

# Estimation of number of jobs created for women by the Green New Deal

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## 1. Research Background and Objectives

All fiscal projects have a purpose. In January 2009, the South Korean government announced a plan they termed the «Green New Deal,» a program designed to generate 960,000 jobs over the following four years by investing a total of 50 trillion won in nine main areas including restoration of the four major rivers of South Korea, expansion of ecologically sustainable transportation, and increasing the recycling of resources.

The Green New Deal (GND) is a mid-term fiscal project endowed with a massive budget. In addition, as implied by the designation combining «green» and «new deal» (a large-scale public investment project designed for job creation), it is aimed at stimulating employment through the further development of environmental and green industries. Given that one of its principle goals is job creation via massive public investment, the nature of the jobs generated would impact the overall ratio and structure of male and female employment.

The GND has poured over 40 trillion won, more than 80 percent of the total budget, into the construction industries and Social Overhead Capital (SOC) projects. Considering the existing higher male participation in both the construction and the SOC, the GND is expected to exacerbate gender imbalances in future employment. Against this backdrop, this research attempts to estimate the potential amount of employment of women created through this massive government project and offer policy recommendations.

## 2. Research Method

The GND consists of projects involving either the construction or SOC that would create jobs directly or indirectly through potential ripple effects on other areas, or public projects and R&D-related projects that generate direct employment. Since the process of job creation principally lies in these two realms, they will be designated as dual categories: construction and SOC projects versus outside of construction and SOC projects.

For construction and SOC projects, the scale of employment by gender is estimated by using the employment generation index to include the number of jobs spawned through spin-off ef-

fects. However, the inter-industry relationships table released by the Bank of Korea only offers an employment generation index by gender in 28 major categories. With the majority of the GND being associated with construction and SOC, using the catchall category of the employment generation index assigned to the construction industry could fail to accurately represent the full range of construction-related enterprises and oversimplify the process of estimating the number of jobs spawned by the GND. Therefore, this research segmented the construction, energy, and public service sectors into 52 sub-categories and approximated their employment generation index by gender.<sup>[A]</sup>

For the estimation of jobs for women produced in fields outside of construction and SOC, the gender ratio indicated in performance data or the gender ratio of workers in analogous businesses as represented by national census data and a complete survey of the service industry (2005) by Statistics Korea were used. Relevant organizations were consulted when necessary.

### 3. Major Findings

#### 1) Characteristics of South Korea’s Green New Deal

The Green New Deal initiated by the South Korean government is principally comprised of construction and SOC projects such as the ‘four major rivers restoration’ project, R&D projects such as the ‘green cars’ project, IT projects exemplified by the construction of the national space information integration system, and public projects like the ‘Clean Korea’ project. However, if simply the share of the overall budget is considered, it is primarily made up of construction and SOC projects.

Since the New Economics Foundation of Britain first coined the term «green new deal» in a report titled «A Green New Deal» published in July 2008, a number of countries around the world have adopted green new deal policies into their efforts to ride out the contemporary economic crisis. However, very few green new deal policies included projects of the nature of the South Korean government’s four rivers project or the large canal project.

Some projects were found to have been cancelled or delayed when relevant organizations

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[A] Employment coefficient ( $l_w = L_w/X$ ,  $L_w$  indicates the number of the employed and  $X$  means output) refers to the amount of labor invested in production activities during a given period of time divided by the gross output. It indicates the amount of labor directly required for the production of one unit (a billion won of output) and is in inverse proportion to labor productivity. Employment inducement coefficient ( $\hat{l}_w(I-A^d)^{-1}$ ) is the employment coefficient multiplied by production inducement coefficient ( $(I-A^d)^{-1}$ ) that represents the direct and indirect production inducement effect for a single unit of the final demand for goods or services, indicating the amount of labor directly and/or indirectly induced during the spill-over process of production.

were contacted regarding their method of estimating the scale of employment publicized by the government. Accordingly, the estimated figures in this paper may be smaller than those previously announced by the government.

**2) Employment inducement coefficients by gender**

It was confirmed that the sectors to which the bulk of the GND budget have been assigned, including energy, construction, R&D, public administration, defense, and hygiene services all display a significantly low employment generation index for female workers. In the case of the construction industry, the number of jobs generated for women across all sub-categories, including housing, non-housing, repair, and transportation infrastructure did not surpass five persons per billion won budgeted. Hygiene services, which includes businesses related to waste disposal and environment protection, generated a mere three jobs for women per billion won, compared to ten jobs for men. Likewise, R&D activities produced three jobs for women and ten for men per billion dedicated.

**Table 1. Employment inducement coefficients by gender**

| Employment inducement coefficients (persons employed/billion won) | Men  | Women  |
|---|--|--|
| Less than 6   | Petroleum and leather products, basic metal products, electricity, urban gas, steam and hot water supply, electronic communications services, banking, banking and insurance-related services, real estate, medical and health care services | Mining products, wood and paper products, petroleum and coal products, chemical products, non-metal mineral products, basic metal products, general machinery, electric and electronic equipments, precision machinery, transportation equipment, electricity, urban gas, steam and hot water supply, water, housing construction, non-housing construction, construction repair, construction of transportation facilities, general civil construction, other special construction, transportation, post and telephone, electronic communications services, broadcasting, banking, banking and insurance-related services, real estate, R&D, business-related specialized services, construction and engineering-related services, computer-related services, public administration and defense, hygiene, repair services |

| Employment inducement coefficients (persons employed/billion won) | Men  | Women   |
|---|--|---|
| 5-10  | Mining products, fabric and leather products, wood and paper products, chemical products, non-metal mineral products, metal products, general machinery, electric and electronic equipment, precision machinery, transportation equipments, water, post and telephone, broadcasting, insurance, R&D, business-related services, advertisement, public administration and defense, education, social welfare, hygiene   | Fabric and leather products, printing and copying, other manufacturing products, insurance, advertisement, business-related service, medical services and health care, printing, culture and entertainment, civic organizations |
| 10-20   | Food and beverage, printing and copying, other manufacturing products, housing construction, non-housing construction, construction repair, construction of transportation facilities, general civil construction, other special construction, wholesale and retail, restaurant and accommodation, transportation, construction and engineering-related services, computer-related services, other business-related services, printing services, culture and entertainment services, civic organizations, repair services, personal services | Food and beverage, wholesale and retail, education, personal services   |
| 20 or more  | Agriculture, forestry and marine products  | Agriculture, forestry and marine products, restaurant and accommodation, social welfare-related business  |

### 3) Scale of female employment in the Green New Deal

The estimated number of jobs created for women by the GND program is projected by this study to be 176,598 or 20% of the total jobs. The total estimated number of new jobs is 880,000, around 30,000 fewer positions than the figure announced by the government. This difference stems from this paper excluding from the projects announced in January of 2009 those projects found to be cancelled as of September of that year.

The total number of jobs generated through the GND peaked in construction-related projects

at around 480,000, followed by environmental protection with 290,000. Energy-related sectors were expected to see around 80,000 new openings, less than 10% of the total. The majority of the environmental protection projects are public projects or projects hiring manual laborers. Therefore, it is no exaggeration to say that a majority of the jobs generated by the GND stem from construction or public projects. On the other hand, those areas reducing carbon emissions by increasing energy efficiency and recycling, which are seen as the keys to green growth, are expected to generate less than 10% of the total jobs. Little impact is made by including the Green Home and Green School projects in the «increased energy efficiency» sector.

When the sub-categories of the GND are investigated, the proportion of jobs occupied by women in the areas of renewable energy and increased energy efficiency is 13.6% and 18.0%, respectively. It is important to note that both numbers are lower than those in construction-related projects. In the case of projects addressing renewable energy and increased energy efficiency, the employment is provided through R&D and technical services. Given that the current ratio of female workers is minimal in these areas, it would be necessary to train more female workers if their employment was desired.

While environmental protection shows the highest proportion of females at 22.8%, most of those jobs are public projects such as forest management or waste collection. The GND, whose ultimate stated aim is environmental protection, needs to be restructured in the future to include a fuller range of environmental action beyond forestation and waste collection.

**Table 2. Jobs for Men and Women in Green New Deal (2009-2012)**

| Area  | Project Name   | Government Plan             |                          | No. of Jobs by Gender<br>(estimated in this study) |        |                    |
|---|--|-----------------------------|--------------------------|--|--------|--------------------|
|   |  | Budget<br>(100 million won) | No. of Jobs<br>(persons) | Men  | Women  | Total<br>(persons) |
| Projects classified in employment generation index of the construction industry | Four Rivers restoration  | 114,000                     | 190,000                  | 119,820  | 30,027 | 149,847            |
|   | Management of disaster-prone areas   | 25,038                      | 41,567                   | 26,288   | 6,596  | 32,884             |
|   | Expansion of green transportation network<br>(Early completion of Gyeongbu and Honam high-speed train (KTX) lines) | 83,173                      | 96,536                   | 100,987  | 21,534 | 122,521            |
|   | Construction of transfer facilities  | 5,178                       | 8,598                    | 6,287  | 1,341  | 7,628              |

| Area  | Project Name   | Government Plan             |                          | No. of Jobs by Gender<br>(estimated in this study) |                  |                    |
|---|--|-----------------------------|--------------------------|--|------------------|--------------------|
|   |  | Budget<br>(100 million won) | No. of Jobs<br>(persons) | Men  | Women            | Total<br>(persons) |
| Projects classified in employment generation index of the construction industry | Construction of nationwide bicycle lane network and bicycle expressway pilot project | 7,980                       | 13,248                   | 9,690  | 2,066            | 11,755             |
|   | Construction of small and mid-sized dams   | 7,262                       | 12,055                   | 7,625  | 1,913            | 9,538              |
|   | Construction of Green Homes and Green Schools  | 80,500                      | 133,630                  | 111,498  | 26,336           | 137,834            |
|   | Eco-river construction   | 4,838                       | 8,031                    | 5,080  | 1,274            | 6,354              |
|   | Redevelopment of retired landfill  | 5,300                       | 9,230                    | 5,565  | 1,396            | 6,961              |
|   | Sub-total  | 333,269                     | 512,895                  | 392,840<br>(80.9)                                  | 92,483<br>(19.1) | 485,322            |
| Environmental protection  | Developing green forests   | 24,174                      | 170,702                  | 122,905  | 47,797           | 170,702            |
|   | Prevention of forest catastrophe and restoration of forest                           | 7,327                       | 52,648                   | 48,963   | 3,685            | 52,648             |
|   | Promotion of use of electronic documents   | 800                         | 8,430                    | 4,385  | 4,045            | 8,430              |
|   | Clean Korea implementation projects  | 2,103                       | 14,546                   | 6,517  | 8,029            | 14,546             |
|   | Creation of low-carbon green growth surrounding riversides                           | 8,000                       | 19,900                   | 18,885   | 1,015            | 19,900             |
|   | Construction of rain water outflow facilities  | 2,160                       | 4,077                    | 3,796  | 281              | 4,077              |
|   | Development of eco-river restoration technology                                      | 4,838                       | 25,104                   | 22,543   | 2,561            | 25,104             |
|   | Sub-total  | 49,402                      | 295,407                  | 227,994<br>(77.2)                                  | 67,413<br>(22.8) | 295,407            |
| Renewable energy  | Utilization of forest biomass  | 881                         | 3,130                    | 2,610  | 520              | 3,130              |
|   | Popularization of new and renewable energy   | 7,391                       | 4,348                    | 1,922  | 739              | 2,661              |
|   | Evaluation of the impact of bioethanol cars and development of relevant technology   | 30                          | 60                       | 47   | 13               | 60                 |
|   | Increase of recycling and investment of waste resources                              | 9,300                       | 16,196                   | 14,565   | 1,631            | 16,196             |

| Area              | Project Name  | Government Plan             |                          | No. of Jobs by Gender<br>(estimated in this study) |                   |                    |
|-------------------|---|-----------------------------|--------------------------|--|-------------------|--------------------|
|                   |   | Budget<br>(100 million won) | No. of Jobs<br>(persons) | Men  | Women             | Total<br>(persons) |
| Renewable energy  | Extraction of biomass energy from vegetable and marine systems                          | 11,220                      | 24,372                   | 22,057   | 2,315             | 24,372             |
|                   | Construction of production facilities to use biomass and utilization of livestock waste | 2,258                       | 4,519                    | 2,785  | 1,734             | 4,519              |
|                   | Recycling of waste water  | 3,767                       | 6,001                    | 2,006  | 308               | 2,314              |
|                   | Sub-total   | 34,847                      | 58,626                   | 45,992<br>(86.4)                                   | 7,260<br>(13.6)   | 53,252             |
| Energy efficiency | Promotion of Green Cars   | 13,136                      | 10,000                   | 7,972  | 2,028             | 10,000             |
|                   | Development of Green Car technology   | 1,936                       | 196                      | 168  | 28                | 196                |
|                   | Installation of LED lights in public facilities   | 13,356                      | 10,030                   | 9,268  | 762               | 10,030             |
|                   | Construction of a test bed for Green IT   | 100                         | 10,000                   | 7,497  | 2,503             | 10,000             |
|                   | Construction of the national integrative energy management system for buildings         | 340                         | 760                      | 497  | 263               | 760                |
|                   | Sub-total   | 28,868                      | 30,986                   | 25,402<br>(82.0)                                   | 5,584<br>(18.0)   | 30,986             |
| Other             | Creation of a "theme park" in rural communities   | 850                         | 850                      | 600  | 98                | 698                |
|                   | Construction of a bus rapid transit (BRT) system  | 1,744                       | 2,208                    | 2,263  | 338               | 2,600              |
|                   | Construction of the national integrative system for space information                   | 3,717                       | 3,120                    | 2,618  | 502               | 3,120              |
|                   | Computerization of road and underground utility information                             | 2,599                       | 7,767                    | 5,080  | 2,687             | 7,767              |
|                   | Advancing into overseas water industry  | 1,989                       | 1,452                    | 1,219  | 233               | 1,452              |
|                   | Sub-total   | 10,899                      | 15,397                   | 11,780<br>(75.3)                                   | 3,858<br>(24.7)   | 15,637             |
| Total             |   | 457,285                     | 913,311                  | 704,008<br>(79.9)                                  | 176,598<br>(20.1) | 880,604            |

\*Note : the numbers in parenthesis indicate the gender ratio of the employed.

## 4. Policy Recommendations

### 1) Revision of the GND to include areas with higher employment inducement coefficients for female workers

The government estimates that a total of 950,000 new jobs will result from the GND program. Apart from whether this prediction will materialize, it needs to be reviewed in terms of the potential impact this massive capital investment will have on the employment of women. Given that the GND will generate a proportion of jobs for women as low as 20%, as identified above, it would make even bleaker the employment prospects faced by women amidst the ever-worsening market conditions for female workers in South Korea. In this light, it is suggested that the GND should be supplemented by projects boasting higher employment generation indices for women in tandem with an accelerated synergy effect with other green industries. Furthermore, the program should be implemented as a rolling plan of which the effect is assessed and reflected upon on a continual basis.

As an example, one sector that could be included in the program is the health care industry, which traditionally generates a great number of jobs for women (4.6 male jobs/billion won; 8.4 female jobs/billion won). Health care is among the areas of greatest public concern, since environmental pollution directly affects public health. Illnesses triggered by pollution also impose an enormous financial burden on society. For example, the social cost of asthma, one of the most prevalent environmental diseases, amounts to 4.1 trillion won per year (Choi Hong-jin, 2008). The GND as it exists stops short of including projects related to environmental health care. If such projects were introduced in a revised program, it would heighten the overall impact of the job creation package.

The efficiency and effectiveness of the GND would be further enhanced if the program were adjusted in such a way for the benefits of the massive public investment to be distributed more equitably between male and female workers while enterprises with a lower relevancy to green projects are either supported separately or renounced. Given that businesses with a higher employment generation index for female workers do not necessarily guarantee jobs of high quality, target projects should be determined by assessing an expanded range of categories including the quality of the jobs created.

### 2) Preparation of measures to increase women's participation in green technology

In addition to the inclusion of sectors with an elevated employment generation index for female workers, the government needs to establish measures to increase participation of female workers in the GND. This research has uncovered that the proportion of female jobs in the GND created in the areas of renewable energy and increased energy efficiency is lower than

that found in the construction and SOC sectors due to minimal female participation in the areas of R&D and technical services. Both of these are major engines of job creation in the renewable energy and energy efficiency industries. It is recommended that the government take more aggressive action to augment the participation of female technicians and their expertise in green technology, including in the energy sector.

In the United States, increasing numbers of women are entering traditionally male positions in the wind energy industry. Outside the customer services sector, where the ratio of female workers is over 60%, these jobs include transportation of goods and materials as well as production and process management. This has only been possible due to the government policies designed to encourage female participation included from the initial emergence of the wind energy industry. In this regard, green technology such as environment remediation and renewable energy technologies should be included in all government policies designed to cultivate talented female engineers, not exclusively the WISE (Women Into Science and Engineering) and WIE (Women Into Engineering) projects by the Ministry of Education, Science and Technology which are aimed at encouraging female students to participate in science and technology. Furthermore, programs such as WANTO (Women in Apprenticeship and Non-traditional Occupations) in the United States and related laws are called for in order to tear down the structural barriers present in the labor market and allow women to participate in more fully in traditionally non-female jobs.

### **3) Provision of sub-categorical employment inducement coefficients by gender and compilation of separate statistics by gender in green growth areas**

The current input-output table provides an employment generation index by gender, education, and profession for only 28 major industry categories, which hampers the precision of predicting the impact of job creation projects on employee demographics. Policies and budgets related to job creation would greatly benefit if the employment generation index by gender were provided for the full 168 sub-categories.

A separate compilation of existing statistics by gender is also deemed to be necessary together with the development of additional statistics related to employment in green and environment industries. As is the case in other areas, gender-based data are scarce in green growth sectors such as the environmental industry: for example, even fundamental questions such as the gender of workers are excluded from the annual statistical survey of the environmental industry. A compilation of statistics by gender concerning the GND and green growth industries such as environmental protection and renewable energy needs to be systematically undertaken.

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