



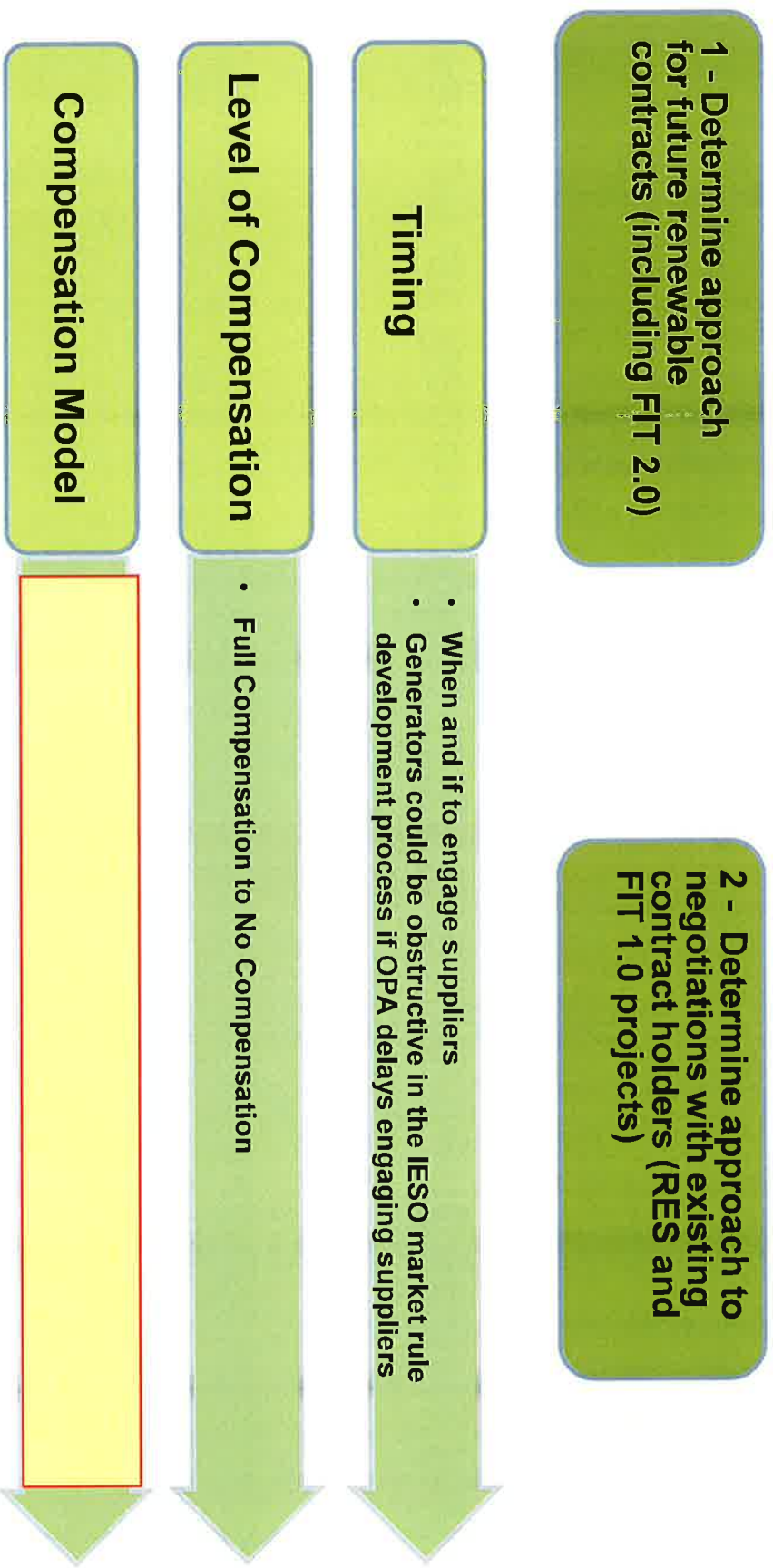
Integration of Renewables: OPA Recommendations for Dispatch Management

Update to Ministry of Energy

Confidential Advice to Government

June 26 2012

Confirmation to Proceed Required



Negotiating Environment

External Factors

Public
Acceptance/
Optics

Contractual
Obligations

Lender's
Acceptance

Litigation
Potential

IESO SE-91
Process



Issues Summary

- Within the next two years, the IESO needs to be in a position to track and dispatch variable generation, specifically wind, in power system operations.
- The IESO, through the SE-91 Renewables Integration initiative is developing tools which will play a role in managing the increasing amount of variable generation resources, including the ability to manage their production when the province (or a particular region of the province) does not need the electricity.
 - Additional options for mitigating potential surplus energy are being developed outside of SE-91; no one fuel type is being exempted or singled out
- In order for the IESO to efficiently administer the wholesale market and effectively operate the system, OPA contracts need to reflect IESO Market Rule provisions.
- OPA contract amendments should contain appropriate provisions for generators to respond to system conditions in real time, in accordance with IESO market rules as well as respect existing contract language in RES and FIT contracts.

Note:

- Focus is on transmission-connected renewables - embedded generation is not being considered by IESO at this point. All references to contract capacity includes only facilities that are Transmission Connected. RESOP is not considered in this presentation as it is distribution connected.

Parameters for Negotiations

- Ministry of Energy have provided the following policy objectives that as much as possible should be supported in any contractual provisions:
 1. Avoid paying generators for not generating.
 2. Minimize ratepayer impacts in the event that the revised contracts provide compensation to developers for dispatch management.
 3. Minimize lawsuits that have merit from existing contract holders.
- The approach to contract amendments needs to find a balance between these competing objectives while avoiding the perception that the OPA is pushing projects into default and/or bankruptcy.

Existing OPA Wind/Solar Contracts (1)

Contract Type	Fuel Type under consideration	# of Contracts	# of MW	
RES I/II 2004-2005 Competitive Procurement	Wind	10 (39.6 to 197.8 MW)	1084 MW	
RES III 2009 Competitive Procurement	Wind	5 (50.6 to 99.4MW)	426 MW	

Notes

- Prices subject to escalation
- Places limit on how low a generator may offer energy into the wholesale market where the lowest allowable offer is -2000(\$/MWh). In periods of low demand, generators with the lowest offers would be the last to be dispatched off, as they are the more economic resource. For instance, of two generators offering at -1 (\$/MWh) and -2,000 (\$/MWh), the one offering -\$1 would be dispatched off first as the more expensive resource.
- In addition to their Contract Price, RES I,II and III generators who have contract prices <\$120/MWh also receive \$10/MWh from the Federal ecoEnergy program. The ecoEnergy credit is provided for 10 years of production.
- 2011 dollars

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Existing OPA Wind/Solar Contracts (2)

Contract Type	Fuel Type	# of Contracts	# of MW	
FIT 1.0 2010-2011 Standard Offer	Wind	77 (63 are >5MW)	3133 MW	
	Solar ³	1792 (95 > 5MW)	1237 MW	
	Wind	4 (2- Phase I and 2- Phase II)	870 MW	
	Solar	2 (1- Phase I and 1- Phase II)	200MW	
Korean Consortium 2010-2011				

Notes:

1. Based on 2009 Price schedule, subject to escalation
2. Places limit on how low a generator may offer energy into the wholesale market where the lowest allowable offer is -2,000(\$/MWh). In periods of low demand, generators with the lowest offers would be the last to be dispatched off, as they are the more economic resource. For instance, of two generators offering at -1 (\$/MWh) and -2,000 (\$/MWh), the one offering -1 (\$/MWh) would be dispatched off first as the more expensive resource.
3. Most FIT solar facilities are not IESO market participants, so would not be subject to Dispatch Management.

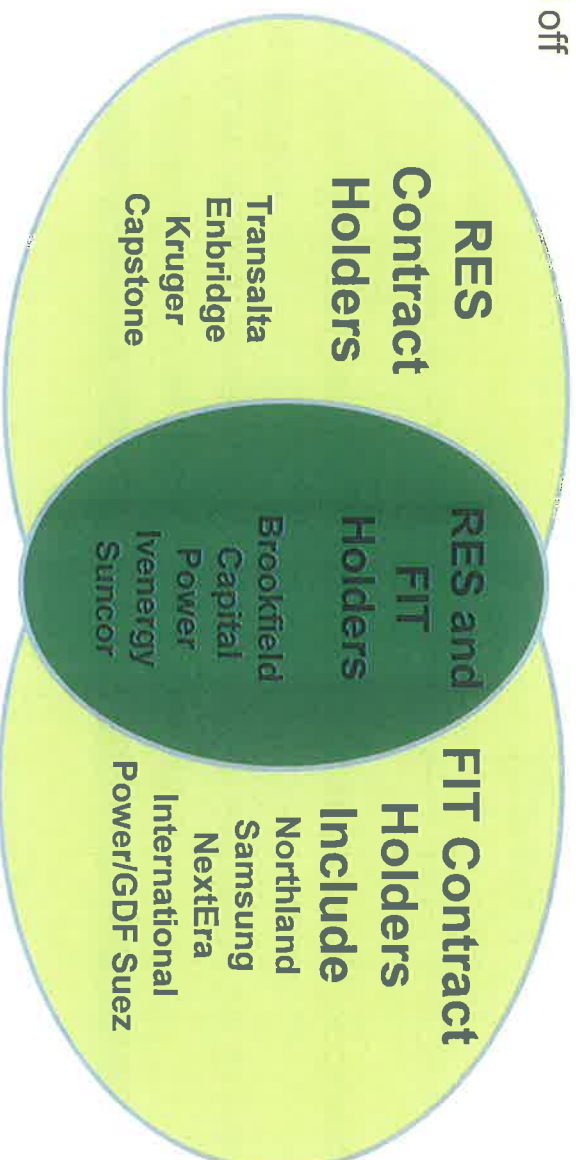
Future OPA Wind/Solar Contracts (FIT 2.0)

- Dispatch Management provisions under FIT 2.0 contracts have not been determined,

- The approach taken with FIT 2.0 needs to balance the following objectives as provided by the Ministry:
 - Minimize ratepayer impacts
 - Avoid perception of payments during periods of non-generation

Incentives for Existing Contract Holders

- RES contract holders are likely content with the status quo as they are not susceptible to negative HOEP since they are not currently being economically dispatched
 - RES contract holders receive their full contract price for all production regardless of HOEP
 - Most recent RES proposal to the Ministry of Energy included request for full compensation of dispatched-off hours through an adder
- FIT contract holders have negative HOEP deducted from their contract price
 - An Additional Contract Payment can be paid through FIT contracts for energy foregone if the generator is dispatched off, so it is in the FIT contract holder's interest to be dispatched off in times of negative HOEP
 - Currently only two Transmission Connected FIT wind projects in commercial operation.
- Some existing FIT contract holders are approaching financial close, financiers are unwilling to agree to a financial close until some certainty is had on the risks associated with being dispatched off

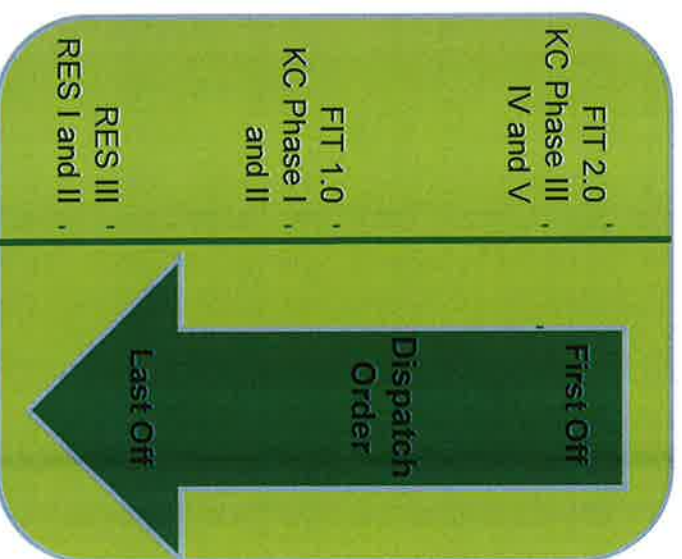


Implementing a Renewable Dispatch Priority

- Minimum offer prices determines hierarchy for dispatch
- Higher floor prices result in more expensive bids which are first to be dispatched off in periods of excess generation
- IESO's Floor Price Working Group is determining dispatch priority for different generation types (nuclear, hydro, wind)
 - OPA could define a further hierarchy between contract types (RES I, II, III, FIT1.0, FIT2.0) as shown in the following examples

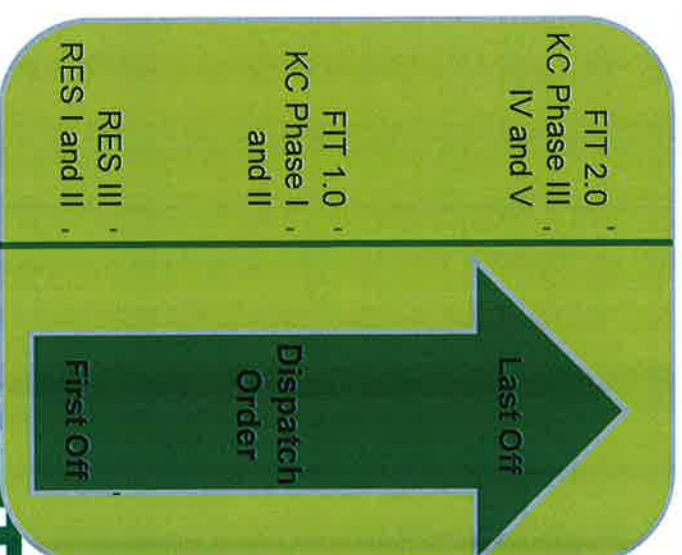
Example 1

“First-in/last-off” principle could be established as shown below



Example 2

Dispatch priority could be based on contractual curtailment economics



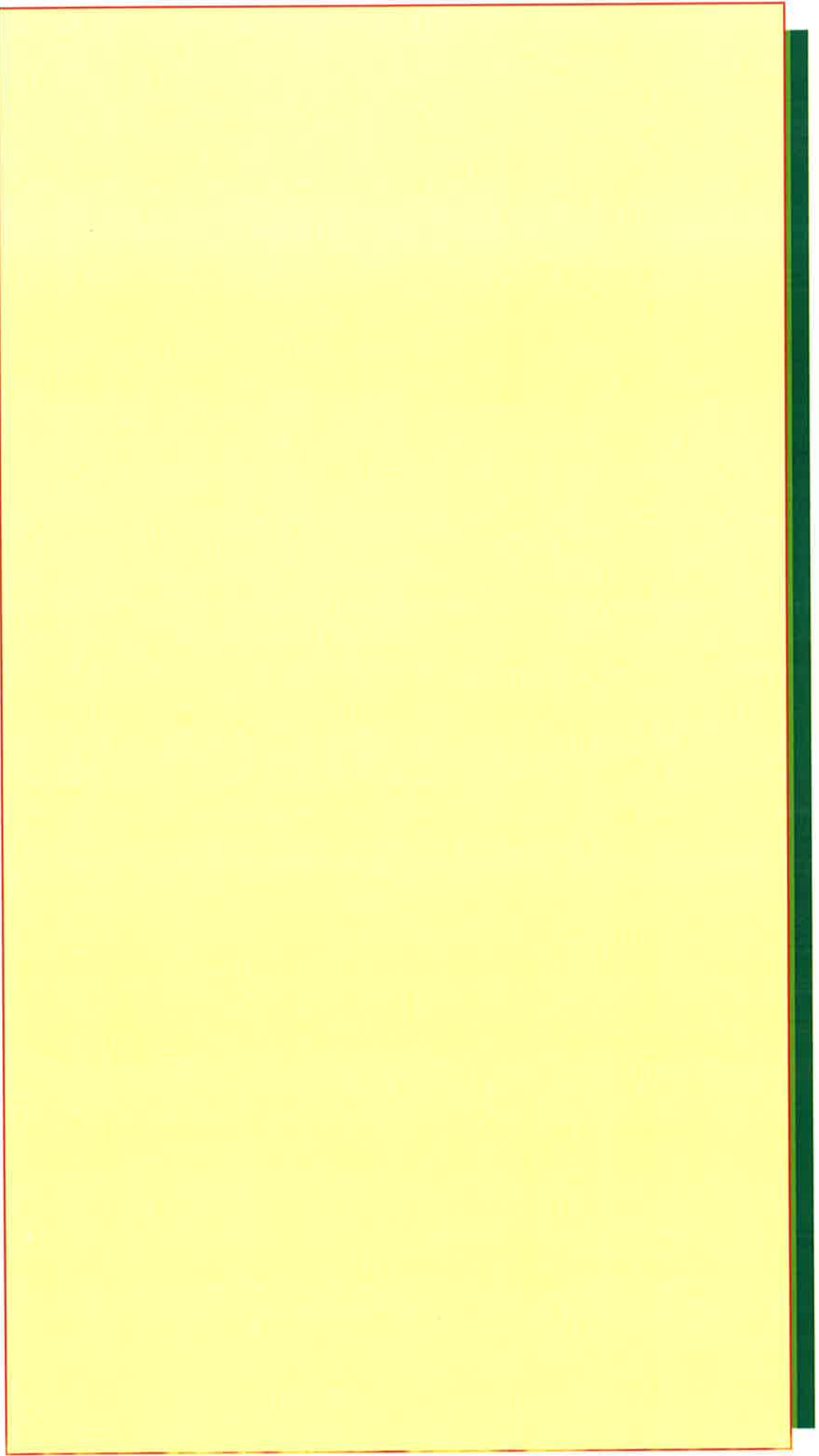
Recommended Compensation Model

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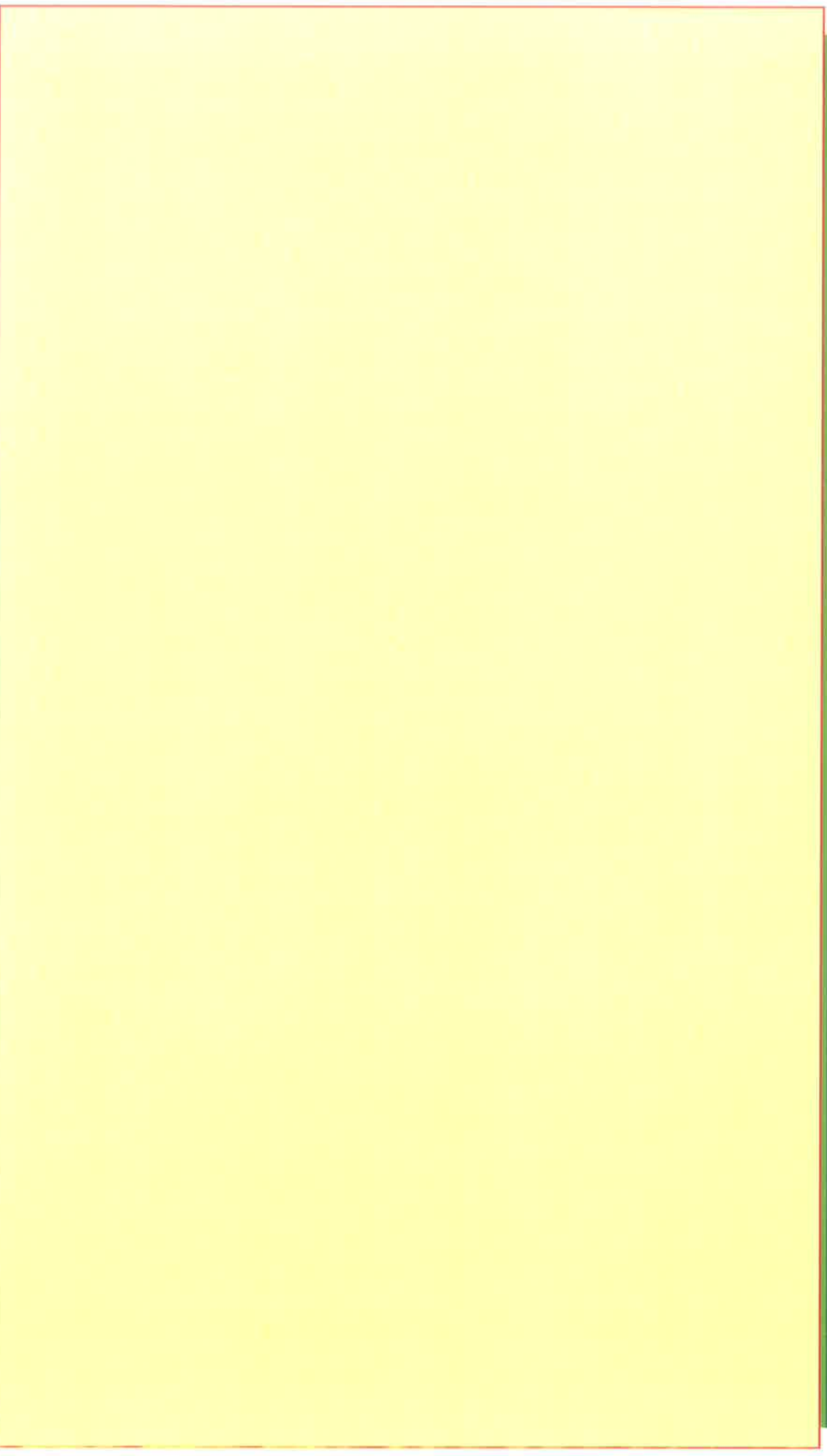
Annual Avoided Contract Payments

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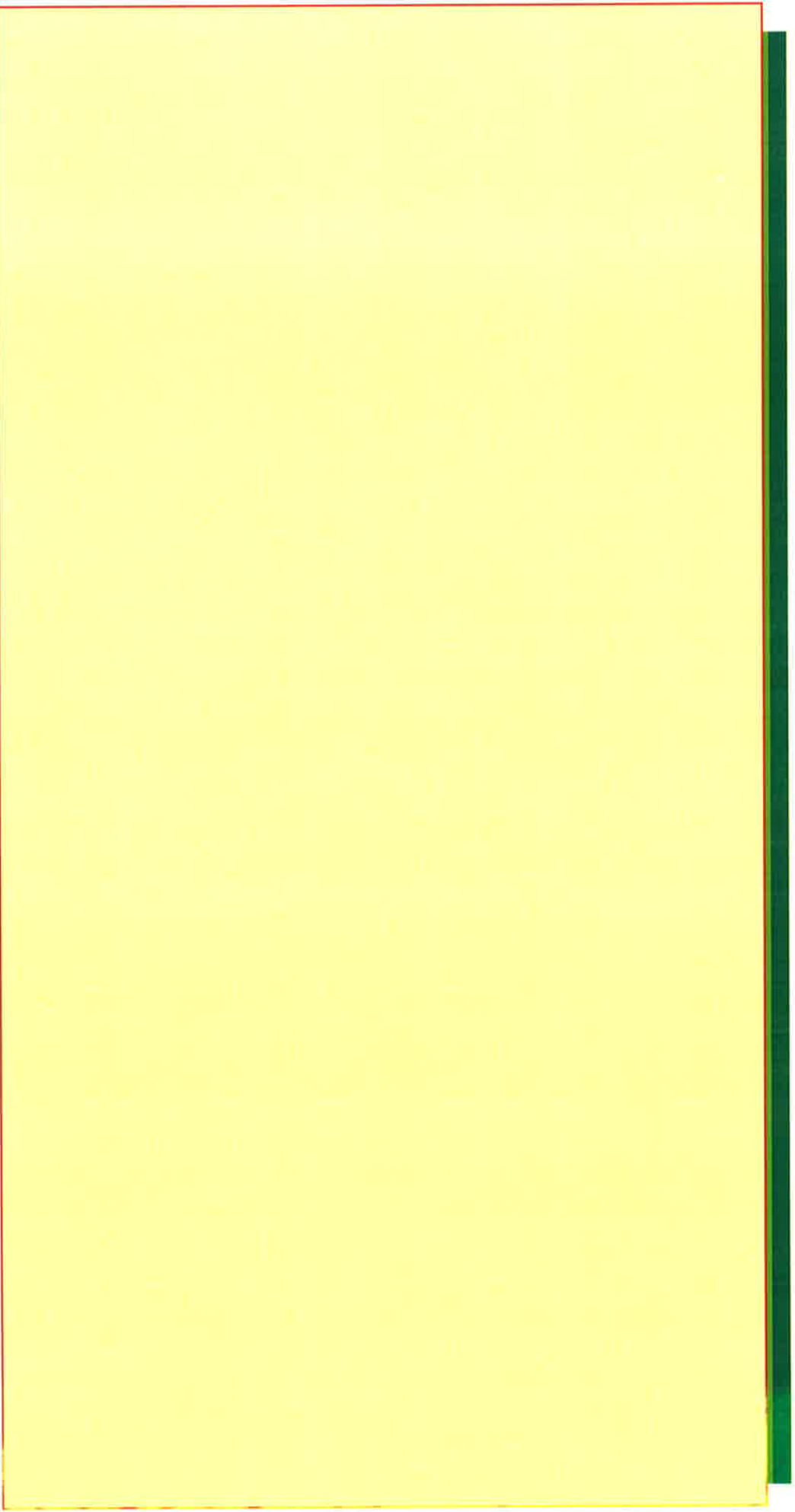
Curtailment Coverage through Caps



Estimated Impact on Generators



Negotiation Principles



Next Steps

1. Draft Market Rules released
2. Engage suppliers

- FIT 1.0 and KC will likely need to be a consistent solution across all contracts due to number of contracts and existing contract language
 - Approach for future renewable contracts including FIT 2.0 to be determined outside of supplier engagement and negotiations
3. Final Market Rules released
 4. Contract Amendments finalized

Timelines:

July 2012 (Draft Market Rules released)
November 2012 (Market Rules finalized)
Negotiations could commence July 2012 and could be concluded prior to when Market Rules are implemented (estimated by IESO to be Q4 2013)



Appendix



Wind Curtailment in Other Jurisdictions

Jurisdiction	Curtail Wind Output?	Curtailment Signal	Payments during curtailment
ERCOT (Texas)	Yes	Transmission congestion (otherwise wind facilities respond to zonal market prices)	Historically received out-of-merit payments (equivalent to CSMC), but only up to daily operating limit
Midwest ISO	Yes	Global surplus supply or transmission congestion	None - payments based on Locational Marginal Pricing (LMP) only
NYISO	Yes	Economic dispatch	None - payments based on LMP only
PJM	Yes	During “constrained operations” or “light load events”	None - payments based on LMP only
Bonneville Power Administration (Pacific Northwest)	Yes, wind is must run until a system imbalance occurs	BPA can assign generation limits to wind plants based on scheduled output plus a pro rata allocation of balancing reserves	No compensation
Southern California Edison	Yes	Economic dispatch	Generators to be paid for curtailed hours, but must deliver energy at end of PPA at a discounted price
Germany	Yes, wind is must run until a system imbalance occurs	Only curtailed for grid congestion	Transmission operators obligated to take all electricity from renewable sources. If curtailed for system reliability wind is compensated at an established tariff rate
Alberta Electric System Operator	Yes	Wind power is only curtailed to manage transmission constraints and other reliability events	No compensation

Alternative Compensation Models

Avoided Contract Payments Associated with Alternative Compensation Models

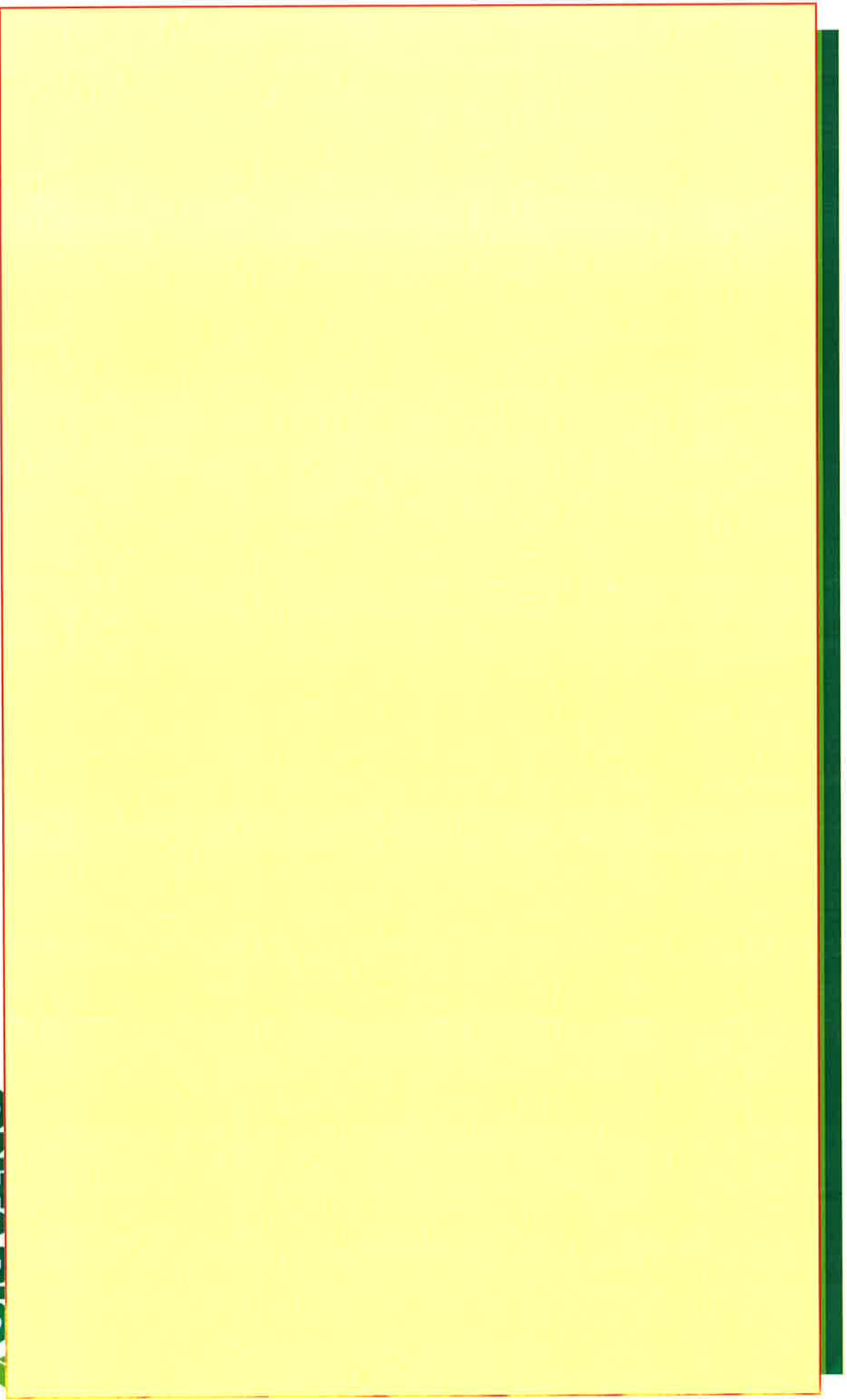


RES I & II Contracts: Context

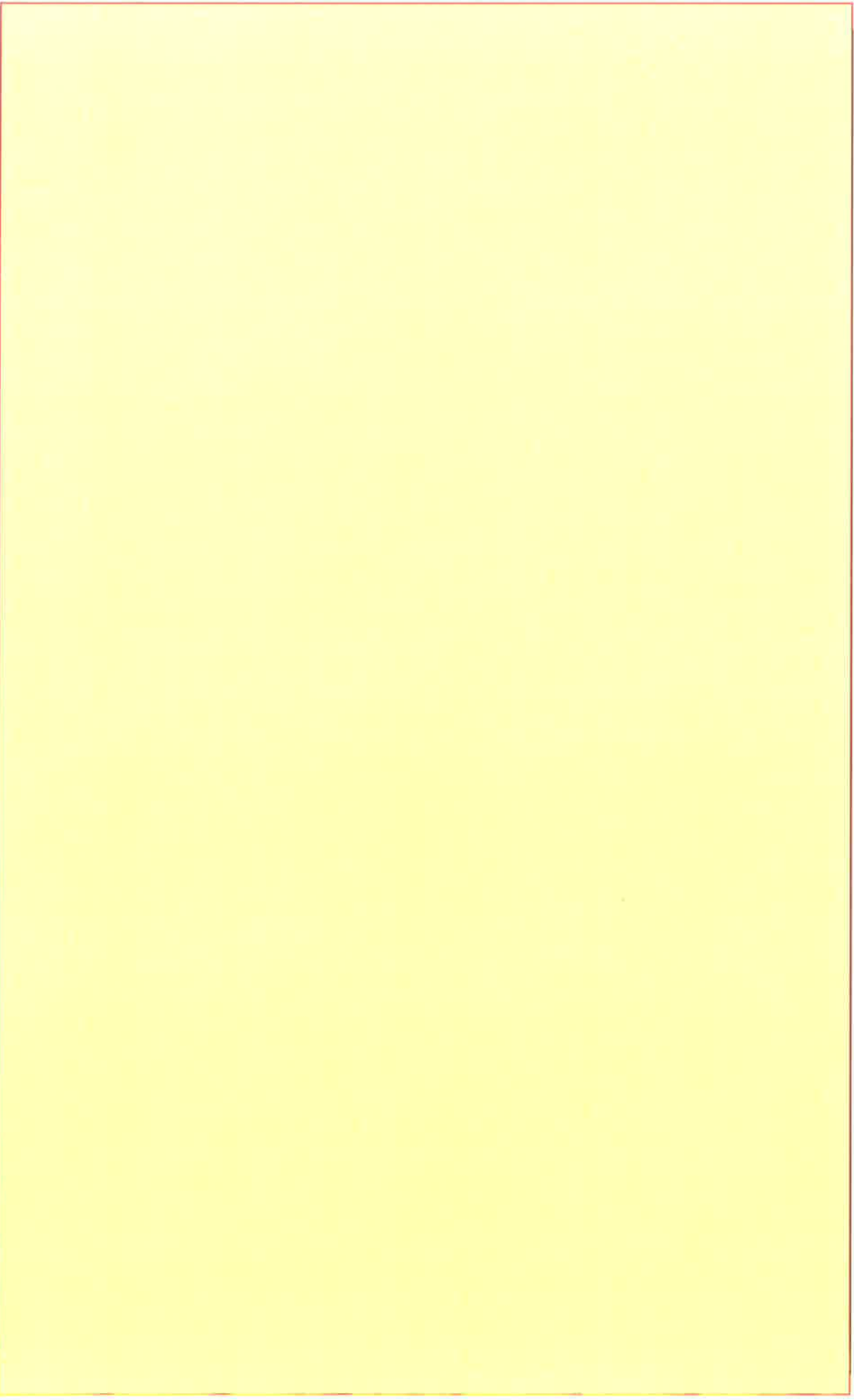
RES I & II Contracts: Confirmation to Proceed Required

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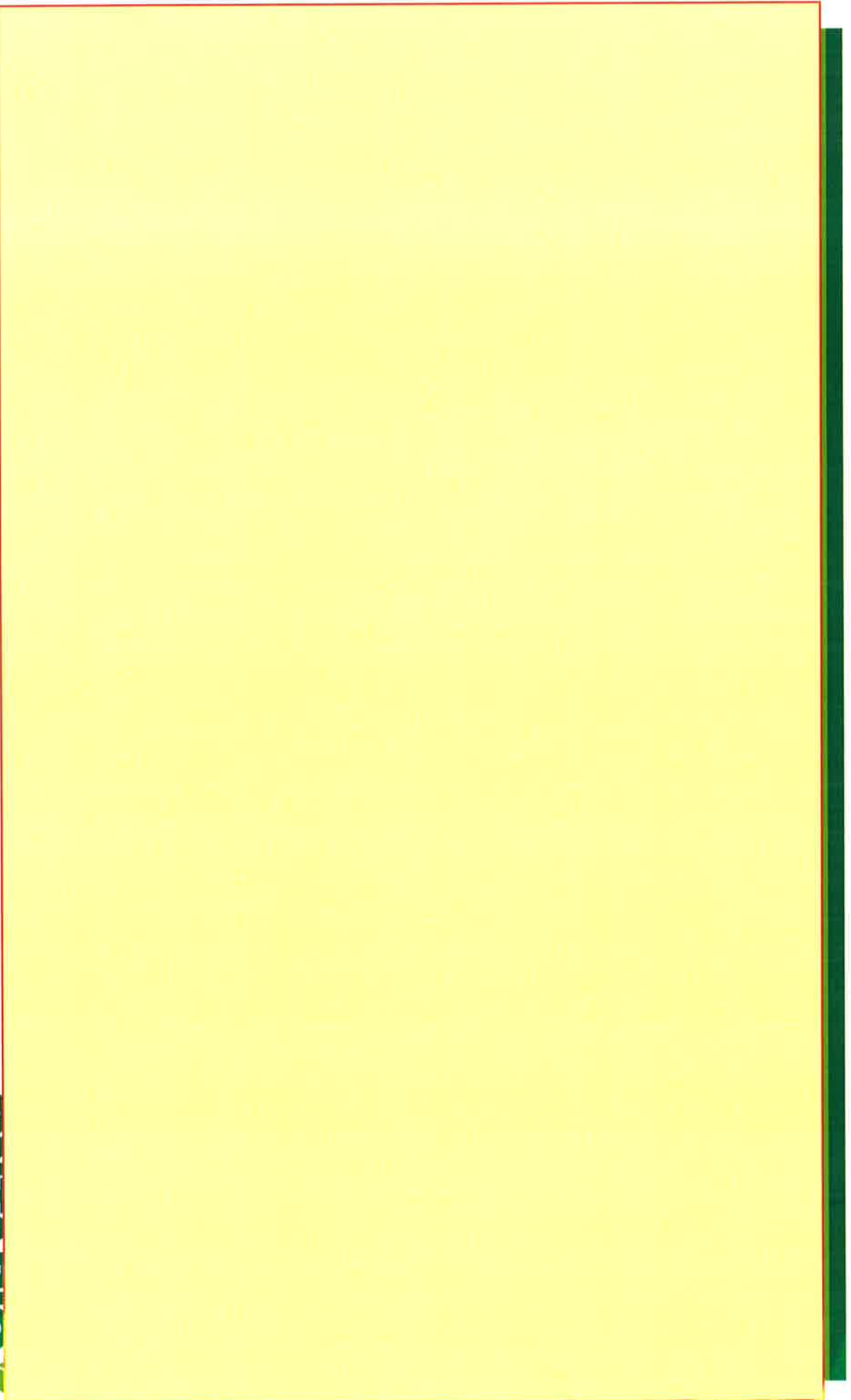
RES III Contracts: Context



RES III Contracts: Confirmation to Proceed Required

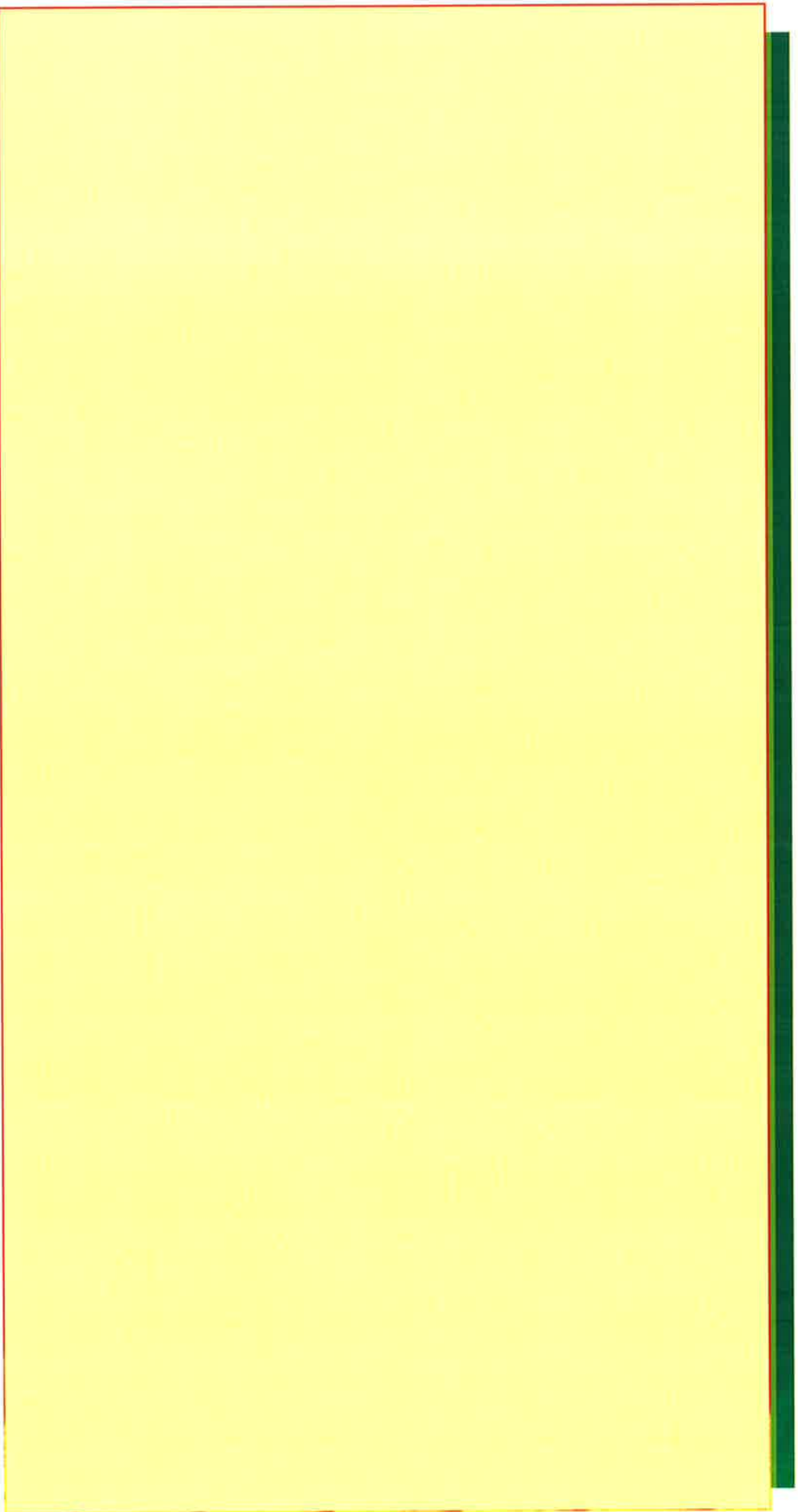


FIT 1.0 Contracts: Context



FIT 1.0 Contracts: Confirmation to Proceed Required

FIT 2.0 Context



FIT 2.0 Contracts: Final Directive Required

