
Building Blocks  
PPP**



# Eight Governance Scenarios: Pruning the non-feasible [provisional]



# Remember our task: +2-Degrees Climate Stabilization



# Four Plausible EUs for 2-Degrees

- [SaM]  
Like EU now, more horizontal coordination

●		sup
●		adm
	●	Mar
- [sAM]  
Re-nationalized (also)  
Climate Policies

●		sup
	●	Adm
	●	Mar
- [SAm]  
Planning Federation,  
heavy bureaucracy

	●	Sup
	●	Adm
●		mar
- [SAM]  
Market Federation,  
lean bureaucracy

	●	Sup
	●	Adm
	●	Mar

•	
•	
	•

sup  
adm  
Mar

# Like EU now, more horizontal coord.

## 1. Institutional Framework

- Electricity markets; BTA; Macro EconPol
- Capital markets; Spatial planning
- Reduced constraints (working hours; Taxes etc)

Remain scattered; BTA difficult; no Clim considerations

Remain scattered; limited move to integrated city

No reduction working hours; Taxes remain scattered

## 2. Internalization 'Climate'

- Encompassing emission pricing

Limited role generic emission pricing : a bit aligned national taxes

## 3. Basic research

- Future technologies;
- Future behavior; ...

National views, limited central funding

Incidental studies; not guiding infrastructure dev.

## 4. Infrastructure for public and private use

- Main electricity grid;
- CO<sub>2</sub> transport for CCS
- Fuel transport H<sub>2</sub>; Ammonia ... )
- HS-train lines; ....

lagging behind needs

no pro-active planning

waiting for private inducement

developed from national perspectives

## 5. Prescriptions overruling market behavior

- Technology specifications , techno-subsidies
- Product specifications; Behavior specs

Many diverging national actions,

Many, national interests prime

## 6. Innovation implementation

- Valley of death prevention;
- Learning curves creation;
- Low-carbon refurbishing initiation
- ...

Prime-mover-advantages led

National Prime-mover-advantages led

Energy supply considerations prime

●	
	●
	●

sup

Adm

Mar

# Re-nationalized Climate Policies

## 1. Institutional Framework

- Electricity markets; BTA; Macro EconPol
- Capital markets; Spatial planning
- Reduced constraints (working hours; Taxes etc)

Remain **scattered**; BTA impossible

Remain **scattered**; No spatial planning principles

Limited reduction; Taxes *more* scattered

## 2. Internalization 'Climate'

- Encompassing emission pricing

Limited role generic emission pricing (country policies more dominant: subsidies + taxes)

## 3. Basic research

- Future technologies
- Future behavior; ...

National views, limited EU funding

Incidental studies; not guiding infrastructure developm.

## 4. Infrastructure for public and private use

- Main electricity grid
- CO<sub>2</sub> transport; for CCS
- Fuel transport (H<sub>2</sub>; Ammonia ...)
- HS-train lines; ....

lagging behind needs

no pro-active planning

waiting for private inducement

developed from national perspectives

## 5. Prescriptions overruling market behavior

- Technology specifications , techno-subsidies
- Product specifications; Behavior specs

Diverging actions

National interests prime

## 6. Innovation implementation

- Valley of death prevention;
- Learning curves creation;
- Low-carbon refurbishing initiation;
- ...

For national innovators: Prime-mover-advantages led

For national innovators: Prime-mover-advantages led

Each country own **different** programs



	●	Sup
	●	Adm
●		mar

# Planning Federation

## 1. Institutional Framework

- Electricity markets; BTA; Macro
- Capital markets; Spatial Planning
- Reduced constraints (working hours; Taxes etc)

Substantially integrated; BTA difficult; some Clim consid.

Substantially integrated

Limited reduction; better ordered

## 2. Internalization 'Climate'

- Encompassing emission pricing

Limited role generic emission pricing; Cap ??

## 3. Basic research

- Future technologies;
- Future behavior; ...

Some supranational views, limited funding?

Incidental studies; limited guidance on infrastructure.

## 4. Infrastructure for public and private use

- Main electricity grid;
- CO<sub>2</sub> transport; for CCS
- Others like ((H<sub>2</sub>; Ammonia ... fuels)
- HS-train lines; ....

Active planning of old technologies

Active planning

Active planning, national try-outs

Active planning reckoning with national perspectives

## 5. Prescriptions overruling market behavior

- Technology specifications, techno-subsidies
- Product specifications; Behavior specs

Supranational interests prime; countries follow

Supranational interests prime; many subsidies, few taxes

## 6. Innovation implementation

- Valley of death prevention
- Learning curves creation
- Low-carbon refurbishing initiation
- ...

Some EU, others national prime-mover-advantages led

Some EU, others national prime-mover-advantages led

Detailed EU level approach

# Market Federation

● Sup

● Adm

● Mar

## 1. Institutional Framework

- Electricity markets , BTA; macro EconPol
- Capital markets; Spatial Planning
- Reduced constraints (working hours, taxes etc.)

**Designed; BTA well possible; EconEnv integr**  
**Unified also small users; some generic design principles**  
**Removed mainly, taxes aligned, partly centralized**

## 2. Internalization ‘Climate’

- Encompassing emission pricing

**Generic emission taxes on all CO2 and  
and on main non-CO2**

## 3. Basic research

- Future technologies
- Future behavior; ...

**National views, limited funding**  
**Incidental studies; limited guidance infrastructure dev.**

## 4. Infrastructure for public and private use

- Main electricity grid
- CO<sub>2</sub> transport; for CCS
- Fuel Transport (H<sub>2</sub>; Ammonia; ... )
- HS-train lines; ....

**Modest planning**  
**Advanced, business led, through strong market incentives**  
**Business led, through strong market incentives**  
**Business led, as through high air transport cost**

## 5. Prescriptions overruling market behavior

- Technology specifications, techno-subsidies
- Product specifications

**Limited, no techno-subsidies**  
**Limited**

## 6. Innovation implementation

- Valley of death prevention;
- Learning curves creation
- Low-carbon refurbishing initiation
- ...

**Limited necessity with high carbon prices**  
**Limited necessity with high carbon prices**  
**Limited necessity with high carbon prices**

# Carbon prices for *2-degrees*

Nordhaus (2013) *Climate Casino*, 15 models:

- For **2.5** degrees, rising to 160 \$/ton in 2050
  - *Iff* full global participation
  - *Iff* most efficient policies are administered
- Both **not possible fully**, never!

Failing to create institutional development:

- **Higher carbon prices** needed, and “**more of all**”
- Substantially **higher real cost** of climate policy



# Conclusions on BBs for 2-Degrees

- **Plausible Governance Scenarios are widely diverging**
- **For effectiveness and optimality, Building Blocks to be focused on high efficiency instruments**
- **Instrument Building Blocks depend very much on Governance Scenarios**
- **2-Degrees target: Is it attainable with any *not-high*?**
  - **Low supranationality?**
  - **Low market dominance?**
  - **Limited administrative capacity?**



