

Impact of energy performance regulations on HVAC innovation: addressing the characteristics of French and Swedish regulations

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Thesis presentation

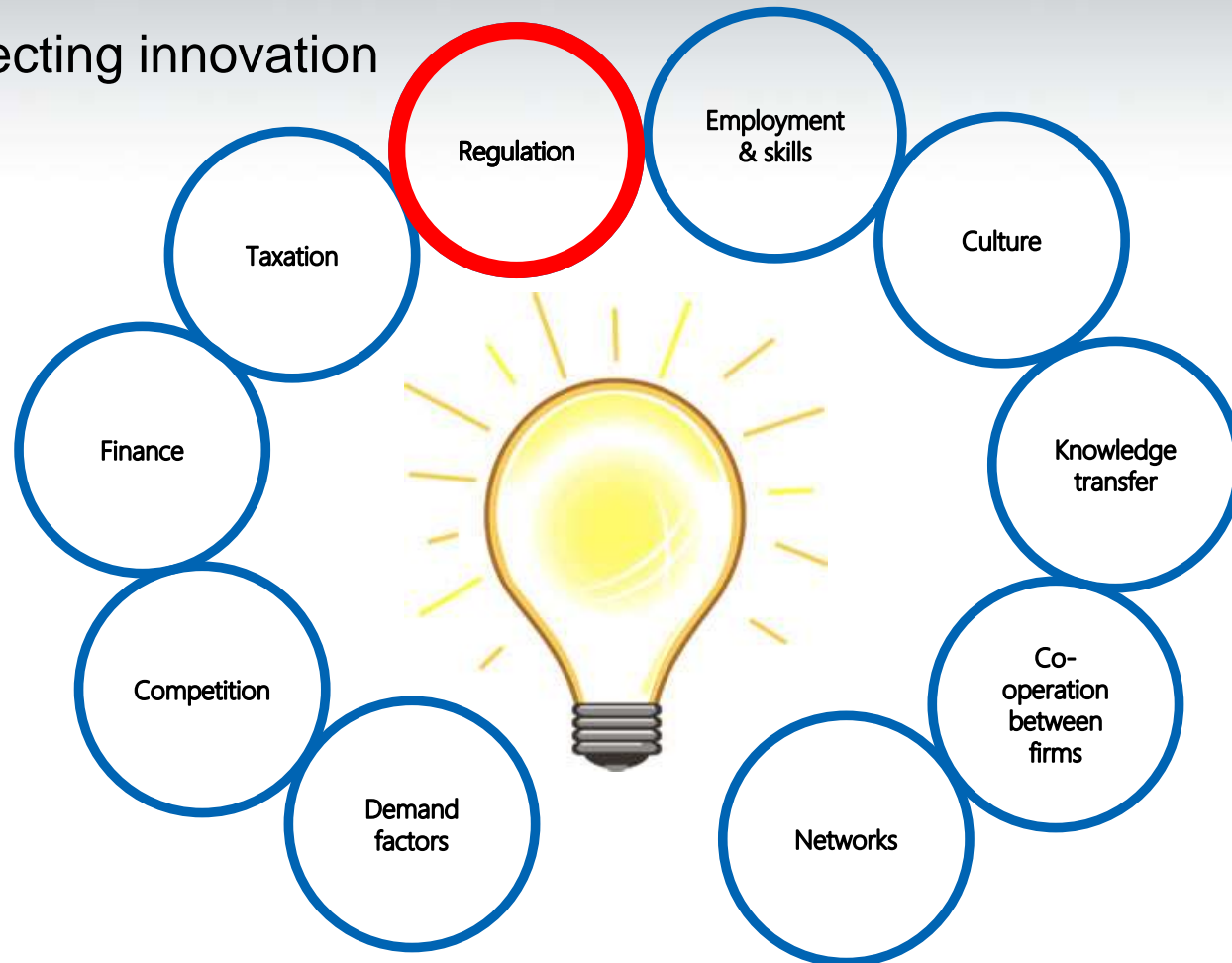
M.Sc. Architectural Engineering



“The introduction of new products to the marketplace is the lifeblood of corporate success”

Source:
Fahy, J. & Jobber, D. (2012) *Foundations of marketing*

Factors affecting innovation



Innovation-regulation paradox:

“the former is concerned with re-writing the rules and replacing the incumbent products and processes specified by the latter”

Sources:

<http://www.blplaw.com/media/know-how/speed-of-business/BLP-The-Speed-of-Business-impact-of-regulation.pdf>

Dewick, P. & Miozzo, M. (2002) *Sustainable technologies and the innovation-regulation paradox*

Energy performance regulation

- a regulation that sets an overall objective for the energy performance of a building, but without defining how it should be attained

Energy Performance (EP):

the calculated or measured amount of energy needed to meet a building's energy demand (kWh/m².year)

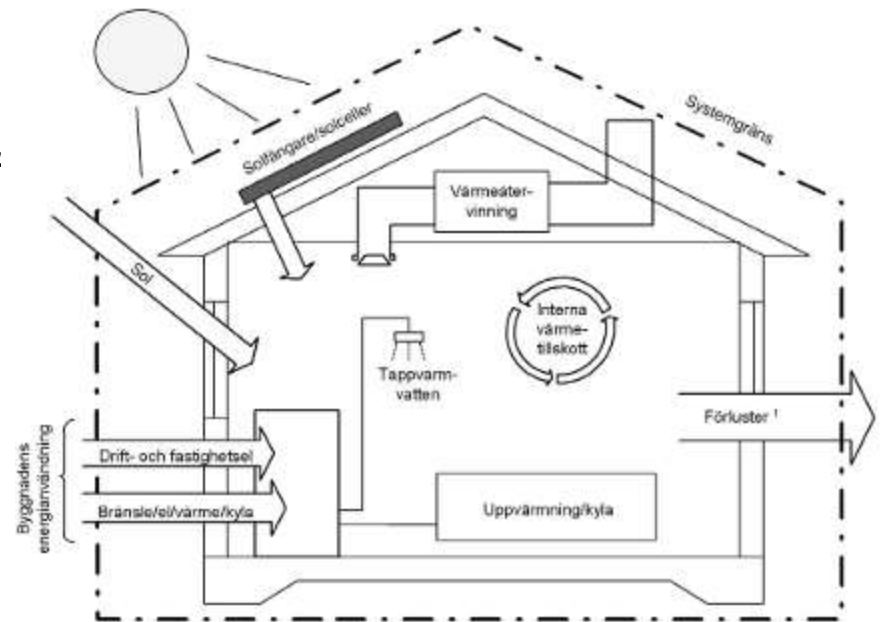
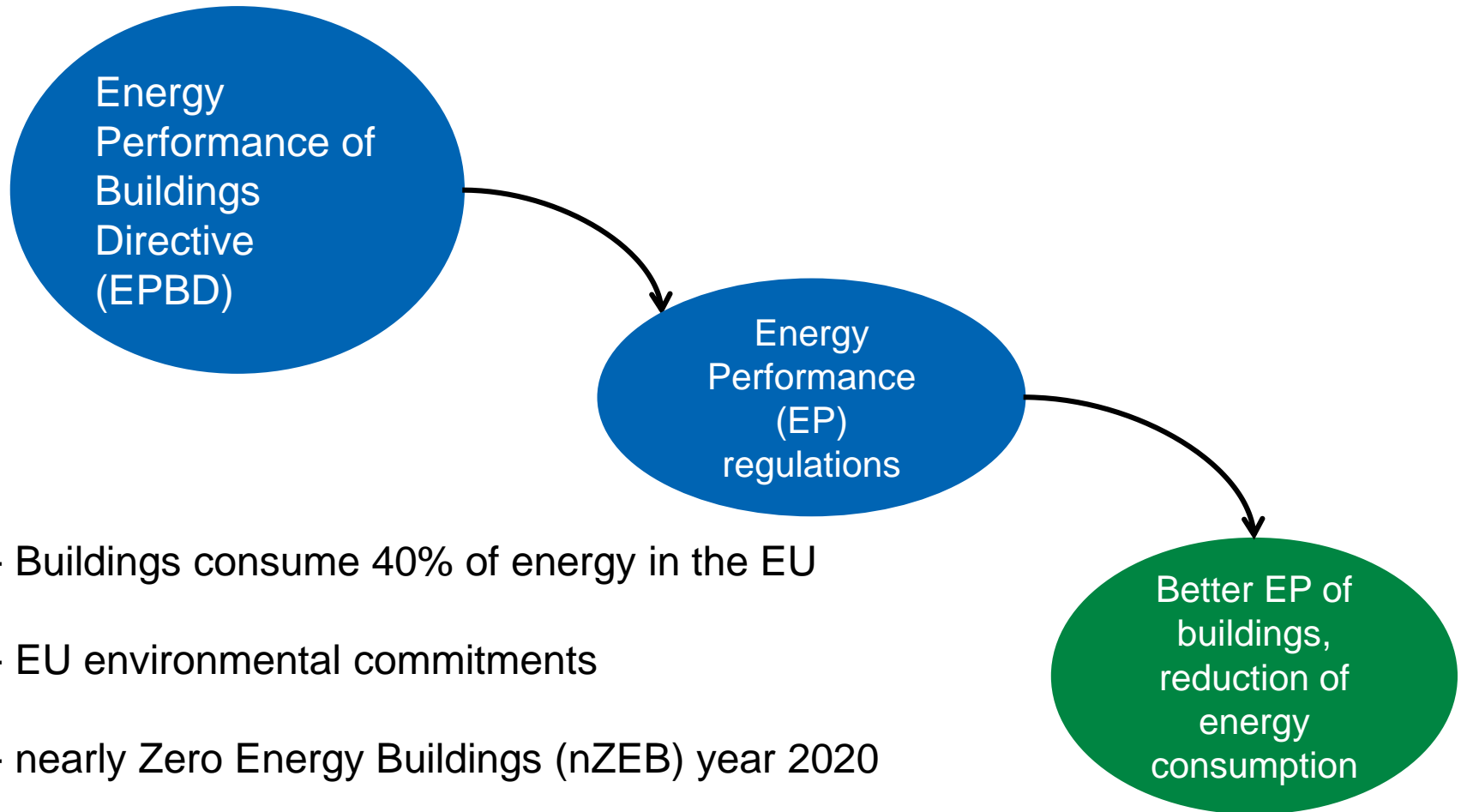


Image source:
<http://www.controlengineering.se/se/energi/energiiberakning/energibalansberakning/>

Energy performance regulation



- Buildings consume 40% of energy in the EU
- EU environmental commitments
- nearly Zero Energy Buildings (nZEB) year 2020
- Why France and Sweden?

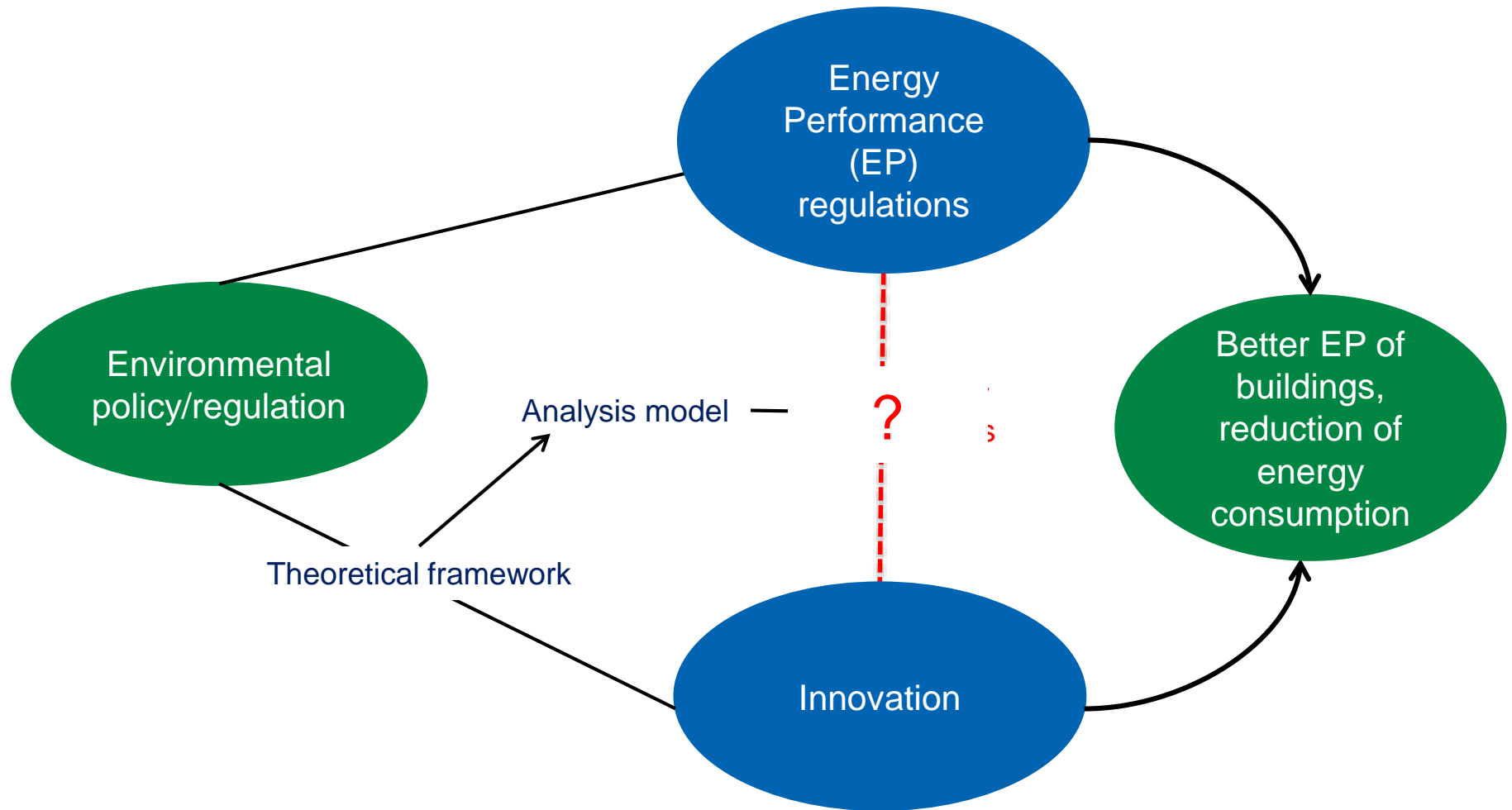
Purpose of the thesis

“to contribute to a better understanding of the impact of energy performance regulations on innovation in the HVAC sector”

Research questions

- ***How can the design of the French and Swedish energy performance regulations be expected to impact innovation in the HVAC field?***
- *How can regulation impact innovation?*
- *What characteristics of regulation design have an impact on innovation?*

Methodology



Disposition

- Earlier projects studying EP regulations and innovation
- How can regulation impact innovation?
- Analysis model
- Results of desk study and interviews
- Analysis
- Conclusions & discussion

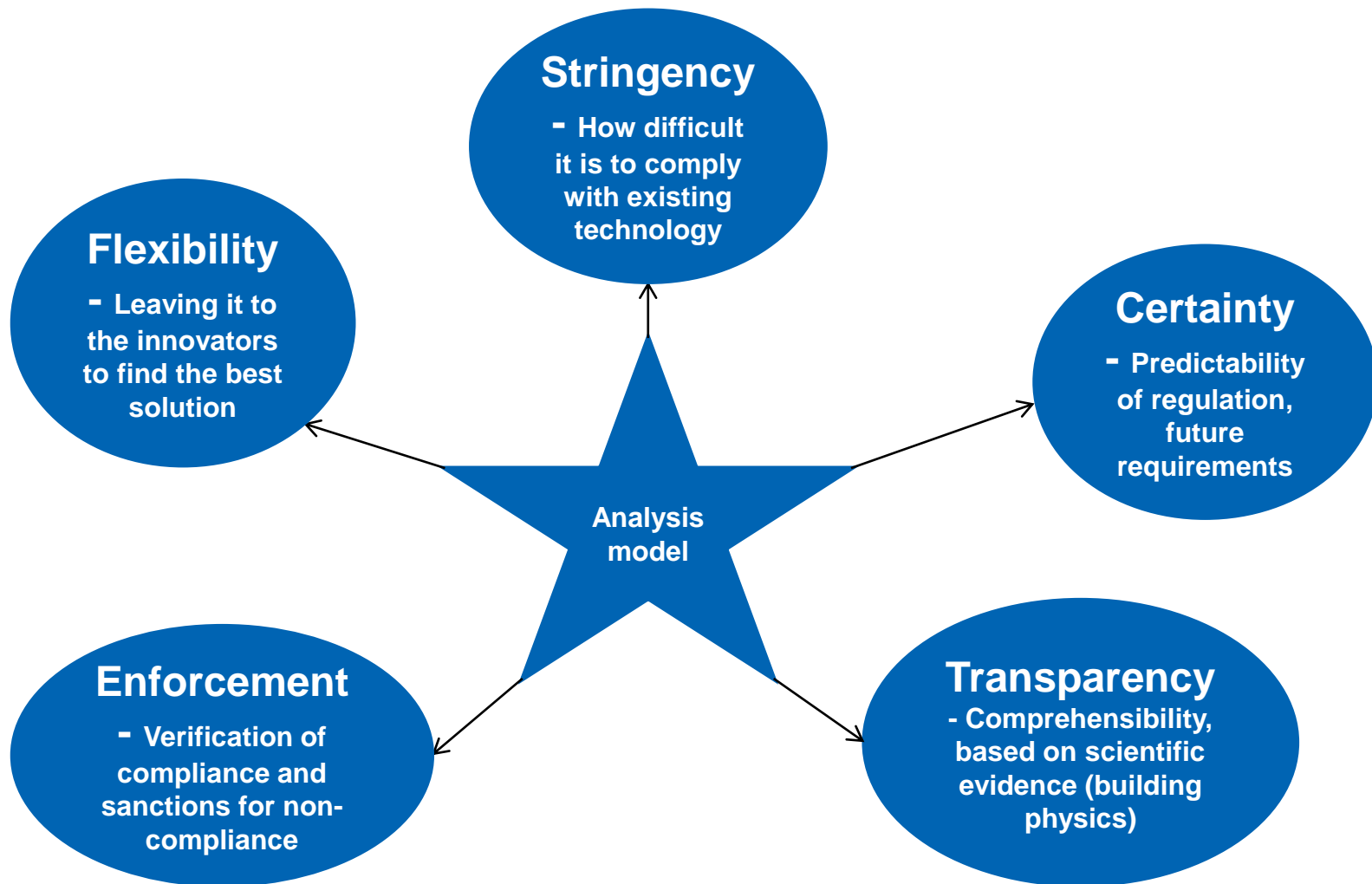
EPBD and innovation

- EU financed projects
- Regulatory calculation method
- Definition of innovation
- Promoting effect: humidity-controlled ventilation in France
- Barrier: to innovations that fall outside the scope of the regulation
- Need to develop alternative assessment procedure

How can regulation impact innovation?

- Regulations can **hinder innovation** by giving advantage to existing technologies, restricting freedom and imposing increased costs for firms
- Regulations are considered to **encourage innovation** by putting pressure on firms, reducing uncertainty and ensuring a demand for products that live up to the regulatory requirements
- Depends on the design of the regulation
- Regulation characteristics are important for the impact on innovation

What characteristics of regulation design have an impact on innovation?



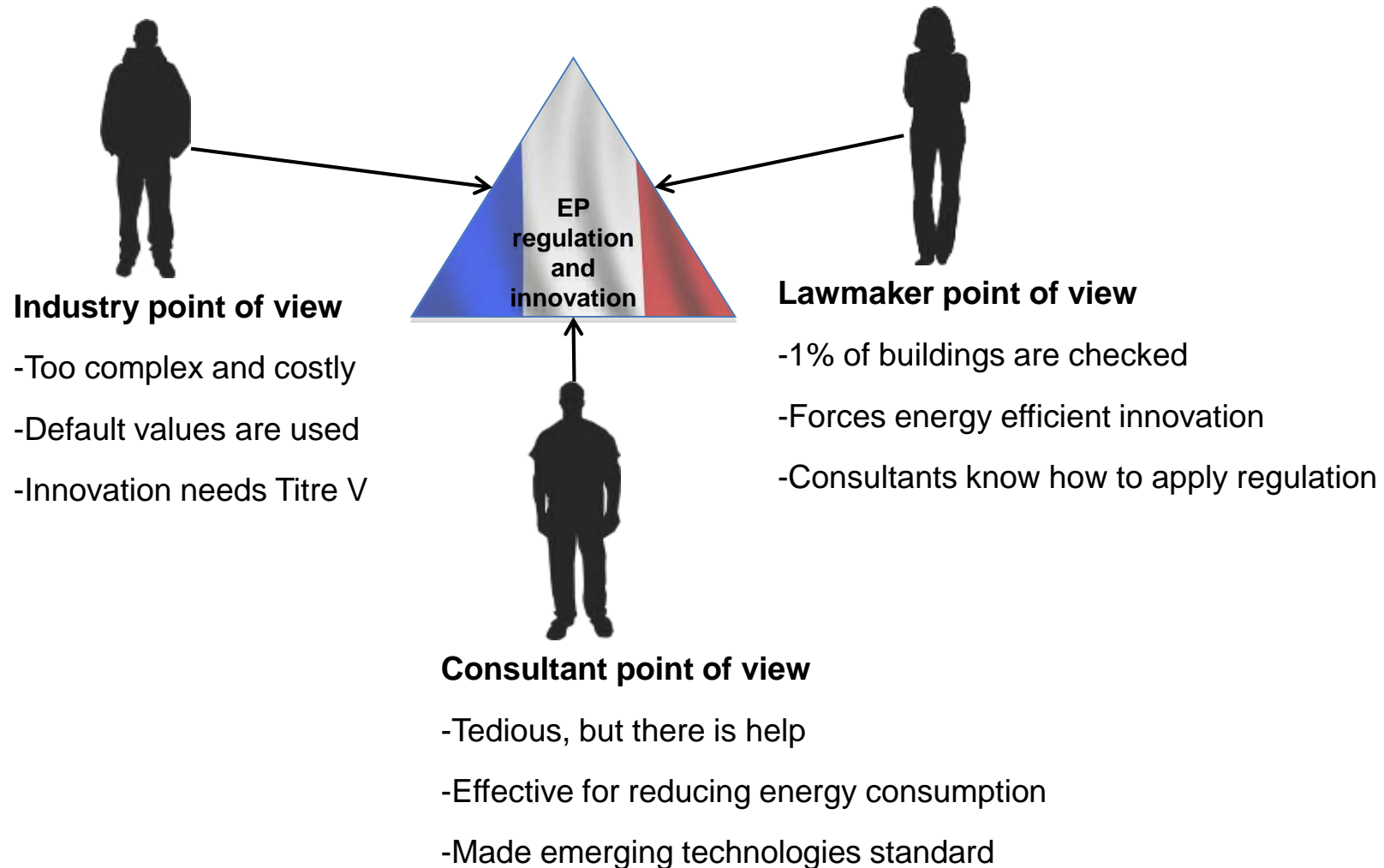
Results of desk study

FRANCE	SWEDEN
<ul style="list-style-type: none"> - EP regulation since 2000 	<ul style="list-style-type: none"> - Shift to EP regulation in 2006
<p><i>“France aspires to be the leading nation in EP policy” (Roger and Remesy, 2012)</i></p>	<ul style="list-style-type: none"> - Requirement levels based on what is economically feasible with existing technology
<ul style="list-style-type: none"> - Requirements have been tightened from 150 to 50 kWh/m².year between 2005 and 2012 	<ul style="list-style-type: none"> - Tightened by 20 kWh/m².year between 2011 and 2014 - Before revising the regulation, Boverket has to analyze the consequences
<ul style="list-style-type: none"> - Compliance is based on calculated values - Calculation method covers 1377 pages 	<ul style="list-style-type: none"> - Compliance is based on measuring the energy use of the finished building
<ul style="list-style-type: none"> - Assessment for innovations: Titre V 	<ul style="list-style-type: none"> - Functional requirements <i>“promote technological development and make the use of innovative solutions possible” (Boverket, 2006)</i>
<ul style="list-style-type: none"> - Fines up to 45'000 euro and prison for non-compliance 	<ul style="list-style-type: none"> - Responsibility for verification of compliance is on local authorities

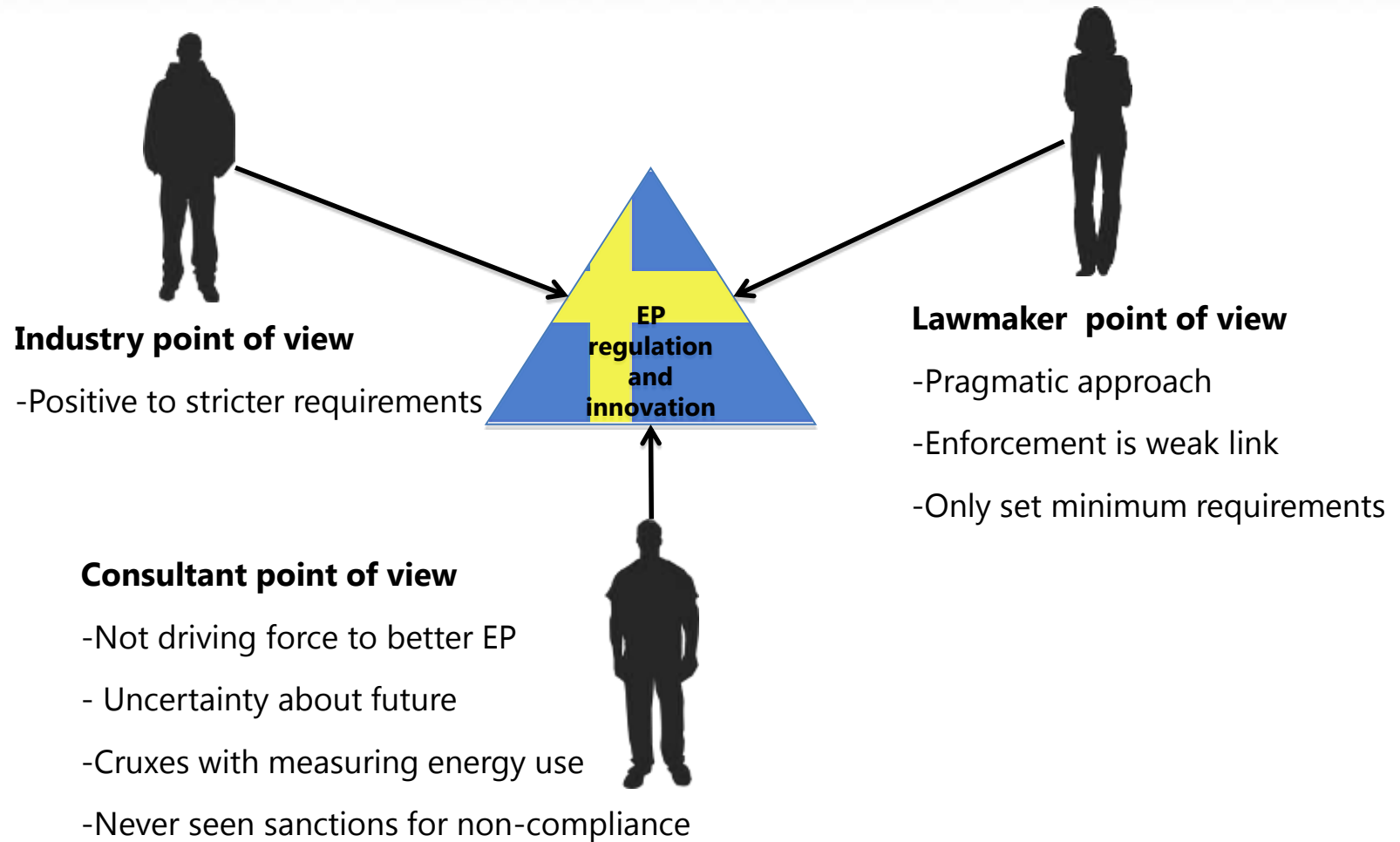
Results of desk study

<i>Criticism against the French EP regulation:</i>	<i>Criticism against the Swedish EP regulation:</i>
- Too complicated	- Stringency levels have only been slightly strengthened between 1977 and 2005
- Certain parameters and even the order they are entered can have an impact on the final EP result	- Requirements should be tighter to correspond to what is technically and economically feasible today
- Complexity of the calculation method is a barrier to innovation of industrial products	- Lack of predictability about future EP requirement levels

Results of interviews France



Results of interviews Sweden



Analysis

Characteristic	France	Sweden
Stringency	<ul style="list-style-type: none"> - High level of stringency <p>7</p>	<ul style="list-style-type: none"> - Construction sector demands stricter EP requirements <p>3</p>
Certainty	<ul style="list-style-type: none"> - Requirements for 2020 already defined <p>8</p>	<ul style="list-style-type: none"> - Future EP requirements have not been published by the authorities <p>2</p>
Flexibility	<ul style="list-style-type: none"> - Regulatory calculation method - Possible to include innovations via Titre V <p>4</p>	<ul style="list-style-type: none"> - No defined calculation method - Compliance based on measuring energy use of finished building <p>8</p>
Transparency	<ul style="list-style-type: none"> - 1377 pages of calculation method - Not always concordant with conventional building physics <p>3</p>	<ul style="list-style-type: none"> - Swedish approach is straightforward and coherent - Not defined what energy use should be measured <p>7</p>
Enforcement	<ul style="list-style-type: none"> - Low percentage of new buildings are controlled every year - High penalties <p>5</p>	<ul style="list-style-type: none"> - Risk that control of compliance falls between jurisdictions - No known cases of penalties <p>3</p>

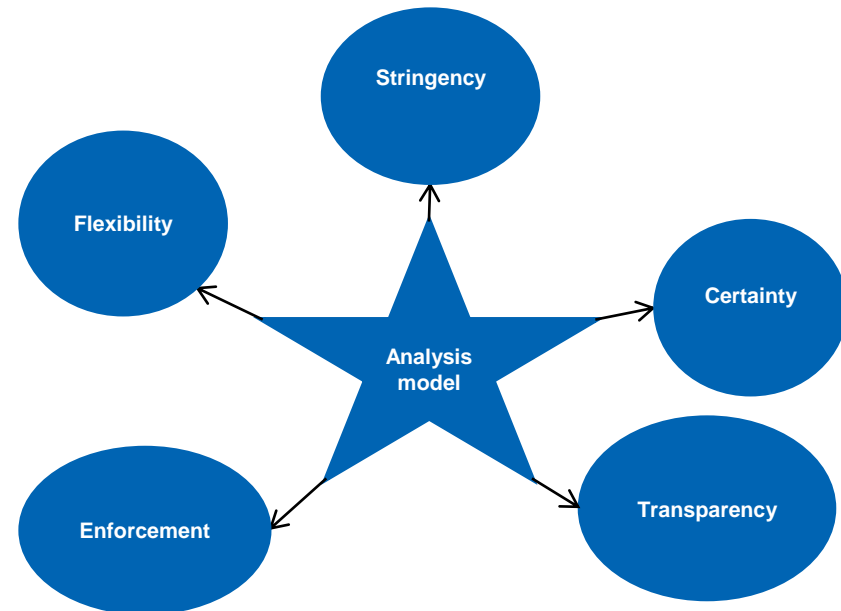
Conclusions & discussion

How can the design of the French and Swedish energy performance regulations be expected to impact innovation in the HVAC field?

- France: driver to HVAC innovation in some cases and impediment in other. Rigid regulation
- Sweden: less important impact, more liberal regulatory approach

For innovative HVAC companies...

- Knowledge about EP regulations is important for market introductions abroad
- Risk having to spend time and money
- Rigid versus liberal regulatory approach
- Use of analysis model for future studies



THANK YOU



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