



Stimulating innovation in the electricity supply industry

David Newbery

University of Cambridge

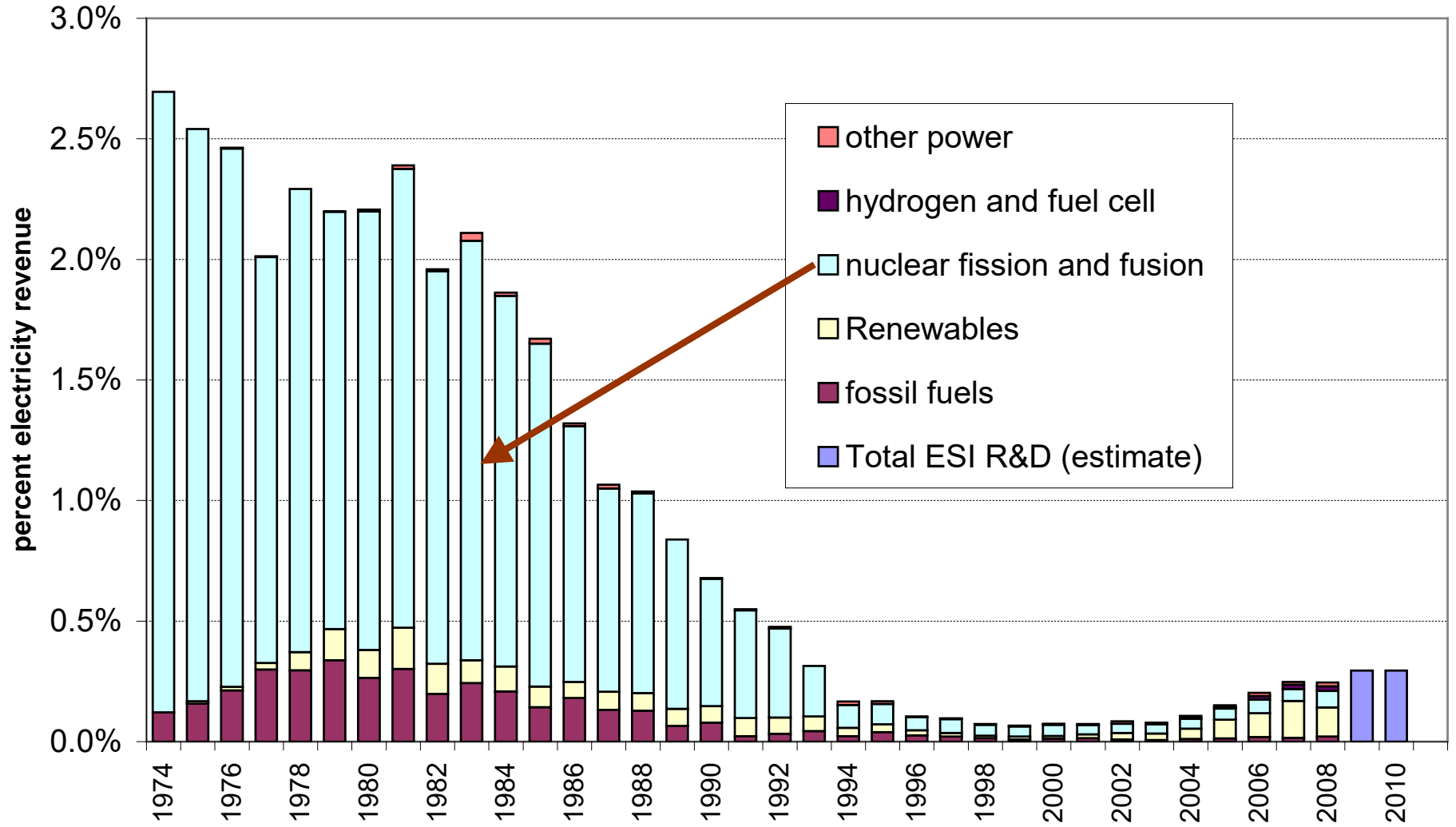
European Energy Forum 2015, London

5th October 2015

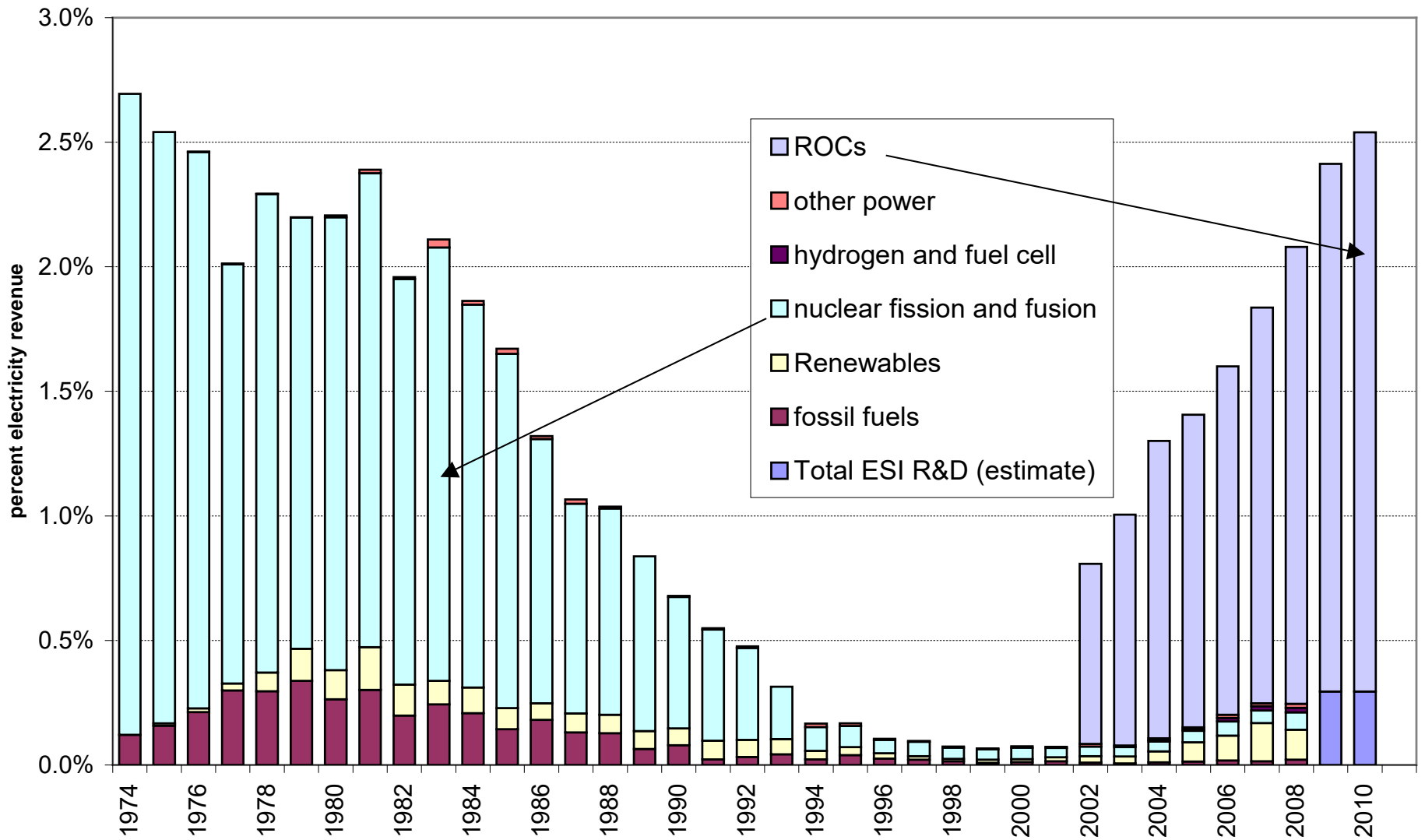


- Liberalisation and the collapse of R&D
- EU response: SET Plan
 - 2015 relaunched as **Energy Union R&I strategy**
- Allocating SET funds, past and future
 - Who pays?
- How to fund R&I
- Ofgem **Network Innovation Competitions** as model

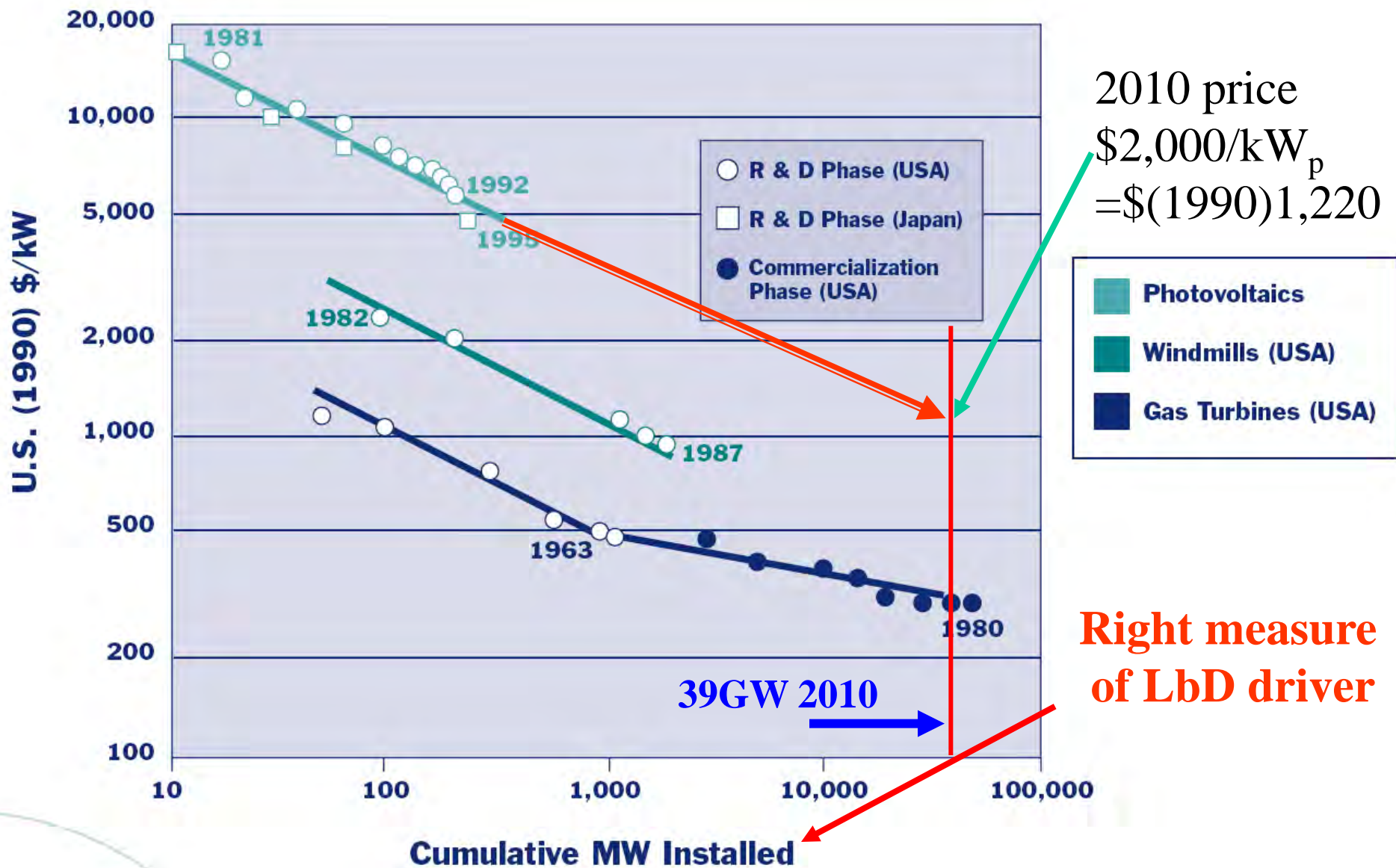
UK Electricity R&D intensity



UK Electricity R&D intensity



Learning justifies *Renewables Directive*



2010 price
 $\$2,000/\text{kW}_p$
 $=\$(1990)1,220$

- Photovoltaics
- Windmills (USA)
- Gas Turbines (USA)

**Right measure
of LbD driver**

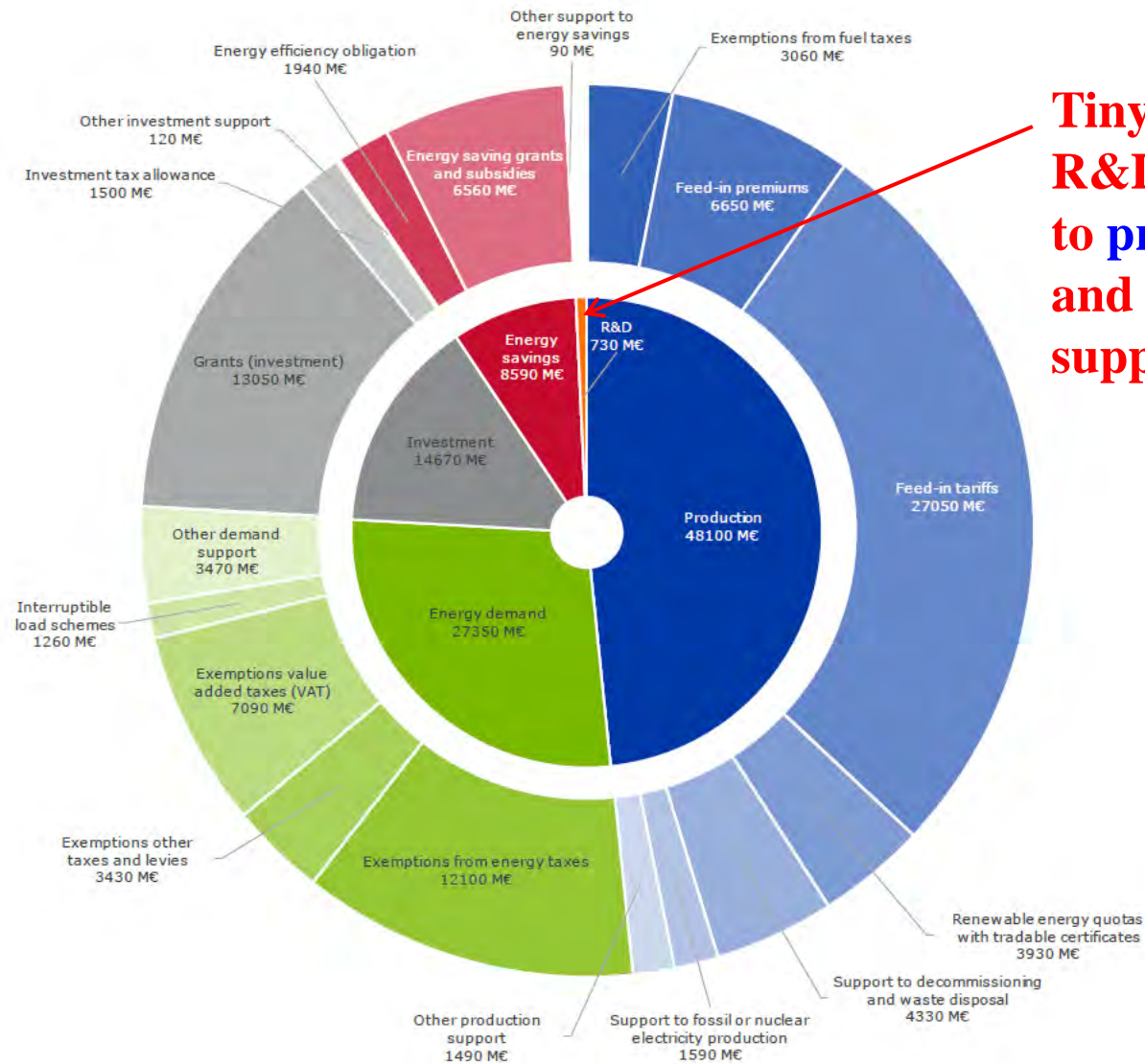
39GW 2010

Source: N. Nakicenovic, A. Grübler, and A. McDonald, eds., *Global Energy Perspectives* (CUP, 1998).



- *Renewables Directive* stimulated RES deployment
 - Not all low-C technology is ready for deployment
 - Excessive deployment, insufficient R&D?
 - R&D collapsed at end of 1980s
 - liberalisation and pessimism over nuclear economics?
 - R&D is a public/club good
 - => need collective action to increase low-C R&D
 - => Need to share IPR benefits contrary to MS interests
- => Strategic Energy Technology (SET) Plan
- SET plan to leverage MS's R&D, steer choices***
- Ensure adequate size and diversity of portfolio***

Breakdown of 2012 support by type of intervention



Tiny share of R&D compared to production and demand support



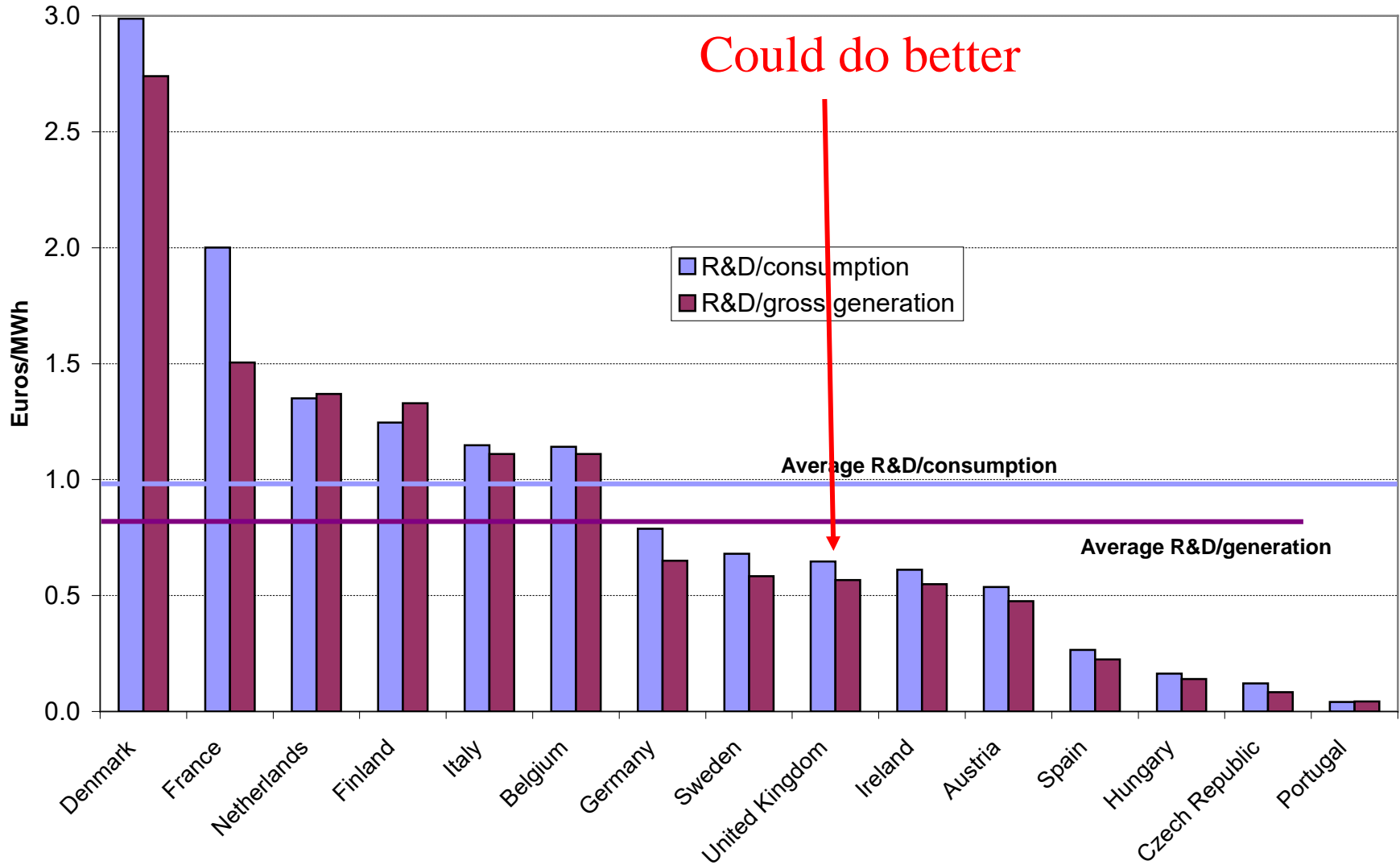
- **2007 SET** R&D non-nuclear \approx €2.4bn (Nuclear €0.94)
 - 70:30 private:public; 80:20 MS:EC
- SET plan to 2020 total €70 bn or **double 2007 rate**
 - Grid: €2bn; fuel cells + H₂: €5bn; Wind: €6bn;
 - **nuclear fission €7bn; bio-energy €9bn;**
 - **smart cities €11 bn; CCS €13 bn; Solar: €16bn;**
- Joint programming to amplify MS R&D
 - CCS as an example, disappointing to date
- **2015:** Energy Union Package 25 Feb COM(2015) 80:
 - A **new strategy for Research and Innovation** (R&I) (*including updated SET Plan*) ... should accelerate energy system transformation



- Encourage R&D in **under-researched** areas
- **rebalance** EU R&D portfolio
- support **high-risk high-cost** long-term R&D
 - particularly where too costly/risky for one country
- cross-border collaboration to **disseminate skills**
- encourage **open access**/reduce restrictive IPR
- create **credible commitments** by joint agreement
- **amplify under-resourced MS R&D**

Who should finance SET-Plan?

R&D intensity 2008



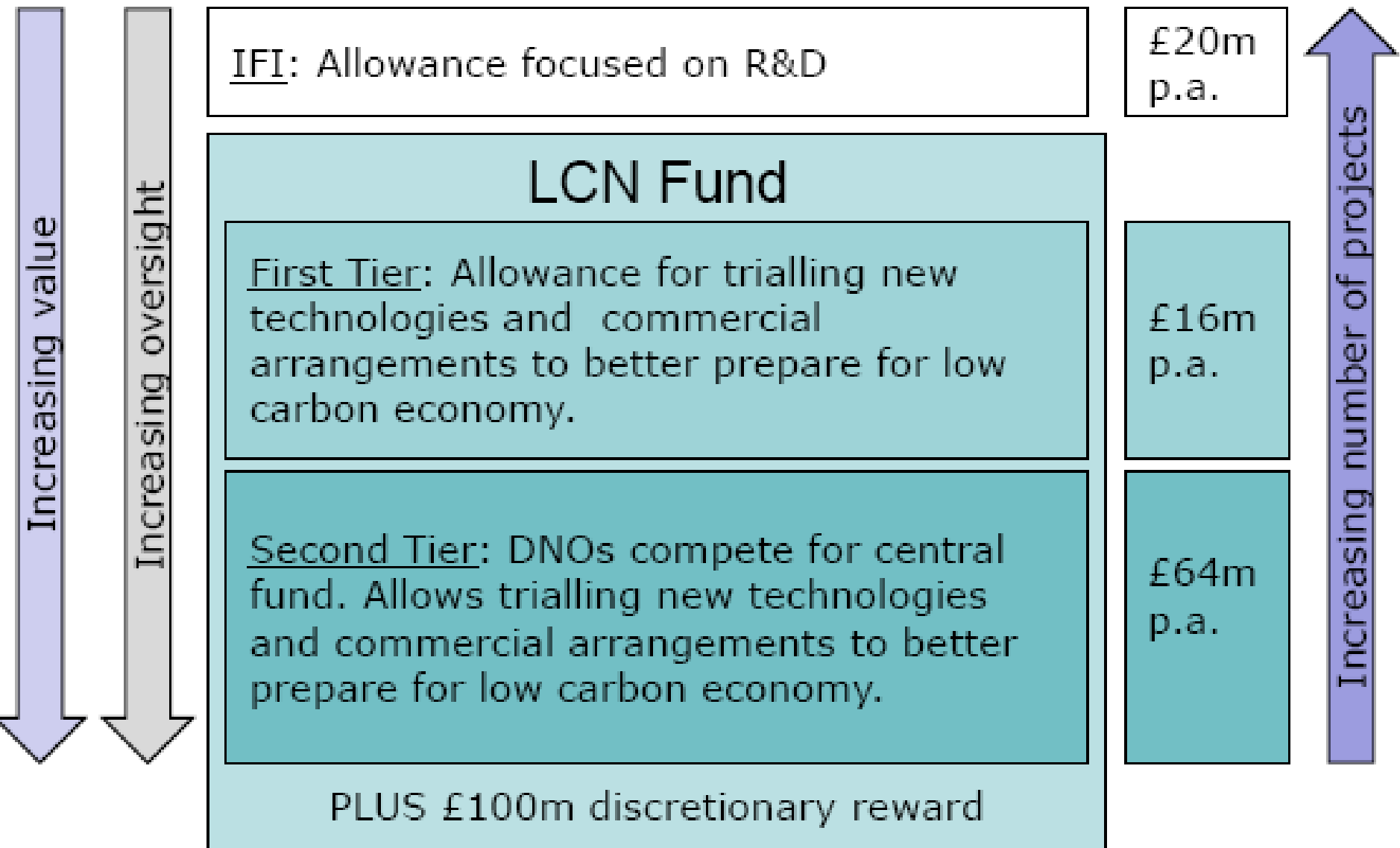
Sources: COM(2009) 519, Eurostat



- *Renewables Directive* solved club good problem
 - allocate MS targets, MSs solve what & how
 - but: hard to trade RES, learning benefits vary widely
- Post 2020: no MS RES targets
- **Possible solution**: MS targets % GDP for R&I
 - decide value of learning benefit of each RES technology
 - counts towards target expenditure, balance => EC
 - R&D and demos allocated by EC competition

Ofgem's innovation competitions as model

LCN Fund structure





- Accelerates development of low-carbon future
 - has direct impact on operation of DN
- DNOs co-fund (>10%) for commitment
 - involves other partners and external funds
- Involves risk, generates new knowledge
 - => disseminate all findings
- Project is robust, ready, relevant and timely
- has potential to deliver customer benefits

replaced by Network Innovation Competitions



- LCNF/NIC: DNO's proved very responsive
 - incentives and competition matter
- Wide range of partners involved
 - encourages learning, transfer of IT from other sectors
 - innovative ways of overcoming local inertia
- Universities involved in data analysis
 - ensures wide dissemination and independence
- EU R&I could adopt this model
 - requires **funding and competitive allocation**



DNO Distribution Network Operator

LCNF Low Carbon Network Fund

NIC Network Innovation Competition

MS Member State

R&I Research and Innovation

R&D Research and Development

RES Renewable Energy Supply

SET Strategic Energy technology