China and the Paris Agreement:

Domestic environmental concerns and new development pathway
巴黎协议之后中国面临的环境与发展方面的挑战

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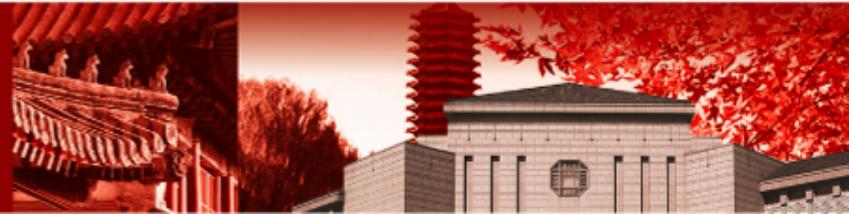
Background 背景

- **After Paris, two growing challenges**
- Domestic environmental improvement
- Expectation and action beyond Paris commitment
- 巴黎会议之后，两个方面的巨大挑战
  - 国内环境改善的压力
  - 改进巴黎自主承诺的压力
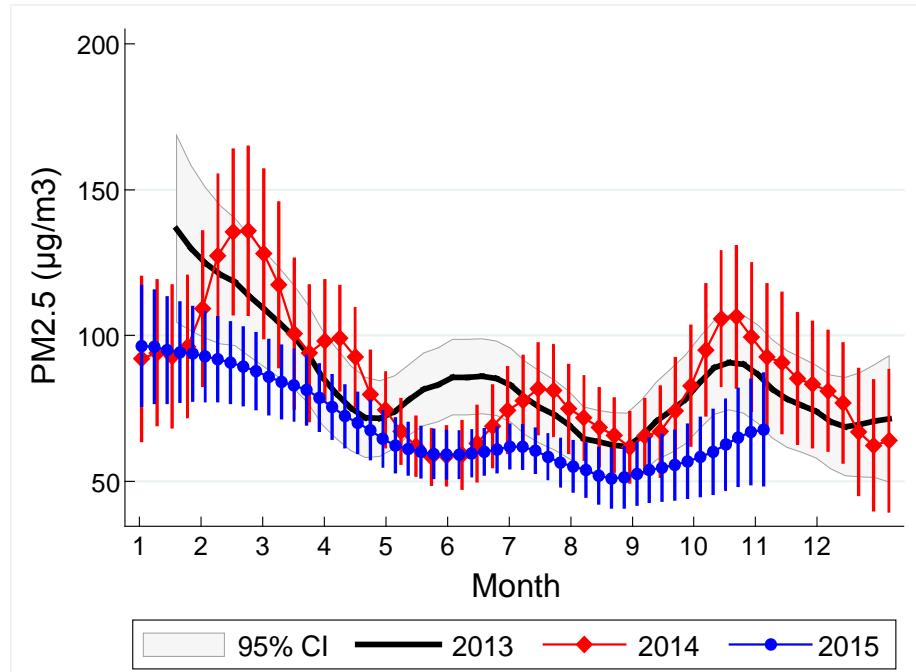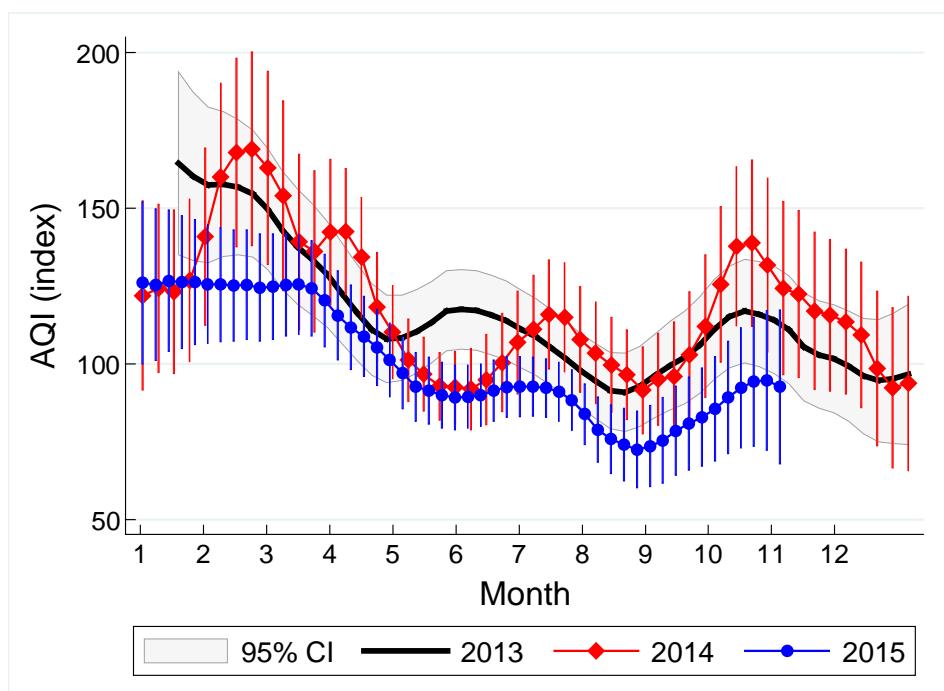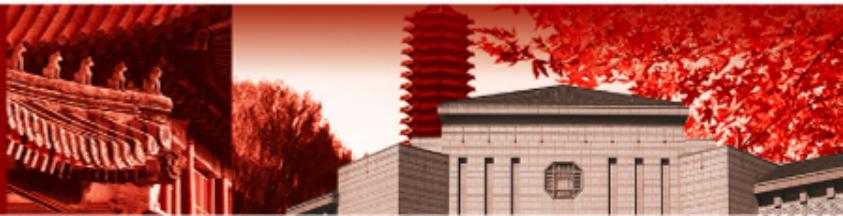
2013–2015, Air Quality in Beijing
北京市空气质量趋势
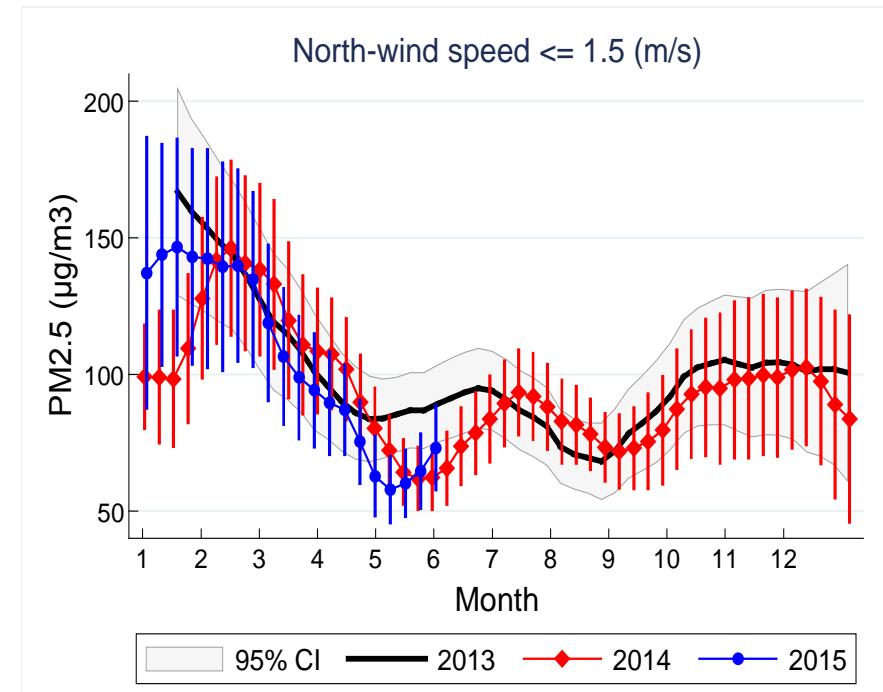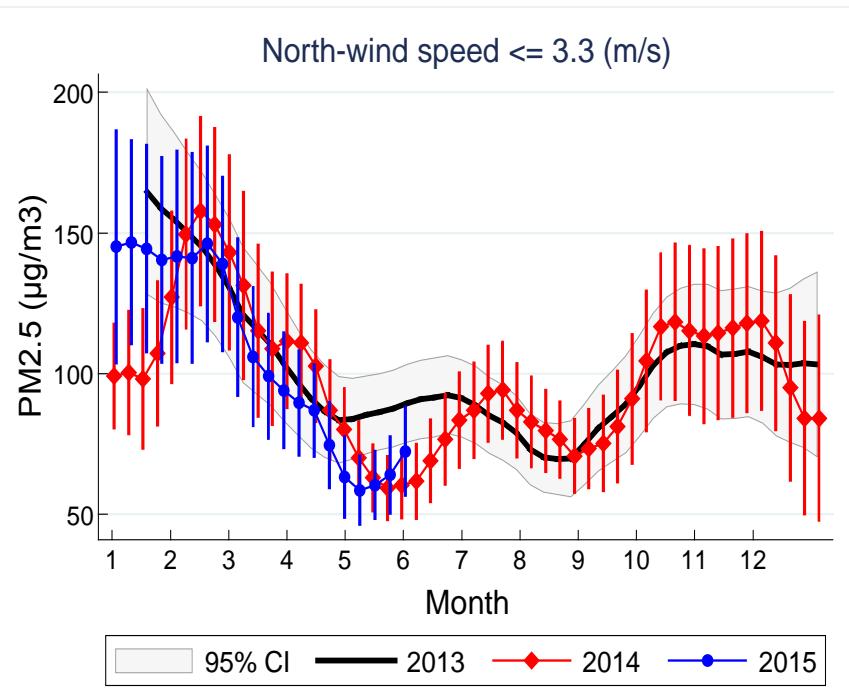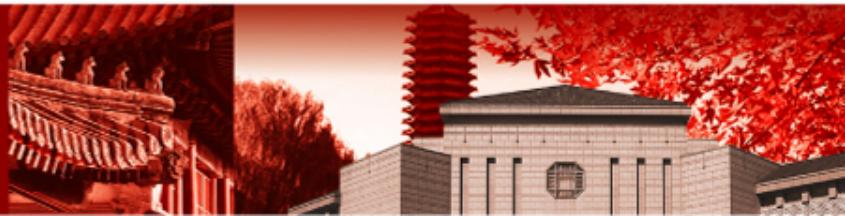
Air Quality without North Wind
当北风不再呼啸

North-wind speed <= 3.3 (m/s)

North-wind speed <= 1.5 (m/s)
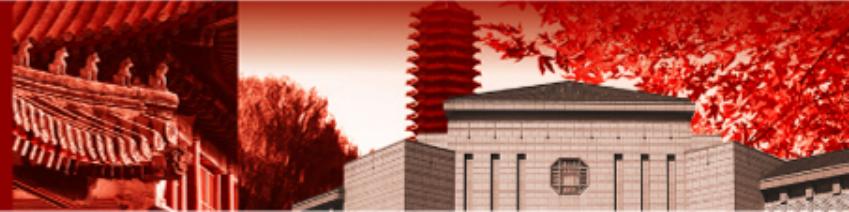
Conclusion One 结论一

- Policies and measures have yet produced results wanted
- 已经出台的空气污染治理措施尚未取得应有效果
- Bigger challenge is regional transfer of pollutants and
- 区域性污染转移挑战目前的环保思路
- Energy structure rigidity
- 能源结构难以改善
- These have to change during 13th five year plan period
- 十三五期间必须见成效的压力

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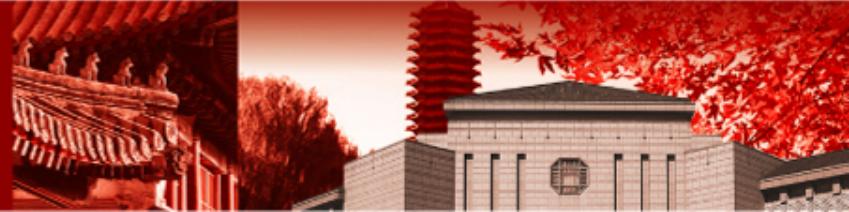
Paris Agreement 巴黎气候协议

- Two most important outcomes:（两个核心内容）
- 1.5 degree，2 degree （1.5~2度目标）
- INDCs （各国自主减排承诺）
- Huge gap between the two（实现目标距离遥远）
- Much stronger actions are called for
- （要求排放大国拿出更强行动）
- Pressure grows
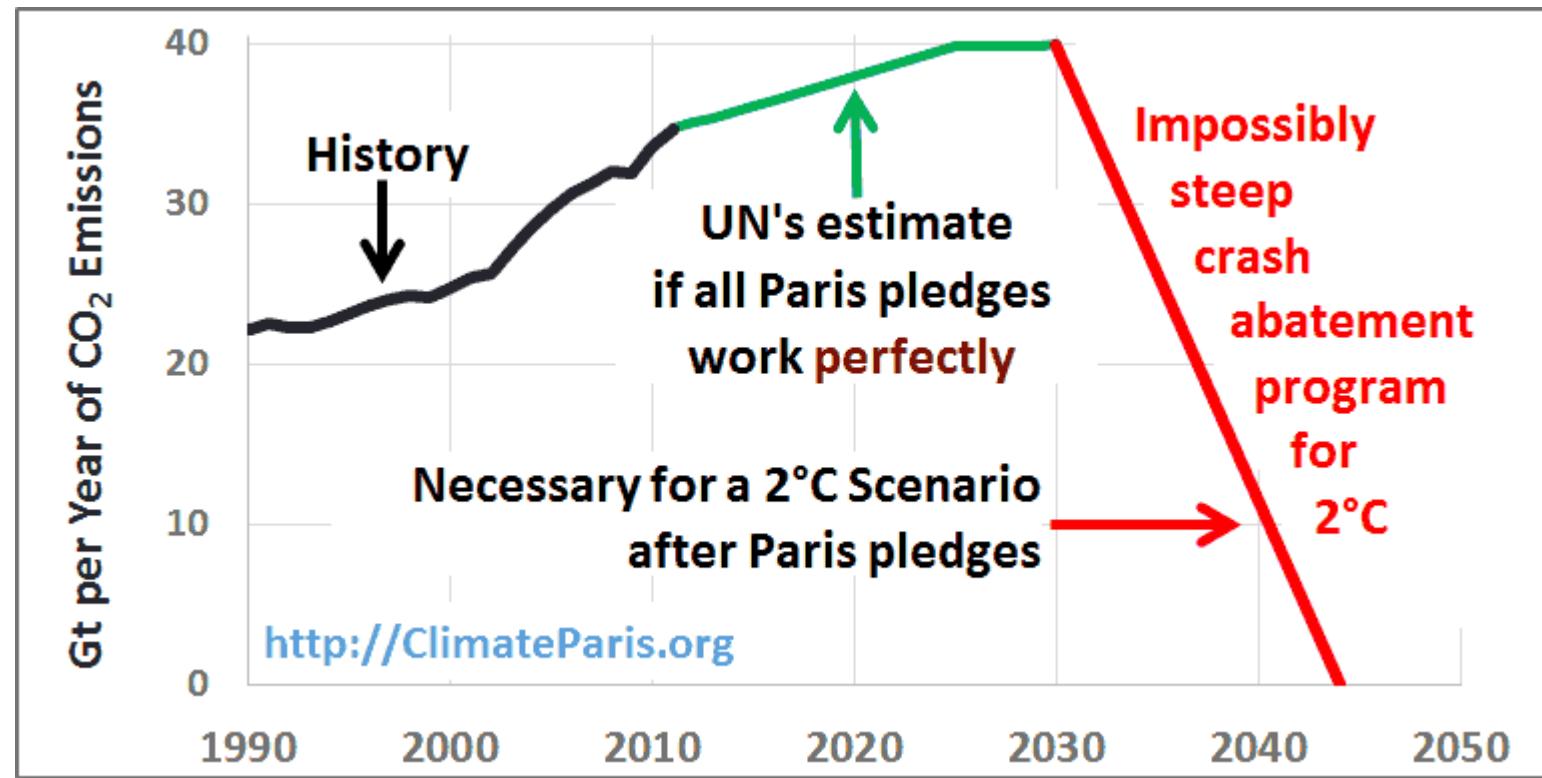
2 degree impossible with INDCs
如果停留于自主减排承诺，2度目标就会落空
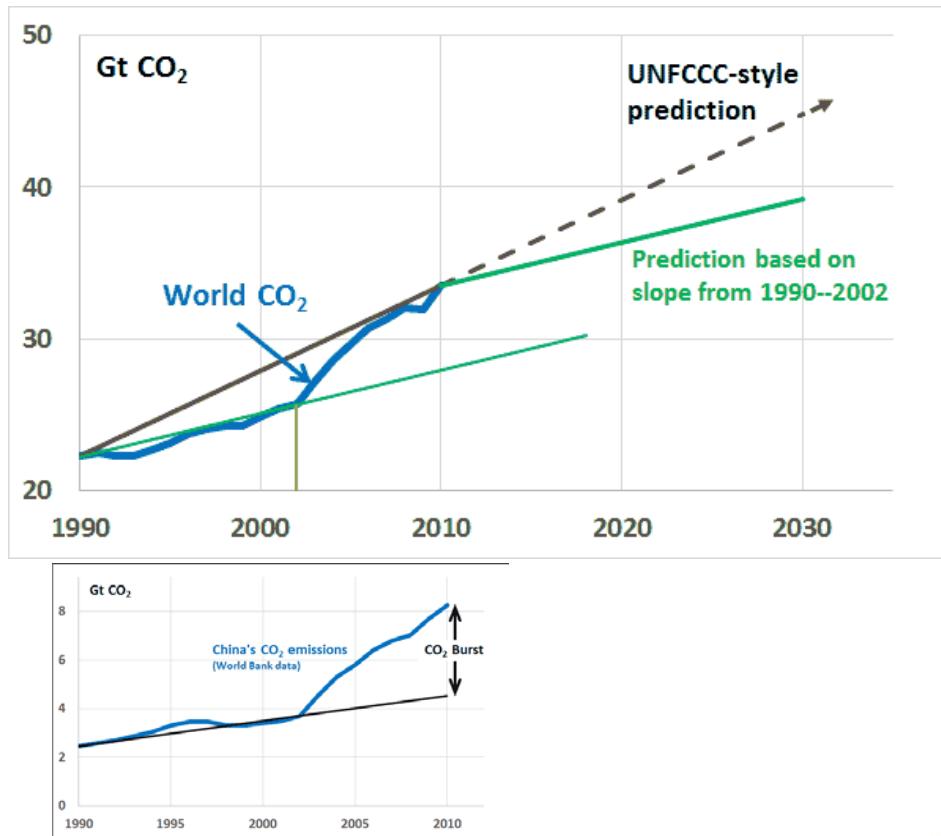
According to the UN report on Paris pledges, at best they will use up 723 out of a 1000 Gt CO_2 budget required for a 66% chance to stay below 2°C. At 40 Gt a year, this runs out in 7 years. The red line stretches this to 14 years with a crash abatement program. MIT says that if the pledges work as expected (not perfectly), the red line would need to hit zero by 2040. （http://climateparis.org/）

China's Burden
中国面临的压力
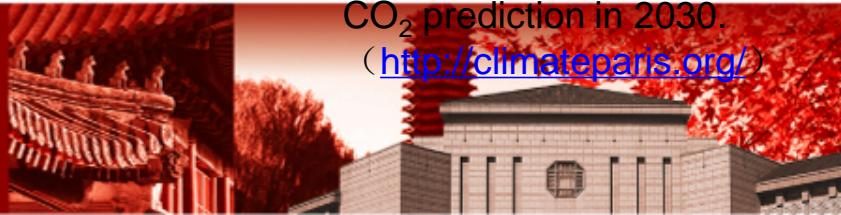
The UN's prediction for 2030 is essentially a straight line based on two points—CO2 emissions in 1990 and 2010. But emissions did not, and will not, follow a straight line. In fact, emissions accelerated dramatically in 2002. The next graph shows why.

China's CO$_2$ burst from 2002 to 2010 was so extreme that in eight years it increased emissions by almost 4 Gt more than its trend line. That's 70% as much as the US now emits in total. Looking back at the world graph, this is a lot of the reason for the high CO$_2$ prediction in 2030. （http://climateparis.org/）
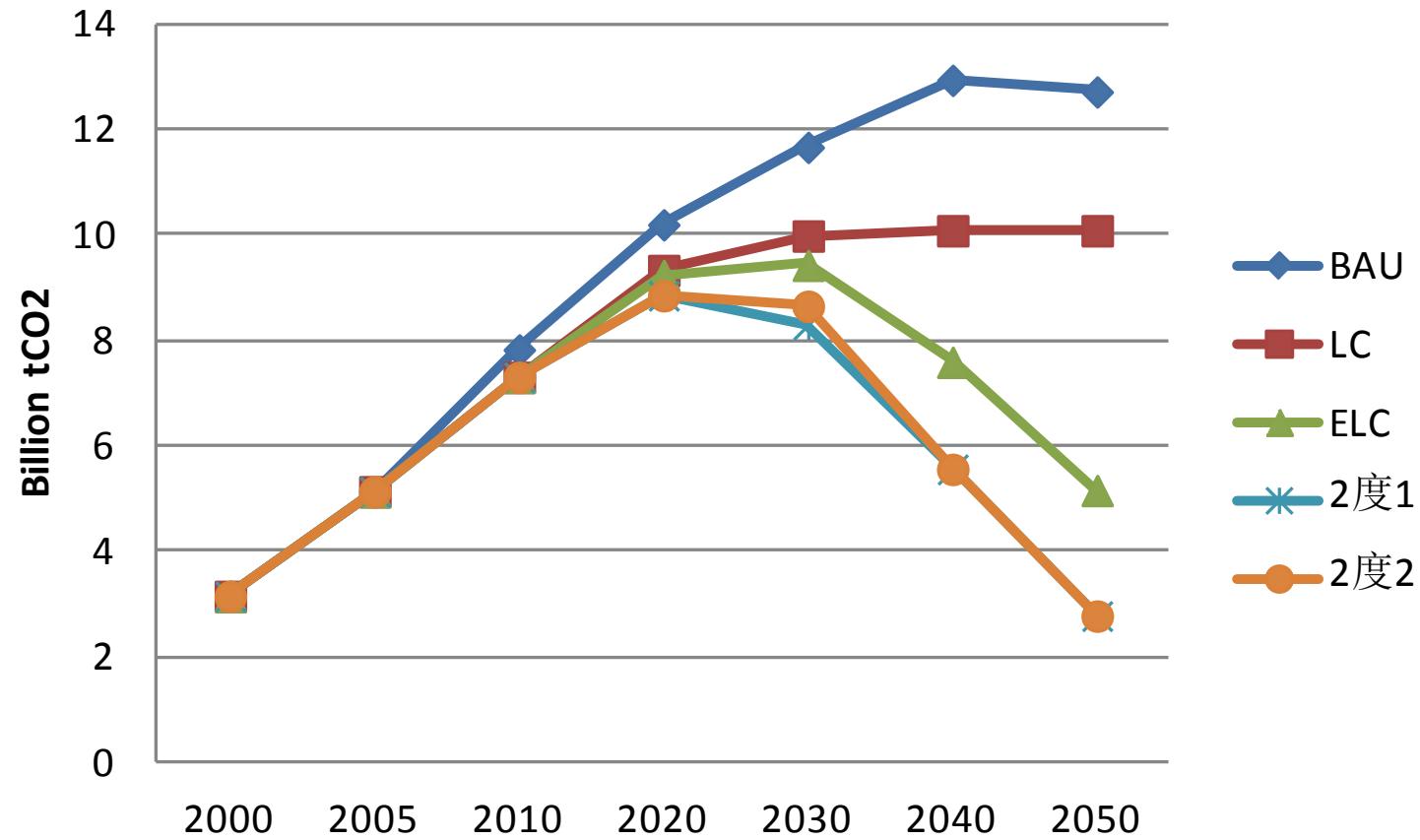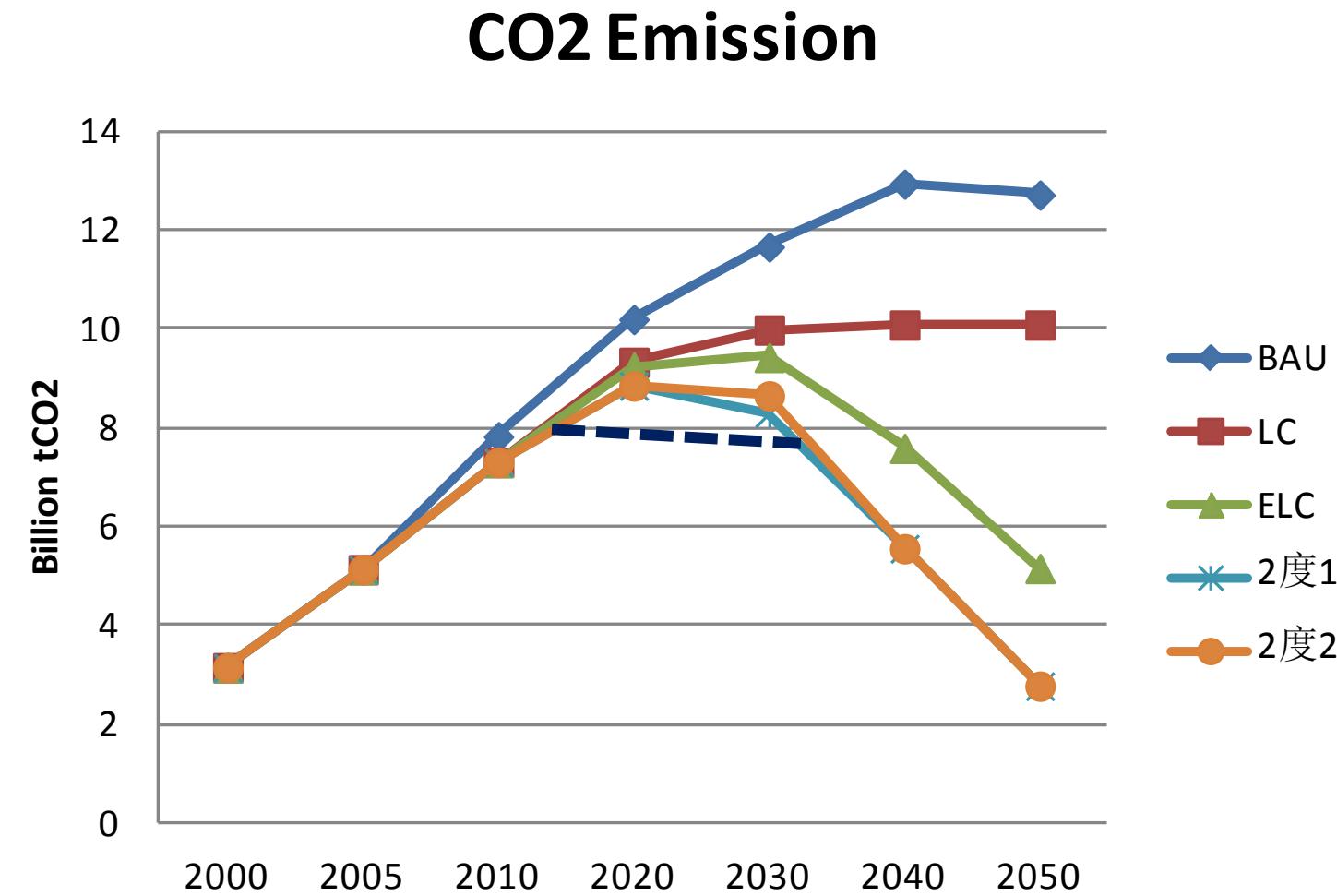
中国减排情景

CO2 Emission

最乐观情景(most optimistic scenarios)
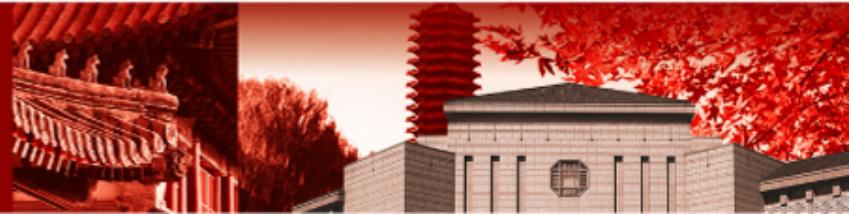
Critical Areas of Action 重点行动领域

- Short run 短期措施
  - Leave the bad guys to market
  - 避免扶持产能过剩的高污染高耗能产业
  - Shale Gas 页岩气
- Long run 长期措施
  - Renewable energy 可再生能源政策落地
  - Economic policy 碳税、污染税
    - 通过价格体系调整促使经济结构调整
    - 调动地方政府积极性，落实环境执法
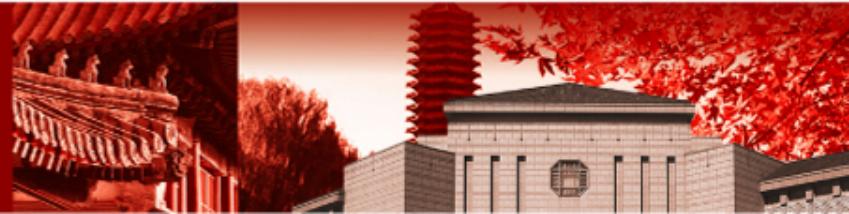
Where is forest sector? 林业的作用

- Despite progresses in forest tenure reform, forest expansion, forest sector role in climate strategy, green growth remain murky
- · 林业在国际气候战略中地位并不突出
- Existing industrial policies suppressed commercial forest
- · 存在许多抑制林业产业发展的政策
  - – Substitution of iron, coal, concrete, etc. for timber
  - – Huge subsidy remains for these heavy industries
    - 1% GDP (RMB 500 billion) annually
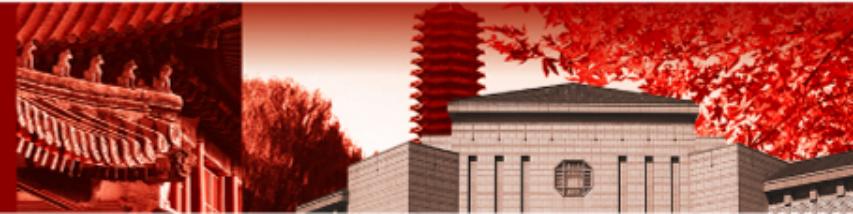
Substitution Reversal
促进林业发展的产业政策

- National leaders announced that next 5 years green subsidy reaches RMB 600 billion/year
- If forest sector gets a share this subsidy and raise
- timber forest productivity by 1/3
- Annually forest growth up by 120 million M3
- 60 million m3 more timber
- 1 million new wooden houses by Tibetan standard
  - 1.6 billion t concrete, 0.5 billion t iron for housing construction
  - Reduced by 0.32 billion t concrete, 0.1 billion t iron
- Reduced CO_2 emissions by ????
  - 1 billion ton
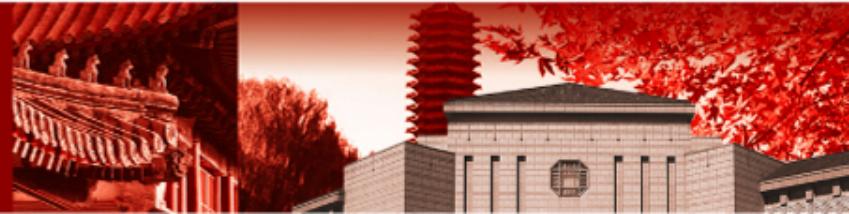
Forest based bioenergy?
林业生物质能源潜力

- A CGE Simulation for NE China
- Triple forest biofuel in China (to 3%)
- CO_2 down by ~3% (温室气体减排3%)
- GDP up by 0.15%
- Forest Investment up by 28% (投资增加28%)
- Forest Employment up by 20% (就业增加20%)
- New logging ban is a heavy blow
- 天然林禁伐带来沉重打击
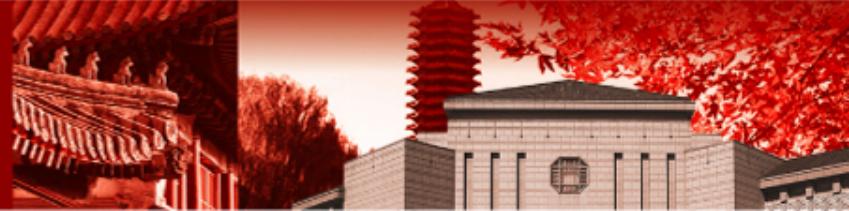
Thanks！
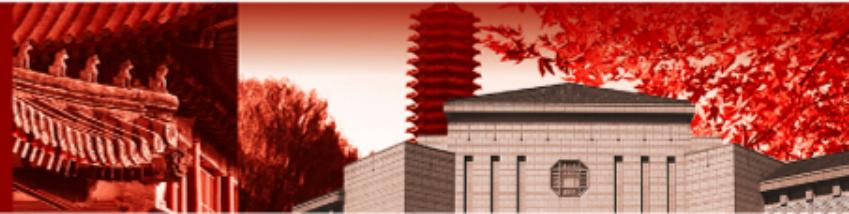
Remaining Tasks

- Strengthening forest tenure reform by
  - Removing constraining forest policy
    - Logging regulation
    - Reevaluating forest protection policy
    - Expanding household forest management
- Establishing enabling policy and regulatory system
  - Removing subsidy to heavy industries
  - Direct subsidy to forest production
  - Supporting R&D and promoting forest based economy
- State forest reform
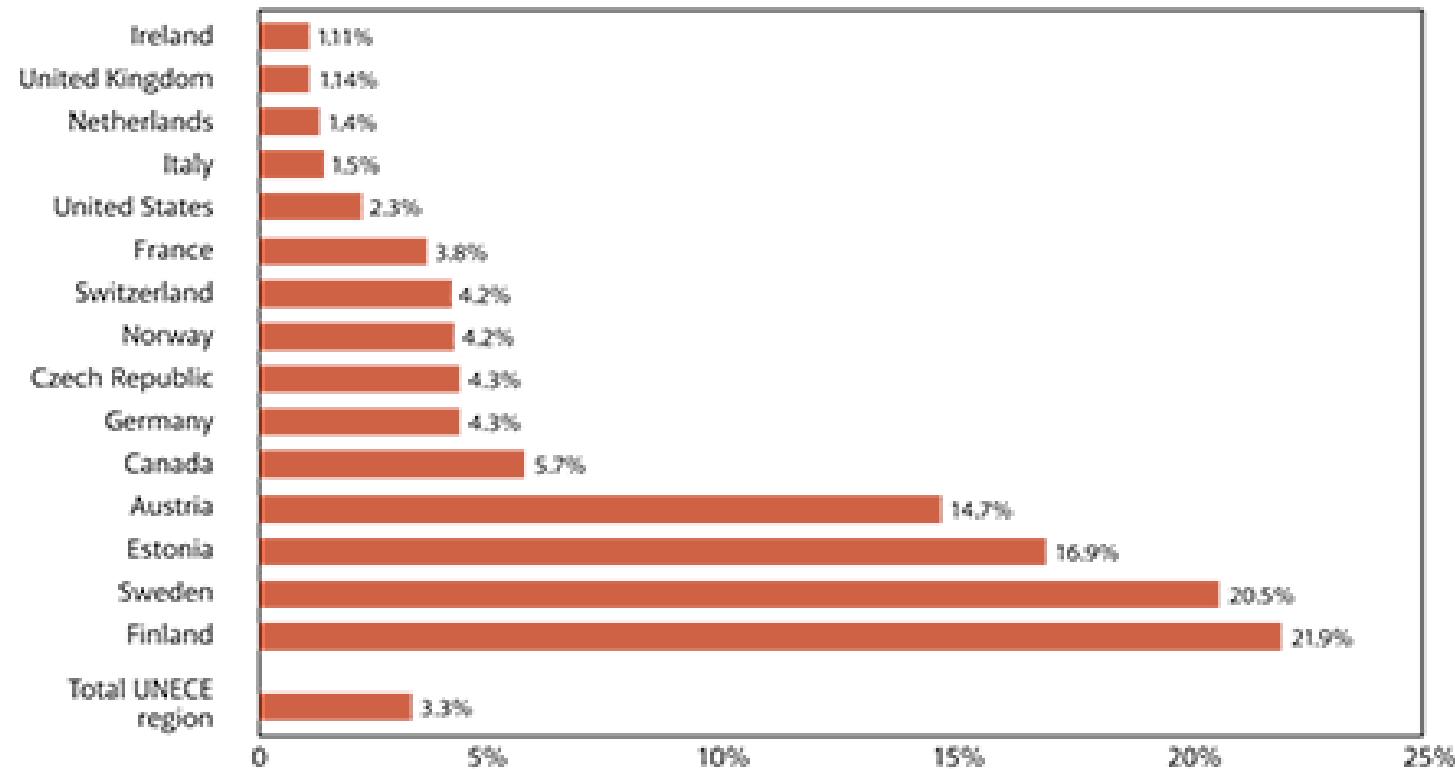
木质能源（占比）

Figure 1. Share of Wood Energy in Total Energy Supply in Select United Nations Economic Commission-for Europe (UNECE) Member Countries
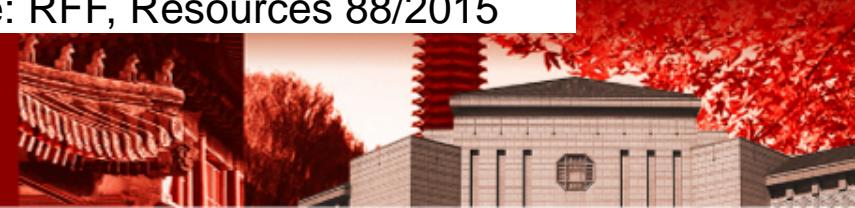
Country	Share
Ireland	1.11%
United Kingdom	1.14%
Netherlands	1.4%
Italy	1.5%
United States	2.3%
France	3.8%
Switzerland	4.2%
Norway	4.2%
Czech Republic	4.3%
Germany	4.3%
Canada	5.7%
Austria	14.7%
Estonia	16.9%
Sweden	20.5%
Finland	21.9%
Total UNECE region	3.3%

Source: Joint Wood Energy Enquiry 2011, a survey of wood energy consumption answered by 27 UNECE countries.
http://www.unece.org/forests/jwee.html.

Source: RFF, Resources 88/2015
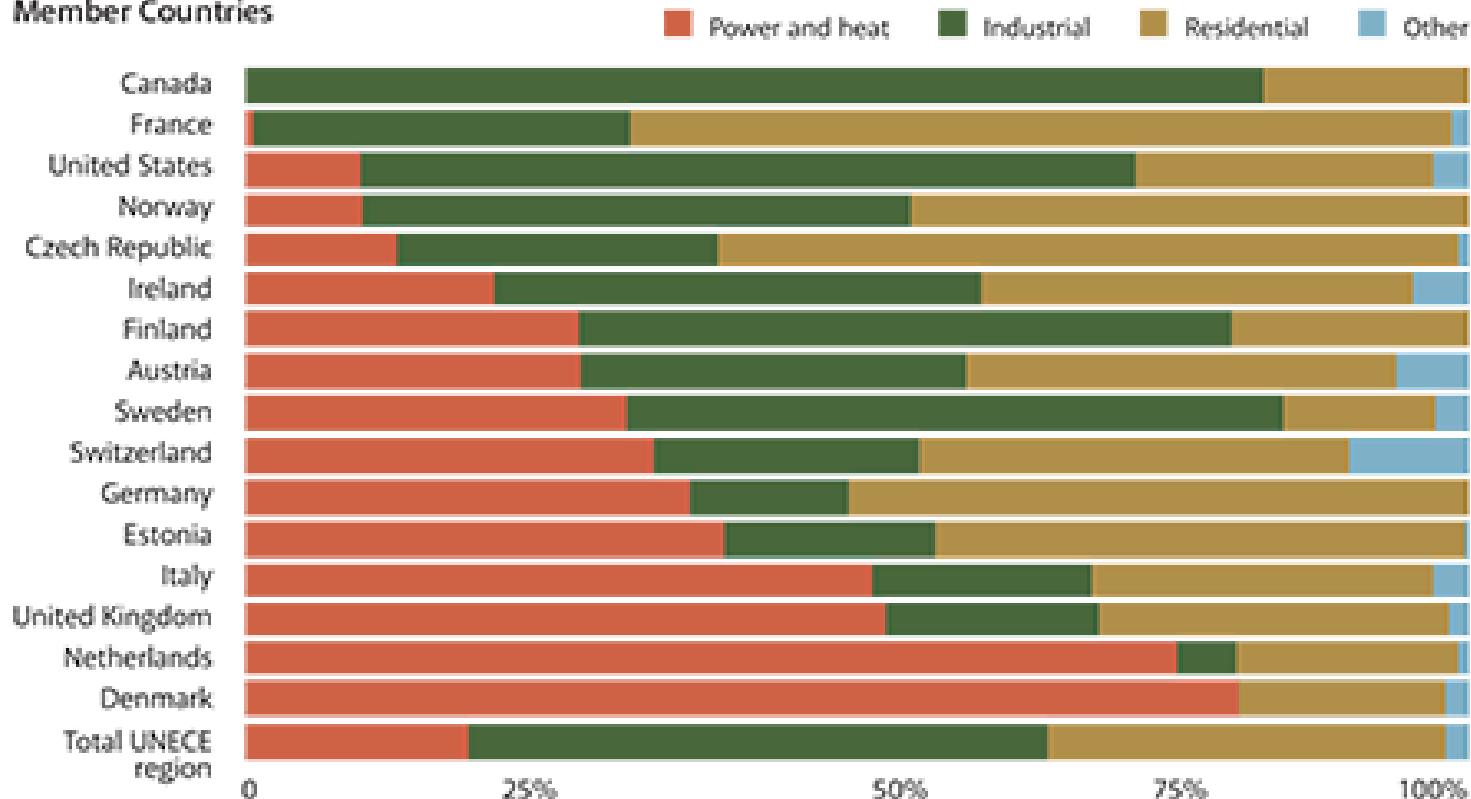
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木质能源（利用结构）

Figure 2. Wood Energy Uses in Select United Nations Economic Commission for Europe (UNECE) Member Countries
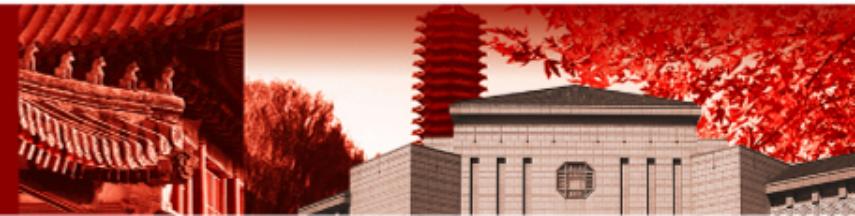
Legend: Power and heat — Industrial — Residential — Other

Countries (top to bottom): Canada, France, United States, Norway, Czech Republic, Ireland, Finland, Austria, Sweden, Switzerland, Germany, Estonia, Italy, United Kingdom, Netherlands, Denmark, Total UNECE region

X-axis: 0, 25%, 50%, 75%, 100%

Source: Joint Wood Energy Enquiry 2011, a survey of wood energy consumption answered by 27 UNECE countries.
http://www.unece.org/forests/jwee.html

我国东北与北欧国家在地理条件、森林资源有许多相似之处，可以借鉴发展木质能源

Source: RFF, Resources 88/2015
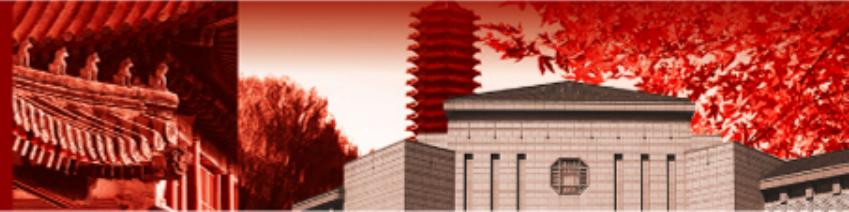
国有林区改革的国际借鉴

- 美国
  - 联邦林、州有林、私有林
  - 产权完全分离，相互独立和合作的关系
  - 类似于中国民国时期的产权和治理体系
  - 对我国国有林区改革的启示
  - 加强人员交流，培养熟悉新环境下中央林业管理模式的人才（中央、地方和民间林业的关系、向研发推广方向的转型、生态保护从强制向运用市场手段的转型）
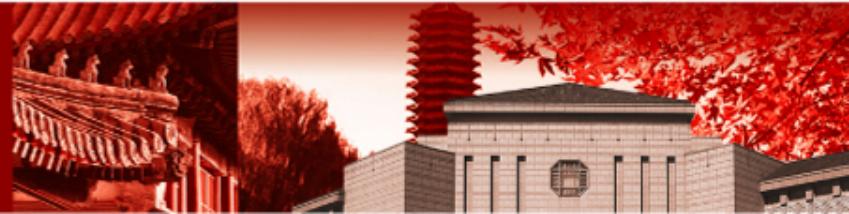
与发展中国家的交流和互相学习

- 印度
  - 以公有林为主体，改革分权呼声高，进度慢
  - 2007 年林权法案，仍然争议不断
  - 与我国的异同
  - 对其它发展中国家的启示
- 其它发展中国家林业部门的转型
  - 中国在许多方面树立了榜样
  - 仍有许多方面可以互相学习、借鉴
  - 加强人员交流、在政策、学术方面互相合作很有必要
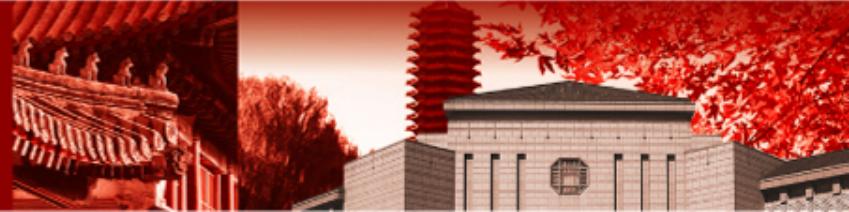
绿色发展中的产业政策

- 国际学术界主张"胡萝卜加大棒"的政策
  - 对传统高污染高能耗产业实行碳税
  - 对清洁产业（可再生能源、低碳产业）实行补贴，加速产业替代
    - 美国的可再生能源强制配额制
    - 欧洲许多国家实行了碳税、碳交易政策
    - 以及风力、太阳能发电标杆上网电价政策

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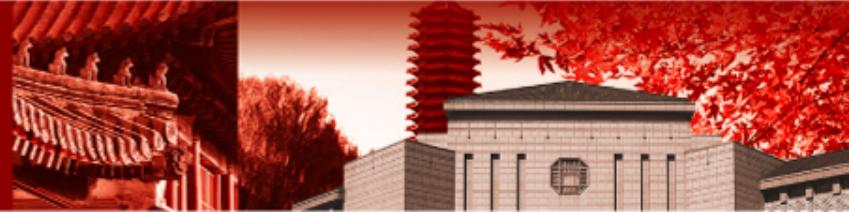
我国：以林业为主体的绿色转型的潜力

- 过去三十年实行的扶持重工业产品替代林产品的产业政策
  - 以钢代木、以煤代木、铝合金代木等等
  - 高耗能高污染行业享受近1%GDP的补贴
  - 国家对林业的扶持侧重生态保护，对提高林产品生产能力的扶持政策不足，打压管制过重
- 绿色发展意味着传统产业政策的逆转
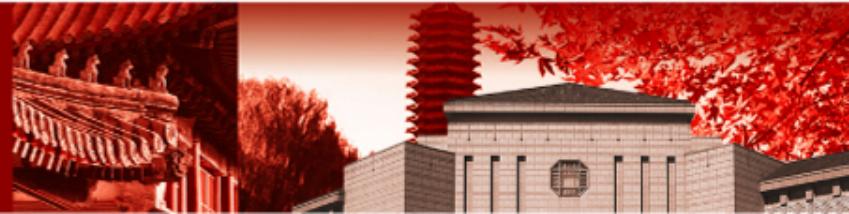
以木质房屋为例

- 如果将1%GDP用于扶持用材林培育
- 意味着商品林每年180元/亩的补贴水平
- 如果我国单位面积商品林蓄积量上升1/3，达到世界平均水平，年森林蓄积量增长量增加1.2亿立方米，假定50%出材率，可增产木材6千万立方米
- 如果用于木质房屋建设，依照藏族标准，可新建房屋1百万套，相当于过去一段时间1/5的年新建商品房套数
- 可替代水泥3.2亿吨，钢材1亿吨
- 减少CO2排放10亿吨
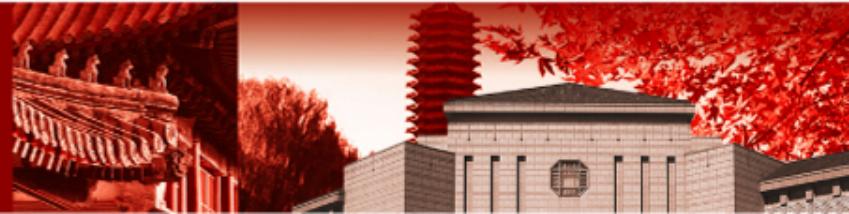
林业政策体系调整的内容

- **体制改革**：继续推进和深化集体林区和国有林区改革，建立起完备的林业市场体系，为林业发展创造一个好的政策环境。

- **政策改革**：1、限制性政策退出。主要是限额采伐政策和当前生态公益林制度的实施办法。

  - （生态公益林在某些地方是以一种政策性掠夺的方式实施的，极大地损害了林农的财产权利，因而也限制了林业生产力的提高）

  　　　　2、鼓励性政策引入。一是林业直补政策，提高林农商品林经营的积极性，提高林地生产力；二是生态公益林发展采取市场手段；三是生物质能源的补贴政策。

|	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(AQI)	Ln(PM$_{2.5}$)	Ln(O$_3$)	Ln(PM$_{10}$)	Ln(SO$_2$)	Ln(No$_2$)	Ln(CO)
013 (Base year)							
014.year	0.0668***	0.0766***	-0.1016***	0.1626***	-0.2356***	0.0810***	-0.0581***
	(20.87)	(18.20)	(-17.12)	(36.98)	(-52.89)	(21.64)	(-18.82)
015.year	-0.0336***	0.0221***	-0.1746***	0.0993***	-0.7446***	-0.0836***	-0.1474***
	(-7.73)	(3.78)	(-23.89)	(16.83)	(-119.42)	(-16.29)	(-33.94)
win1	-0.0095***	-0.0178***	0.0111***	-0.0136***	-0.0175***	-0.0147***	-0.0134***
	(-58.66)	(-83.89)	(44.06)	(-61.80)	(-86.58)	(-81.49)	(-87.32)
win2	-0.0075***	-0.0160***	0.0118***	-0.0111***	-0.0170***	-0.0140***	-0.0125***
	(-43.20)	(-71.96)	(39.50)	(-47.86)	(-73.05)	(-65.67)	(-73.61)
win3	-0.0079***	-0.0145***	0.0107***	-0.0095***	-0.0142***	-0.0122***	-0.0110***
	(-45.24)	(-63.30)	(38.60)	(-38.45)	(-63.63)	(-59.41)	(-65.22)
win4	-0.0047***	-0.0107***	0.0107***	-0.0057***	-0.0093***	-0.0107***	-0.0074***
	(-25.22)	(-45.26)	(32.55)	(-22.54)	(-35.00)	(-48.18)	(-40.72)
win5	-0.0036***	-0.0071***	0.0144***	-0.0035***	-0.0047***	-0.0098***	-0.0043***
	(-17.37)	(-25.81)	(38.87)	(-11.95)	(-15.18)	(-39.83)	(-20.38)
win6	-0.0043***	-0.0092***	0.0086***	-0.0029***	-0.0063***	-0.0093***	-0.0059***
	(-20.19)	(-34.26)	(22.03)	(-10.25)	(-21.16)	(-38.31)	(-28.07)
win7	-0.0039***	-0.0091***	0.0192***	-0.0027***	-0.0019***	-0.0092***	-0.0056***
	(-15.01)	(-24.26)	(40.47)	(-7.66)	(-4.95)	(-27.96)	(-19.22)
win8	-0.0019***	-0.0039***	0.0138***	-0.0012***	-0.0060***	-0.0078***	-0.0050***
	(-9.44)	(-15.57)	(38.53)	(-3.42)	(-21.21)	(-27.56)	(-27.43)
win9	-0.0021***	-0.0065***	0.0191***	-0.0031***	-0.0087***	-0.0115***	-0.0088***
	(-10.85)	(-25.22)	(53.58)	(-12.11)	(-31.64)	(-51.58)	(-46.58)
win10	-0.0030***	-0.0071***	0.0157***	-0.0039***	-0.0075***	-0.0100***	-0.0080***
	(-20.16)	(-35.56)	(58.62)	(-18.57)	(-35.26)	(-54.62)	(-53.58)
win11	-0.0044***	-0.0090***	0.0134***	-0.0041***	-0.0088***	-0.0096***	-0.0087***
	(-30.73)	(-47.40)	(52.97)	(-20.70)	(-44.05)	(-55.73)	(-60.89)
win12	-0.0043***	-0.0083***	0.0118***	-0.0057***	0.0165***	-0.0095***	-0.0084***
	(-21.10)	(-31.97)	(33.19)	(-20.44)	(-40.29)	(-36.98)	(-42.31)
win13	-0.0107***	-0.0155***	0.0143***	-0.0116***	0.0175***	-0.0152***	-0.0128***
	(-33.10)	(-35.74)	(29.16)	(-22.79)	(-42.79)	(-39.61)	(-41.74)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(-34.60)	(-62.34)	(34.15)	(-32.23)	(-80.53)	(-71.79)	(-68.85)
win15	-0.0047***	-0.0121***	0.0116***	-0.0056***	-0.0172***	-0.0143***	-0.0111***
	(-32.66)	(-63.74)	(51.90)	(-27.66)	(-89.47)	(-80.89)	(-74.50)
win16	-0.0056***	-0.0135***	0.0135***	-0.0075***	-0.0160***	-0.0136***	-0.0115***
	(-40.63)	(-68.05)	(67.11)	(-36.97)	(-84.92)	(-82.14)	(-80.28)
emp-max	0.0024***	0.0039***	0.0006***	0.0030***	0.0026***	0.0032***	0.0016***
	(45.31)	(56.66)	(6.34)	(44.14)	(35.54)	(50.05)	(30.96)
emp-min	0.0000	-0.0008***	0.0038***	-0.0004***	-0.0017***	-0.0030***	-0.0016***
	(0.31)	(-10.98)	(40.15)	(-5.46)	(-22.84)	(-46.47)	(-29.18)
ecipitation	-0.0016***	-0.0017***	0.0008***	-0.0020***	-0.0010***	-0.0007***	-0.0006***
	(-55.57)	(-45.32)	(22.18)	(-30.11)	(-39.81)	(-22.93)	(-33.89)
gh air pressure	-0.0015***	-0.0022***	0.0014***	-0.0017***	-0.0021***	-0.0013***	-0.0013***
	(-20.97)	(-23.82)	(11.69)	(-17.30)	(-21.49)	(-15.98)	(-18.77)
ow air pressure	0.0000	0.0012***	0.0001	-0.0004***	0.0015***	0.0005***	0.0006***
	(0.17)	(14.49)	(0.47)	(-4.03)	(17.44)	(6.92)	(10.02)
elative humidity	0.0230***	0.0333***	-0.0144***	0.0222***	0.0060***	0.0118***	0.0204***
	(196.54)	(210.13)	(-75.61)	(133.20)	(36.39)	(86.69)	(172.42)
and 6 days	0.3525***	0.5869***	-0.3430***	0.5125***	0.6241***	0.3922***	0.3561***
	(21.29)	(27.60)	(-12.48)	(24.01)	(29.94)	(21.15)	(22.37)
and 7 days	0.3989***	0.5940***	-0.3639***	0.5003***	0.5793***	0.3735***	0.3905***
	(23.98)	(27.85)	(-13.26)	(23.38)	(27.77)	(20.08)	(24.52)
and 8 days	0.4106***	0.6440***	-0.3252***	0.5256***	0.6155***	0.3582***	0.3846***
	(24.79)	(30.31)	(-11.87)	(24.54)	(29.59)	(19.23)	(24.13)
and 9 days	0.4131***	0.6144***	-0.3301***	0.5353***	0.6612***	0.3643***	0.3981***
	(24.72)	(28.75)	(-12.00)	(24.83)	(31.58)	(19.48)	(24.94)
and 0 days	0.4039***	0.5960***	-0.3959***	0.5357***	0.6136***	0.3857***	0.3639***
	(24.26)	(27.92)	(-14.40)	(25.02)	(29.31)	(20.70)	(22.81)
on-driving restriction	0.1817***	0.4254***	-0.2744***	0.3068***	0.6715***	0.3212***	0.2729***
	(11.87)	(22.74)	(-10.94)	(15.68)	(34.46)	(19.95)	(19.25)
oliday	0.1053***	0.0288***	0.0858***	0.1375***	-0.2177***	0.1759***	-0.0657***
	(12.69)	(2.71)	(6.02)	(11.97)	(-19.60)	(13.54)	(-8.62)
orkday-shift	0.0363***	0.1317***	-0.2688***	0.0307**	0.0964***	0.1187***	0.0933***
	(3.14)	(8.37)	(-13.40)	(2.07)	(6.40)	(10.74)	(8.32)
onth FE	Y	Y	Y	Y	Y	Y	Y
ur FE	Y	Y	Y	Y	Y	Y	Y

Notes: *t* statistics in parentheses; * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01. The baseline of the five pairs of driving restriction days and the non-driving restriction days is odd-even days