

Macroeconomic Impacts of Nuclear Power (Joint Activity IAEA/NEA)

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Nuclear Energy Integrates with Multiple SDGs

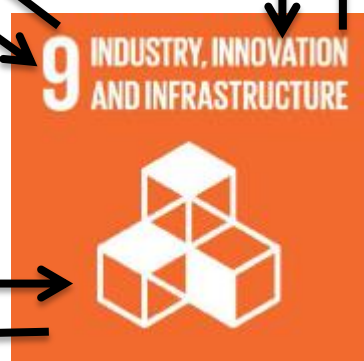
IAEA macroeconomic analysis considers linkages between four Sustainable Development Goals

Nuclear reduces volatility in electricity prices and supports access to modern energy services



Nuclear is a low carbon technology that mitigates climate impacts

Nuclear construction and operation creates economic value and jobs

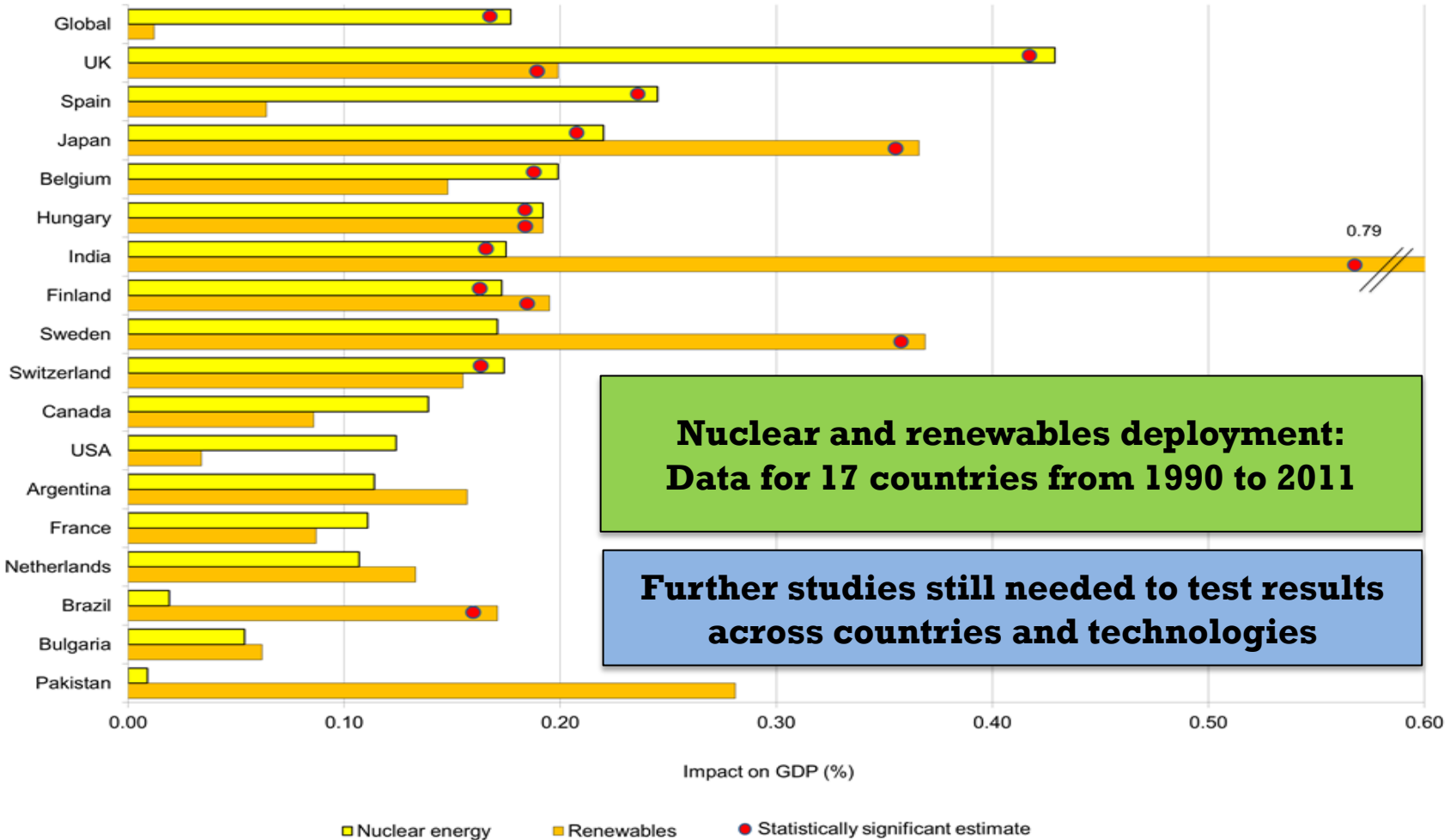


Nuclear stimulates industry, research and infrastructure development

Source: Adapted from UN (2015):

<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Macro-Econ Impacts can be significant and country specific



Source: IAEA, *Climate Change and Nuclear Power* (2015) based on data from Omri and Chaibi (Working Papers 2014-188, Ipag Business School, Paris.)

IAEA Nuclear Macro-Analysis is multi-dimensional

The three main pillars in the work at the IAEA:

Meetings & Capacity Building

Conducting consultancies, coordinated research projects (CRPs), training courses, expert and review missions

Studies & Reports (in progress)

Joint IAEA/NEA study on employment effects of an NPP

Study on macroeconomic impacts of nuclear power: multi-country analysis

Quantitative Tools

Developing an Input Output (I/O) model to study macro-economic impacts from an NPP and other energy technologies

IAEA is developing new tools to assess impacts

Testing



↑
Development
↓


MACRO MODEL

Input Output Model for Economic Impact Assessment

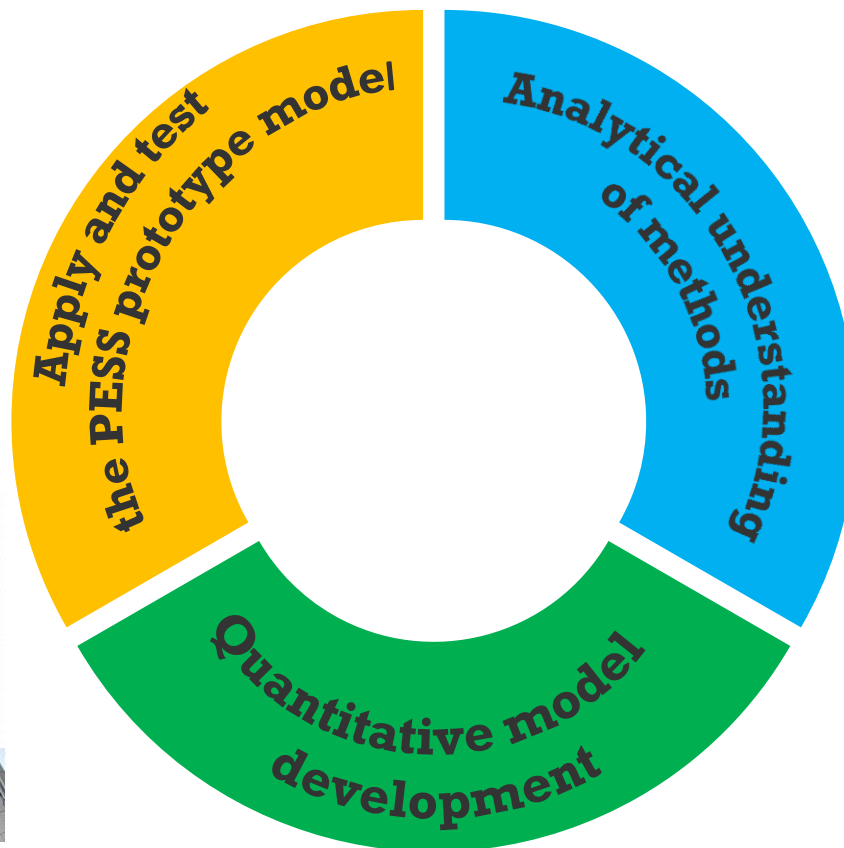
Version 1

Model Description

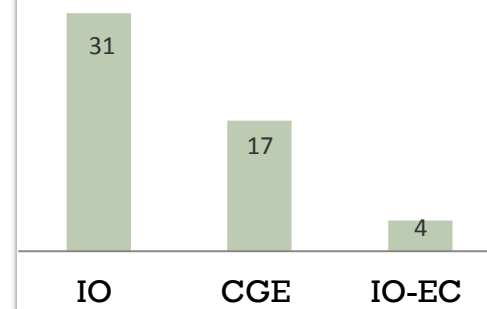
Case Study



Disclaimer: The International Atomic Energy Agency does not bear any responsibility for the accuracy of the results obtained using this tool



Quantitative literature review with a focus on a NPP



↓

CM “Roadmap for development of PESS tools and methods for economic impact assessment of an NPP programme”,

17-19 December 2012

↑ **Input-Output Model as an appropriate tool**

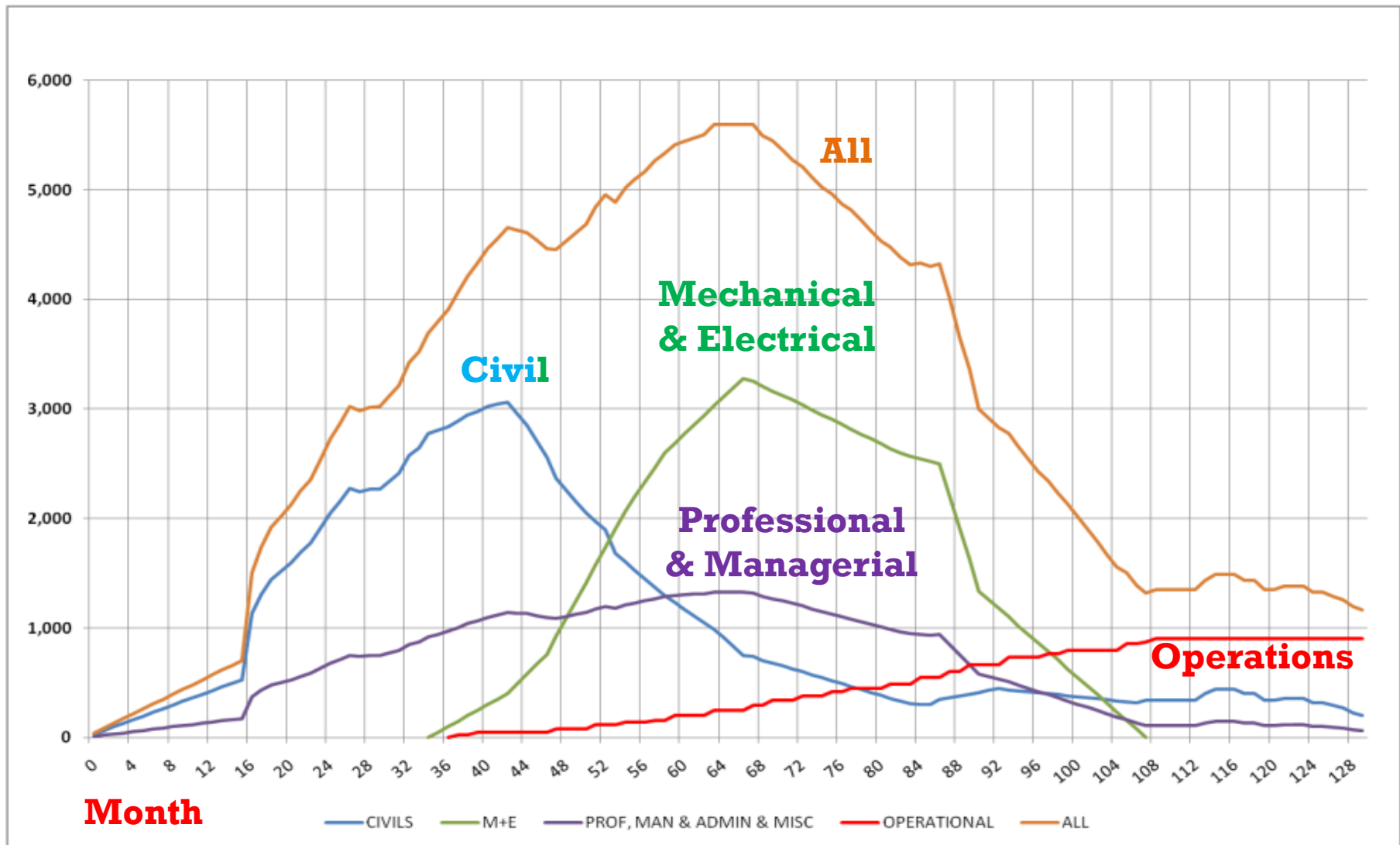
Example: South Korea I/O Table (Energy highlighted)

38 Sectors in the Korean Nuclear Power Sector and National Economy

Sector name		No.	Sector name
1	Agriculture, forestry, and fisheries	20	Thermal power generation
2	Mining and Quarrying	21	Nuclear power generation
3	Food, beverage and tobacco	22	Other generation
4	Textile and apparel	23	Gas and water supply
5	Wood and paper products	24	Construction (except sector 25)
6	Printing and reproduction of recorded media	25	Electric power plant construction
7	Petroleum and coal products	26	Wholesale and retail trade
8	Chemicals, drugs and medicines	27	Accommodation and food services
9	Inorganic basic chemical products	28	Transportation
10	Non-metallic mineral products	29	Communications and broadcasting
11	Basic metal products (except 9 sector)	30	Finance and insurance
12	Primary metal products	31	Real estate agencies and rental
13	Fabricated metal products	32	Business services
14	General machinery and equipment	33	Public administration and defense
15	Electronic and electrical equipment	34	Research and Development
16	Precision instruments	35	Education
17	Transportation equipment	36	Health services and social welfare
18	Furniture and other manufactured products	37	Other services
19	Hydro power generation	38	Dummy sectors

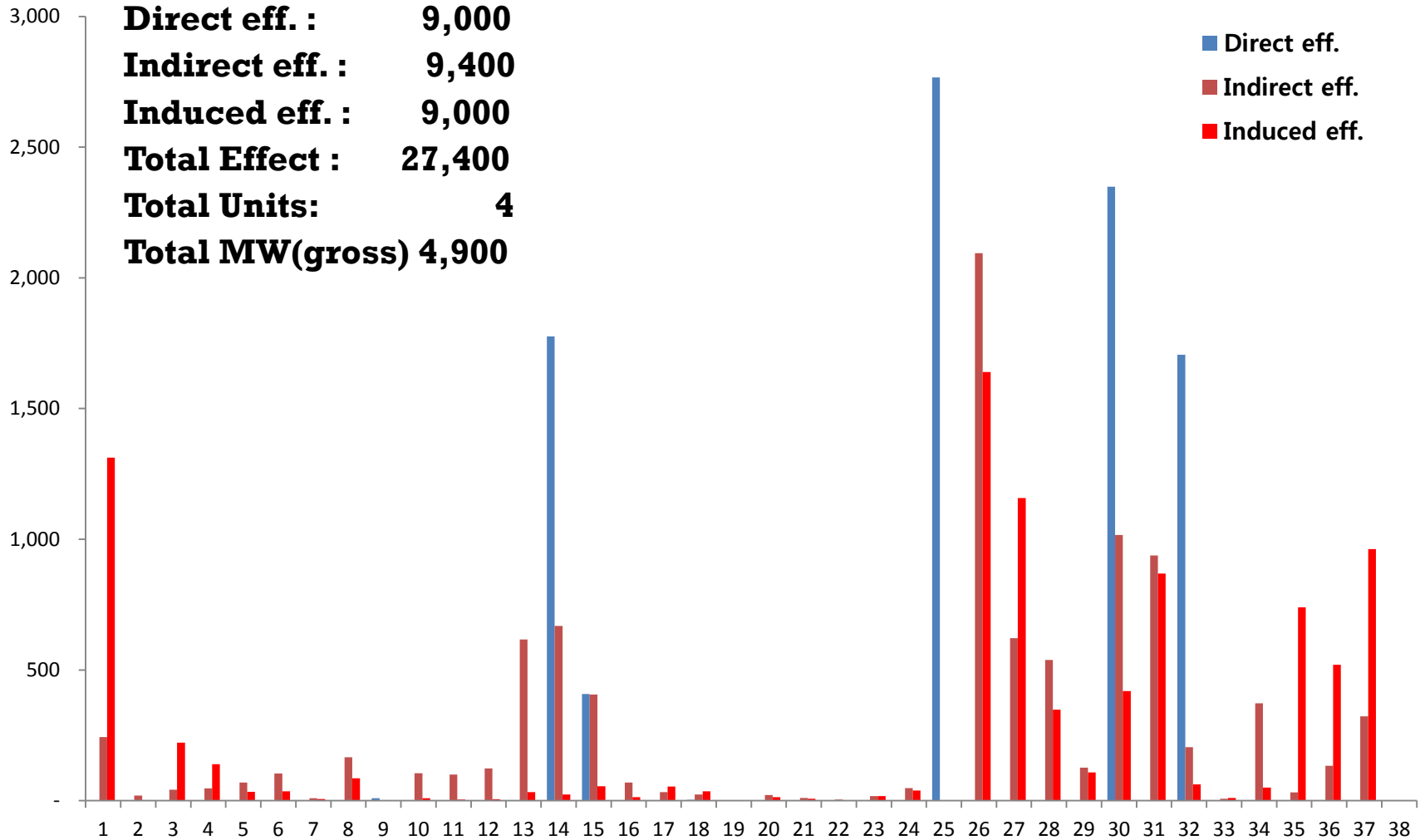
Source: IAEA, Nuclear Technology and Economic Development in the Republic of Korea, 2009.

Example: Nuclear Construction Manpower



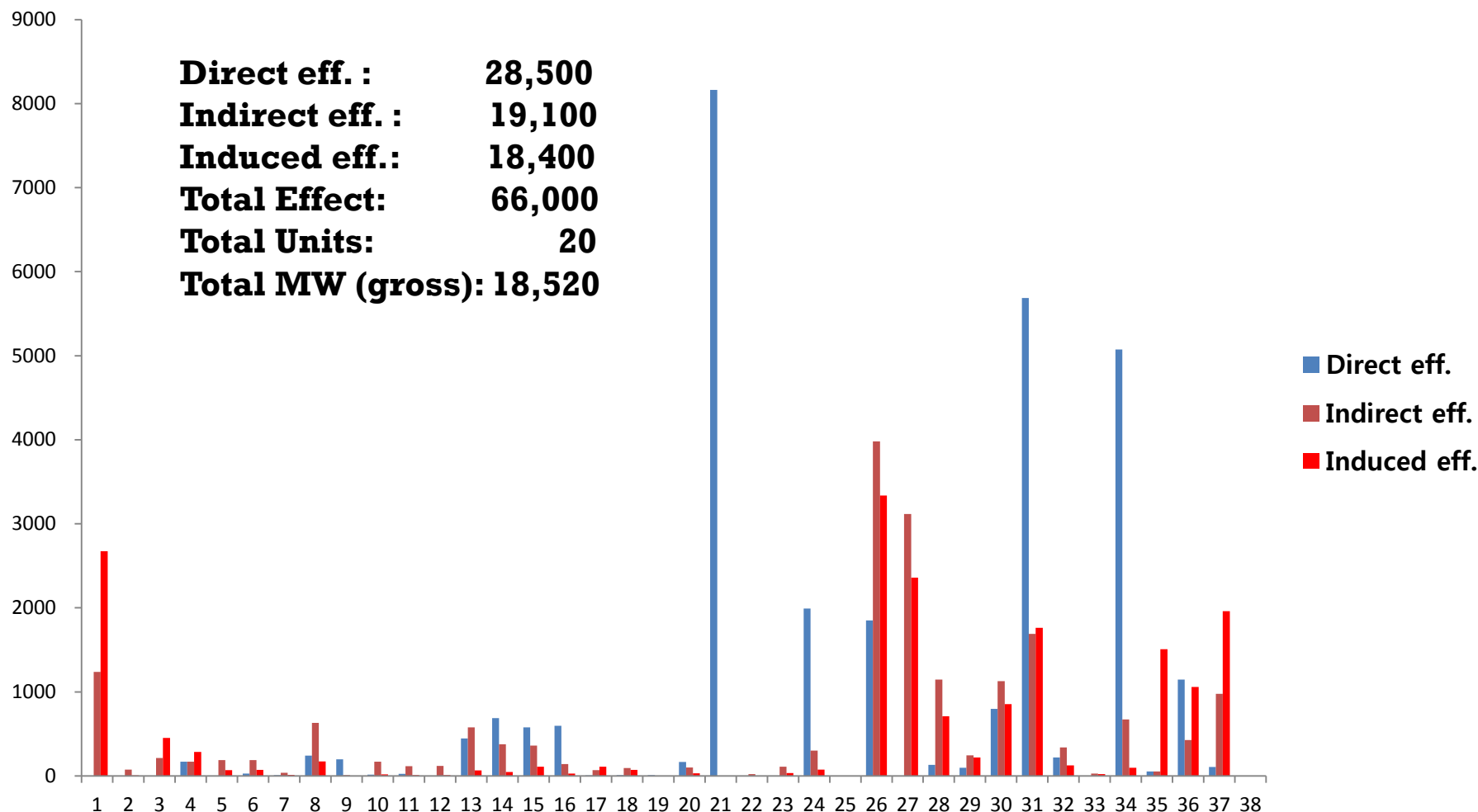
Source: EDF, "Hinkley Point C, Development Consent Order Application: Accommodation Study," October 2011. <https://www.edfenergy.com/file/1662/download>

Example: Construction Labour Effects



Source: Lee, Man-ki, "Korean Experiences in Applying I-O Analysis to Economy Wide Effects from Nuclear Power," Presented at 2nd Joint NEA-IAEA Workshop, 20 Nov 2014.

Example: Operations Labour Effects



Source: Lee, Man-ki, "Korean Experiences in Applying I-O Analysis to Economy Wide Effects from Nuclear Power," Presented at 2nd Joint NEA-IAEA Workshop, 20 Nov 2014.

Nuclear creates good jobs in the Electricity Sector

Job and Income Comparisons

(Note: Salaries have doubled since this was written

<http://www.simplyhired.com/salaries-k-nuclear-power-plant-jobs.html>)

Technology	Jobs/MW	Average Size (MW)	Direct Local Jobs	Average Salary (\$/hour)	Workforce Income (\$ Million/year)
Nuclear	0.50	1,000	504	\$31	\$32.49
Coal	0.19	1,000	187	\$28	\$10.99
Hydro > 500 MW	0.11	1,375	156	\$33	\$10.79
Hydro Pumped Storage	0.10	890	85	\$38	\$6.70
Hydro > 20 MW	0.19	450	86	\$33	\$5.79
Concentrating Solar Pwr	0.47	100	47	\$27	\$2.62
Gas Combined Cycle	0.05	630	34	\$28	\$2.02
Solar Photovoltaic	1.06	10	11	\$15	\$0.33
Micro Hydro < 20 MW	0.45	10	5	\$35	\$0.33
Wind	0.05	75	4	\$35	\$0.29

Source: Donald Harker and Peter Hans Hirschboeck, “Green Job Realities: Quantifying the Economic Benefits of Generation Alternatives,” *Public Utilities Fortnightly*, May 2010. <http://www.fortnightly.com/fortnightly/2010/05/green-job-realities?page=0%2C0>

Coordinated Research Project (CRP) “Assessing the economic and social impacts of nuclear programmes at the national and regional level” (2014-2017)



**CRP Participating Member States:
Croatia, Indonesia, Germany, Jordan,
Malaysia, Poland, Republic of Korea,
South Africa, Tunisia, Uruguay, Vietnam
and United States**

CRP-Outputs:

- 1. Test the prototype model**
- 2. Apply to country cases;**
- 3. Evaluate potential impacts on a country's economy**
- 4. Compare results to other energy technologies**

Research project underway at the IAEA to model macro impacts

Conclusions:

Nuclear has potential macro-economic benefits, while quantitative tools help determine the magnitude of the effects.

IAEA is conducting a research project to develop macro-economic tools, training courses, expert and review missions and other instruments.

Assessment of macroeconomic impacts can help IAEA Member States build a sustainable position on nuclear energy with greater public acceptance.

A joint publication of the NEA and IAEA, *Guidance Document for Measuring Employment Generated by the Nuclear Power Sector*, published early in 2016.