Appendix. Additional material for the SCDR example

~FI_Comm							
	Csets	CommNa	me CommDesc	Unit	LimType CTSLvI PeakTS Ctype	pe CTSLvI	е
	DEM	SC	SC	PJ	DAYNITE	DAYNITE	
	ENV	SC_in	SC_in	PJ	N		
	ENV	SC_out	SC_out	PJ	N		

Here is an example commodity table, including SC_in and SC_out as dummy commodities:

SC_in and SC_out are of LimType N, and will thus not have any commodity balance.

Here is an example process table:

~FI_Process							
Sets	TechName	TechDesc	Tact	Тсар	Tsivi	PrimaryCG	Vintage
PRE	SCDR-NP	SCDR (normal process)	PJ	PJ_a	DAYNITE	SC_out	NO
STG	SCDR-STG	SCDR (storage)	PJ	PJ_a	DAYNITE	SC	NO
DMD	Cool1	Cooling tech 1	PJ	PJ_a	DAYNITE	SC	NO
DMD	Cool2	Cooling tech 2	PJ	PJ_a	DAYNITE	SC	NO
DMD	Cool3	Cooling tech 3	PJ	PJ_a	DAYNITE	SC	NO

As one can see, two new processes SCDR_NP and SCDR_STG are added, in addition to regular demand processes Cool1, Cool2, and Cool3. SCDR_NP is a normal process with PG=SC_out, and SCDR_STG is a storage process with PG=SC.

Here is the process characterization table for these example technologies:

Process of	characterization		~FI_T			
TechName	*TechDesc	Comm-IN	Comm-OUT	EFF	LIFE	INVCOST
SCDR-NP	SCDR (normal process)	SC_in SC	SC_out		20	1
Cool1	Cooling tech 1	ELCD	SC	2	20	1
Cool2	Cooling tech 2	ELCD	SC	3	20	1
Cool3	Cooling tech 3	GASD	SC	1.5	20	1
SCDR-STG	SCDR (storage)	SC			20	1
		SC_in	SC_out			

As one can see, the two example SCDR processes both have SC and SC_in as inputs, and SC_out as an ouput. For the storage process, SC_in and SC_out are auxiliary flows needed if VAR_SIN and VAR_SOUT variables are to be referred in user constraints. The numerical parameters are arbitrary (and not necessary at all for the SCDR processes).

To complete the SCDR process descriptions, the following additional parameters are defined:

~TFM_DINS							
TimeSlice LimType		Attribute	Year	Other_Indexes	Test	Pset_PN	Cset_CN
ANNUAL		FLO_EMIS	2010	SC_in	1	SCDR-NP	SC
ANNUAL		FLO_EMIS	2010	SC_out	-1	SCDR-NP	SC
ANNUAL		FLO_FUNC	2010	SC	1	SCDR-STG	SC_in
ANNUAL		FLO_FUNC	2010	SC_out	1	SCDR-STG	SC

The FLO_EMIS parameters take care of the SC balance for SCDR_NP, and the FLO_FUNC parameters define auxiliary flows SC_in and SC_out to be equal to VAR_SIN(SC) and VAR_SOUT(SC) for SCDR_STG.

In order to bound the timeslice-specific flows to zero in all but the three flows { (ts,in), (ts-1,out), (ts+1,out) } used in the constraint, FLO_BND, STGIN_BND and STGOUT_BND can be used, like shown below (only a few example timeslices shown here for illustration):

~TFM_DINS						
TimeSlice LimType		Attribute	Year	Test	Pset_PN	Cset_CN
ts-1	UP	FLO_BND	0	2	SCDR-NP	SC_in
ts	UP	FLO_BND	0	2	SCDR-NP	SC_out
ts+1	UP	FLO_BND	0	2	SCDR-NP	SC_in
ts-1	UP	STGIN_BND	0	2	SCDR-STG	SC
ts	UP	STGOUT_BND	0	2	SCDR-STG	SC
ts+1	UP	STGIN_BND	0	2	SCDR-STG	SC

To define the constraint formulated, the following user constraints can be defined (assuming here that $k_1=k_2=1$ for simplicity):

R_E: AllRegio	ons					
				~UC_T		
Pset PN	Cset CN	Year	TimeSlice		UC FLO	UC_RHSRT ~0
SCDR-NP	SC_in	2010	ts	FX	1	2
SCDR-NP	SC_out	2010	ts-1		-1	
SCDR-NP	SC_out	2010	ts+1		-1	
SCDR-STG	SC_in	2010	ts	FX	1	2
SCDR-STG	SC_out	2010	ts-1		-1	
SCDR-STG	SC_out	2010	ts+1		-1	
	R_E: AllRegion Pset_PN SCDR-NP SCDR-NP SCDR-NP SCDR-STG SCDR-STG SCDR-STG	R_E: AllRegions Pset_PN Cset_CN SCDR-NP SC_in SCDR-NP SC_out SCDR-NP SC_out SCDR-STG SC_in SCDR-STG SC_out SCDR-STG SC_out SCDR-STG SC_out	R_E: AllRegions Pset_PN Cset_CN Year SCDR-NP SC_in 2010 SCDR-NP SC_out 2010 SCDR-NP SC_out 2010 SCDR-NP SC_out 2010 SCDR-STG SC_in 2010 SCDR-STG SC_out 2010 SCDR-STG SC_out 2010 SCDR-STG SC_out 2010	R_E: AllRegionsPset_PNCset_CNYearTimeSliceSCDR-NPSC_in2010tsSCDR-NPSC_out2010ts-1SCDR-NPSC_out2010ts+1SCDR-STGSC_in2010tsSCDR-STGSC_out2010ts-1SCDR-STGSC_out2010ts+1	R_E: AllRegions~UC_TPset_PNCset_CNYearTimeSlice LimTypeSCDR-NPSC_in2010tsFXSCDR-NPSC_out2010ts-1SCDR-NPSC_out2010ts+1SCDR-STGSC_in2010tsSCDR-STGSC_out2010ts+1SCDR-STGSC_out2010ts+1SCDR-STGSC_out2010ts-1SCDR-STGSC_out2010ts+1	R_E: AllRegions-UC_TPset_PNCset_CNYearTimeSliceLimTypeUC_FLOSCDR-NPSC_in2010tsFX1SCDR-NPSC_out2010ts-1-1SCDR-NPSC_out2010ts+1-1SCDR-NPSC_out2010ts+1-1SCDR-STGSC_in2010ts+1-1SCDR-STGSC_out2010ts-1-1SCDR-STGSC_out2010ts-1-1SCDR-STGSC_out2010ts+1-1

As one can see, the constraint specification is very straightforward, and looks exactly similar for both of the example SCDR technologies. Using any k1 / k2 would be equally easy.