

November 20, 2003

Manual for DNE21 Model Use

1. For Compiles (Skip to the Section 2 to use the execution files directly)

(A) UNIX

The following 3 make files are prepared:

- d : Matrix generator
- f : Optimization solver
- b : Report generator

Please make the execution files by the following commands:

```
$ make -f d
$ make -f f
$ make -f b
```

The execution files of "gene", "run" and "rep" are generated by the above commands, respectively. The compiler is assumed to be "gcc" in the prepared make files. Please change the descriptions in the make files if the other compiler is used, e.g., "cc".

(B) Windows (e.g., Visual C/C++)

An ANSI C compiler, e.g., Visual C/C++, should be prepared, and the execution files are generated by the compiler referring the make files for UNIX. The execution file is compiled as the Win32 Console Application when Visual C/C++ compiler is used.

2. Model calculation

(1) Model calculation in the Reference Case

- (a) First, the Reference Case is calculated. The model simulation parameters as shown in the following are set in the "control.dat" file. You can set the "Sulphur Emissions Regulation" to "0" if you do not assume the sulphur emission constraints, and set the "Integration of Macro Economic Model" to "0" if you want calculate the model without the macro economic model. However, we recommend the following set. You have to set "Energy Demand adjustment by retail prices" to "0" and the other global warming mitigation policy (e.g., "Carbon Tax") to "0" in the Reference Case.

```
*****
Mode Number of Model Operation (Yes=1, No=0)
*****
Energy Demand adjustment by retail prices      : 0
```

```
Carbon Tax : 0
Emissions Regulation (Permits trade) : 0
Concentration Regulation : 0
Sulphur Tax : 0
Sulphur Emissions Regulation : 1
Regional Temperature Change Function : 0
Temperature Regulation : 0
Damage Function : 0
Integration of Macro Economic Model : 1
Approximated Inter-regional trade : 0
*****
```

- (b) The optimization time span as shown below is set in the "control.dat". The "probability" is set to "1" for the "Scenario No. 1" and to "0" for the other scenarios, and set the time points for the optimization. The scenarios of No. 2, 3 and 4 is for the decision making analysis under the uncertain future.

```
*****
Scenario Branch for Uncertainty Analysis
*****
Scenario No. 1 2 3 4
Probability : 1 0 0 0
Block No. Year NO.
1 : 0 1 1 1 1
2 : 1 1 1 1 1
3 : 2 1 1 1 1
4 : 3 1 1 1 1
5 : 4 1 1 0 0
6 : 5 1 1 0 0
7 : 6 1 0 0 0
8 : 7 1 0 0 0
9 : 4 0 0 1 1
10 : 5 0 0 1 1
11 : 6 0 1 0 1
12 : 7 0 1 0 1
13 : 6 0 0 1 0
14 : 7 0 0 1 0
15 : 6 0 0 0 1
16 : 7 0 0 0 1
```

```
-----
where Year No.
0=2010, 1=2020, 2=2030, 3=2040, 4=2050, 5=2075, 6=2100, 7=2150
*****
```

- (c) Other model assumptions in "*.dat" are changed if you want to.

- (d) Matrix generator

(A) UNIX

\$ gene

(by the full path if the path is not set)

(B) Windows

> gene.exe

(by the full path if the path is not set)

- (e) Optimization calculation

It will take a considerable time (from a few to a few decade hours) by your computer ability. The

calculation time also strongly depends on the optimization time span which are set in the above (b).

(A) UNIX

\$ run

(by the full path if the path is not set)

(B) Windows

> run.exe

(by the full path if the path is not set)

(f) Report generator

The report files are generated by the following command after the optimization calculation is finished.

Files of “*.rep” are generated.

(A) UNIX

\$ rep

(by the full path if the path is not set)

(B) Windows

> rep.exe

(by the full path if the path is not set)

(2) Model calculation in CO₂ regulation cases

(a) A CO₂ regulation case (e.g., the CO₂ tax case, the CO₂ emission regulation case, the CO₂ concentration regulation case, etc.) is calculated. The model simulation parameters as shown in the following are set in the “control.dat” file (The following sample is for the CO₂ concentration regulation case).

You can set the “Sulphur Emissions Regulation” to “0” if you do not assume the sulphur emission constraints, and set the “Integration of Macro Economic Model” to “0” if you want calculate the model without the macro economic model. However, we recommend the following set and you have to set the same flag in the Reference Case for these parameters.

```
*****
Mode Number of Model Operation (Yes=1, No=0)
*****
Energy Demand adjustment by retail prices      : 1
Carbon Tax                                       : 0
Emissions Regulation (Permits trade)           : 0
Concentration Regulation                        : 1
Sulphur Tax                                     : 0
Sulphur Emissions Regulation                   : 1
Regional Temperature Change Function            : 0
Temperature Regulation                         : 0
Damage Function                                : 0
Integration of Macro Economic Model             : 1
Approximated Inter-regional trade              : 0
*****
```

(b) The regulation target level of the CO₂ concentration as shown in the following is set in the

“control.dat” file for the CO₂ concentration regulation case. For the other CO₂ regulation cases, each target is set in the corresponding data (e.g., carbon tax rate for the carbon tax case).

```
*****
Concentration Regulations by year(ppmv)
( For cancelation of regulation, please set negative values.)
*****
year   2010   2020   2030   2040   2050   2075   2100   2150
Scenar1 :   -1.    -1.    -1.    -1.    -1.   550.   550.   550.
Scenar2 :   -1.    -1.    -1.    -1.    -1.    -1.    -1.    -1.
Scenar3 :   -1.    -1.    -1.    -1.    -1.    -1.    -1.    -1.
Scenar4 :   -1.    -1.    -1.    -1.    -1.    -1.    -1.    -1.
*****
```

- (c) The optimization time span is set as same as in the “Reference Case”. (Please do not change it from in the Reference Case)
- (d) The other model assumptions are also set as same as in the “Reference Case”. (Please do not change them from in the Reference Case)

(e) Matrix generator

(A) UNIX

\$ gene

(by the full path if the path is not set)

(B) Windows

> gene.exe

(by the full path if the path is not set)

(f) Optimization calculation

It will take a considerable time (from a few to a few decade hours) by your computer ability. The calculation time also strongly depends on the optimization time span which are set in the above (b).

(A) UNIX

\$ run

(by the full path if the path is not set)

(B) Windows

> run.exe

(by the full path if the path is not set)

(g) Report generator

The report files are generated by the following command after the optimization calculation is finished. Files of “*.rep” are generated. Please note the overwritten, if the command is operated in the same folder or directory as in the Reference Case.

(A) UNIX

\$ rep

(by the full path if the path is not set)

(B) Windows

> rep.exe

(by the full path if the path is not set)

The below figure shows the input and output relations of DNE21 model. The file of "shadow.dat" which is obtained in the Reference Case is required in the CO2 regulation cases. The file of "pp.out" is generated after the optimization calculation. The optimization calculation time would shorten by using the "pp.dat" which is copied from "pp.out", if the optimization solution is located near the solution for the "pp.dat". The file of "pp.tmp" is the temporary file under the optimization calculation; this file can be also used for the re-start of the optimization.

