











### Technology optimism is not enough

Some considerations on the difficulty of triggering low-carbon transition in France

> Jean-Charles Hourcade, Ruben Bibas Presented by Julien Lefèvre **CIRED AIM International Workshop** 9 December 2016



# Question: How can one trigger transition towards factor 4 by 2050 in France?

### Not doing anything is not an option

Policies are needed!

#### Reference

-33% CO<sub>2</sub> emissions in 2050 relative to 1990 (analysis using IMACLIM-R France)

# A set of 'consensus' policies & measures still insufficient for factor 4

**EncilowCarb PM** 

Reference

#### Including:

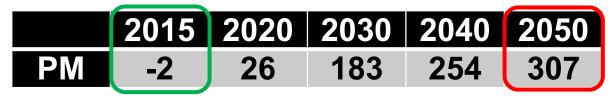
- Energy efficiency norms in new buildings
- **Financial** incentives for energy efficiency renovation
- **Eco-taxes** on trucks and kerosene

=> **-61%** CO<sub>2</sub> emissions in 2050 relative to 1990

# Despite 'engineer optimism', a transition cost

	2010-	2010-	2020-	2030-	2040-	2010-
	2015	2020	2030	2040	2050	2050
REF	0.77	0.83	1.09	1.47	0.85	1.06
PM	0.73	0.9	1.32	1.46	0.9	1.15

**GDP** mean annual growth rate (%)



**Employment variation relative to BAU (1000s full-time jobs)** 

**Computed with IMACLIM R France** 

- PM have positive macroeconomic implications in the long-run
- Time-lags between expenditures and benefits create short-term loss

# P&M + carbon tax improve environmental performance

**Carbon tax** 

**EncilowCarb PM** 

Reference

#### Quinet report carbon tax:

- 32€/tCO<sub>2</sub> in 2012
- 100€/tCO<sub>2</sub> in 2030
- 300€/tCO<sub>2</sub> in 2050

#### Revenue recycling:

- ½ labor tax cuts
- ½ 'green checks' to households

### **But transition costs persist**

	2010-2015	2010-2020	2040-2050	2010-2050
REF	0.77	0.83	0.85	1.06
PM	0.73	0.90	0.90	1.15
PM + T	0.69	0.86	0.87	1.09

**GDP** mean annual growth rate (%)

	2015	2020	2030	2040	2050
PM	-2	26	183	254	307
PM + T	2	5	166	<b>174</b>	202

**Employment variation relative to REF (1000s full-time jobs)** 

#### PM+T underperforms PM

 Economy-wide propagation of energy costs not compensated by lower labor taxes given recycling rule and time profile of carbon tax

# P&M + carbon tax + negotiation do not improve environmental performance

**Carbon tax + negotiation** 

**EncilowCarb PM** 

Reference

Share tax revenue between labor tax reduction and green checks to balance:

- Competitiveness risk of low reduction in labor tax
- Demand risk of low redistribution towards households

### Now transition costs disappear

	2010-2015	2010-2020	2040-2050	2010-2050
REF	0.77	0.83	0.85	1.06
PM	0.73	0.90	0.90	1.15
PM+T	0.69	0.86	0.87	1.09
PM+T+N	0.81	0.96	0.88	1.14

**GDP** mean annual growth rate (%)

	2015	2020	2030	2040	2050
PM	-2	26	183	254	307
PM+T	2	5	166	174	202
PM+T+N	36				628

**Employment variation relative to REF (1000s full-time jobs)** 

- This result is not tax carbon specific...
  - ... But the carbon tax provides degree of freedom for social negotiation through wider tax base

# Adding financial device overshoots factor 4

Financial tool, signal credibility

**Carbon tax + negotiation** 

**EncilowCarb PM** 

Reference

Financing device lowers investment risk in low-carbon projects

→ modeled as lower discount rate

Increased credibility of carbon signal

→ modeled as 'less myopic' decisions

=> -85% CO<sub>2</sub> emissions in 2050 relative to 1990

### While transition cost do not reappear

	2010-2015	2010-2020	2040-2050	2010-2050
REF	0.77	0.83	0.85	1.06
PM	0.73	0.90	0.90	1.15
PM+T	0.69	0.86	0.87	1.09
PM+T+N	0.81	0.96	0.88	1.14
PM+T+N+F	0.77	0.9	0.94	1.2

**GDP** mean annual growth rate (%)

- Complementarity between financial device and carbon tax:
  - Lower carbon tax (50€/tCO<sub>2</sub> instead of 300€ in 2050) yields Factor 4 and improves growth
- However, this result assumes political, social and technical capacity to enforce a diverse set of measures

#### Conclusion

### Question: How can one trigger transition towards factor 4 by 2050 in France?

A heuristic tale suggests that ...

- ... technology is not enough and deep decarbonisation is possible only if embedded in a broader social contract, including:
- sectoral policies
- carbon fiscal reform
- labor markets and labor regulations
- financial intermediation



ET LE DÉVELOPPEMENT











### Thank you

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#### References

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## Appendix: Finance is needed in an uncertain world

